Applying Operations Research Techniques in the Higher Education System: An Exploratory Study of Roadmap to Timely Graduation

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ABSTRACT

Public Policy Institute of California (PPIC) projects that California will have short of 1.1 million college graduates to meet economic needs by 2030. The projected workforce shortage is expected to have an adverse impact on California future economic development. In summer 2009, President Obama introduced the American Graduation Initiative, calling for the college graduation rate to be raised to 60% by 2020. Nonetheless, the national data paints a grim picture of 4-year college graduation rate. This study tends to comprehend the divergence between institutional graduation outcomes and governmental graduation target.

INTRODUCTION

Nationwide, on average only 34 percent of bachelor's degree seeking students graduate within four years. In some of California's large public universities, the 4-year graduation rate has lingered below 20% in the past decade. Since fall 2010, CBA (College of Business Administration) introduced an important initiative of improving timely graduations of students with highly valued degrees, which was justified when CBA received re-accreditation from AACSB International (The Association to Advance Collegiate Schools of Business) in 2013. This holistic process calls for the attention and support of early intrusive advising throughout students' learning experience, targeted outreach effort of preparing incoming students' readiness, actively enrollment management based on students' needs, maximum utilization of Degree Planner, proactive reminder of filing graduation after 90 unites have been accumulated, and collaboration with business communities for internship opportunities. Throughout these efforts, we have observed CBA retention rate is 93% for 4-year CBA native junior and 87% for 1-year CBA transfers. CBA native juniors' 4-year graduation rate (23%) is much in line with CSULB gradation and delivers much better outcome of 5-year (73%) and 6-year (87%) graduation rates. Despite the improving results, much can be done to improve graduation rates and time-to-degree for CSULB all undergraduate students.

We found that there are two central reasons that students do not complete college, and they typically operate in tandem: inadequate preparation (non-completion of courses) and not getting correct courses at the right time. The second issue is to some extent related to "timetabling". de Werra (1985) lays out the basis for developing future applications to address potential problems arises in course scheduling, instructor assignment, and examination timetabling. Stallaert (1997) develops automate course timetabling system at UCLA's Anderson School of Management. Stalllaert's approach primarily separates core course from non-core course, thus, its main feature is to maximize the core-course instructors' schedule preferences. Hinkin and Thompson (2002) take class days, time slots, duration, and classroom-equipment requirements into consideration when they create *SchedulExpert*. Ho, Dey and Higson (2006) report the studies of scheduling in higher education do not receive adequate attention in

the period from 1996-2005. In this exploratory study, we tend to address the second issue" not getting correct courses at the right time" by applying process analysis techniques to examine curricular structure and assess the resulting capacity of students' probability of graduating in four years given the historical levels of academic preparation. We then use line balancing and critical path techniques to inform course scheduling, and establish key performance milestones for each degree roadmap investigated.

Facing gradual funding decrease in higher education, our research findings are desirable for all stakeholders for a variety of reasons. First, we can help our students to meet 4-year timely graduation milestone. Second, other CSU institutions can emulate our successful tactics to ensure their students graduate on time. Third, a better educational experience can translate into strong commitment of future monetary donations to the institutions; in particular, when the sustainability of state funding in support of higher education is uncertain.