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Case Article

Take Me Out Of The Ball Game

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This paper describes a teaching case in which students model crowd management using process analysis. The case study consists of a classroom exercise that provides a practical illustration of the steps required to analyze a process, the need for abstraction in modeling a process, and an understanding of the relationship between process metrics and their managerial implications. The students are expected to behave as city planning consultants, addressing the long lines fans regularly face when getting home at the end of a Chicago Cubs™ baseball game. The case requires them to use knowledge from operations, economics, and process analysis classes to model, analyze and provide concrete solutions to alleviate crowding.

Keywords: teaching modeling; teaching production/operations management; process analysis; service capacity; crowd management
History: Received: April 2013; accepted: March 2014.

Introduction

In order to illustrate operations management concepts we have developed several short cases set in familiar local settings to which students can easily relate. The focus of this case is on fans waiting to take the elevated train ("Addison Red Line el") after leaving Wrigley Field, home of the Chicago Cubs™ baseball team. Despite the team's dismal record, the Cubs still draw a large number of fans to their afternoon games, and most of these fans endure excessive wait times to reach the train platform and head home at the end of the game. The main goal of the case is to provide a solid understanding of the definitions, modeling, measurement, and management insights of process analysis. In addition to congestion, these facets of process analysis are the basis for modeling other situations such as inventory and supply chain management, queuing and service analysis, and quality and statistical process control.

Prior to attempting to address the issues in the case, students should be familiar with process diagrams and definitions of activity, resource, flow time, and wait time. Those concepts are covered in many introductory operations management textbooks. After completing the exercise, students will have learned how modeling and analysis tools provide key insights for planning, developing, and managing a process.

Classroom Experience

This exercise is simple, straightforward, and geared towards both operations management undergraduate and MBA students. We guide the case discussion around three quantitative questions. We spend at most half a lecture (30 to 45 minutes) to cover Questions 1 and 2 in detail. Time permitting we also cover Question 3 which deals with cost analysis. Question 3 appears to be more interesting to MBA students and to students who live near the ball park.

The first challenge for most students is drawing the process diagram. This task is easier if students have already covered project management since they are familiar with activities (boxes) and precedence relationships (arrows) which we redefine as flows. With the completed diagram on the board we return to the case and pose the three questions.

It is our opinion that beginning the discussion with quantitative analysis is more effective. This allows students to familiarize themselves with and use the tools (diagram and spreadsheet) to derive important measurements and test potential improvements.

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We navigate through the spreadsheet formulas to illustrate the computation of flows and average waits. We also use the spreadsheet to show the impact of additional resources or other potential improvements. The following two representative and anonymous comments from our end of term course evaluations support the value of quantitative analysis in this case.

> The class exercise was a good example of the difficulties in translating a simple every day situation to the math and OM language.

> Until you try and solve a real life problem you do not realize how complex even the simplest of problems is.

Another key learning goal of process analysis is helping students develop an understanding of a bottleneck resource (Goldratt 1984). The case is structured so that the bottleneck shifts from the turnstiles to the train after 5 P.M. with the addition of two turnstile attendants. Before 5 P.M. the train platform is almost empty and fills as more and more fans line up to enter the station. At 5 P.M. the additional attendants start contributing to the filling of the platform as the street line achieves its maximum. Students often struggle to model the additional attendants since those cause the bottleneck to shift and in turn impact overall process performance. This example also illustrates that adding resources to a station may release it from being a bottleneck only at the expense of creating a different and more expensive bottleneck deeper into the process.

We close the discussion by asking students to recommend sustainable process improvements. Those should balance both the customer's experience in terms of waiting time along with the total system cost incurred from adding turnstile capacity or trains. Recommendations for potential improvement are also expected to take into account their impact on fans, taxpayers, neighborhood establishments, and residents.

Conclusion

The setting we propose can be adapted to crowd management at other public events such as marathons and fundraising runs, parades, firework displays, or concerts. We found it sufficiently generic to be used for in-class teaching, on exams, or as the basis for small projects.

We performed this exercise in small groups. The learning we observed and the feedback we received seemed to favor small groups over having the students work the case independently. Moreover, we asked some groups to select leaders. After comparing groups with and without leaders, the former were more effective in approaching the problem, dividing tasks, and developing solutions, which supports the value of leadership in analyzing and improving a process.

The main objective of this classroom exercise is to provide students with an opportunity to gain a deeper and more practical understanding of process analysis than traditional lectures can provide. The case introduces several key definitions and principles of processes, helps the students understand the challenges of properly managing a process, and provides them with an adaptable tool they can use to model subsequent operations principles or situations they encounter outside the classrooms. We have witnessed the case achieve its objectives in a fun, flexible, and relevant way. As one student commented informally,

> After participating in the class exercise, going to a Cubs game was a completely different experience for me. I constantly try to find the best time to leave the stadium and I see possible process improvements wherever I look.

Many graduate students note in their comments that this exercise can serve as a natural gateway to potential process improvement techniques and root cause analysis. These are certainly valid points and we usually refer back to this exercise when teaching quality management and process improvement.

Reference

Goldratt E (1984) *The Goal: A Process of On-Going Improvement* (North River Press Publishing, Great Barrington, MA).