Leveraging Data Analytics to Study the Impact of State Budget Cuts on Public Higher Education Institutions in the United States

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Abstract

Public higher education in the United States (US) is funded through two primary forms: one is through state higher education appropriation funds, and the other is student financial aid that is directly given to students. Increasing postsecondary full-time equivalent (FTE) enrollment and graduation rate are becoming a crucial economic priority in the US. However, only a limited study is available about whether state investment in higher education and increasing tuition charges can impact FTE student enrollment (FTEE) and graduation rate (GR) at 4-year public universities in the US. A systematic literature review was conducted for the present research to comprehend the literature gap and identify factors or variables that may affect FTEE and GR. Five independent variables (IVs): state higher education appropriations per FTE (SHEA), average undergraduate charges per FTE (AUGC), student tuition share as a percentage of per capita income (STSPCI), state higher education appropriations as a percentage of GDP (SHEAGDP), and state financial aid (SFA) per FTE were selected. The dependent variables (DVs) were full-time equivalent enrollment (FTEE) and graduation rate (GR) at 4-year US public higher education institutions. Historical US public higher education data for 50 years (each year as one dataset, n=50) between 1971 and 2020 were collected and analyzed. The multiple linear regression tool of the open-source data analytics and machine learning software was used to test the hypotheses if the independent variables were significantly related to the dependent variables. Hypothesis 1 was about FTEE, and hypothesis 2 was about GR.

For FTEE, three variables were found to be significant: SHEA, AUGC, and SFA. For GR, two variables were found to be significant: SHEA and STSPCI. Hence, two data analytical models were developed involving the significant IVs: one for FTEE and the other for GR. Findings from the first model revealed that when state higher education appropriation (SHEA) funds increase, average undergraduate tuition charge (AUGC) decreases, and more student financial aid (SFA) is awarded, FTE enrollment (FTEE) increases. The second model results indicated that when state higher education appropriation (SHEA) funds increase and student tuition share as a percentage of per capita income (STSPCI) decreases, there is an increase in graduation rate (GR). These findings show how state budget cuts could impact students enrolling and graduating at public 4-year institutions in the US. State policymakers, higher education administrators, and other stakeholders could use this study to develop their customized data analytics and machine learning models and better analyze their past data to better prepare themselves for future uncertainties.

This study did not investigate how state funding or budget cuts a) impact full-time faculty vs. part-time faculty at public higher education institutions, as data were unavailable for some of the years, and b) if any specific year impacted the corresponding year of cohort. These can be investigated in future work.

Keywords
Data analytics, Graduation rate, Budget cuts, Enrollment, State appropriations.

Biographies
Praveen Kumar Guraja, Ph.D. Candidate, is the program coordinator and Assistant Professor of Information Technology Management at University of Pikeville, USA. Before, he worked as a Database Administrator at Pittsburg State University between 2017-2021, and Adjunct Faculty between 2019-2021 at the same university. He holds an undergraduate degree in Business Management, a Master's in Technology, and currently a Ph.D. Candidate in Technology Management Program at Indiana State University. In addition to his academic experience, he is an Information Technology professional with 10+ years of experience in leading U.S. IT companies as Technical Associate at Genpact India Pvt. Ltd., Senior Support Representative 2A at Unisys India Pvt. Ltd., Senior Technical Associate at ADP India Pvt. Ltd.

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