

ABSTRACT

After implementation of the new GCE (A/L) examination system in 2001, the students are allowed to select any combination of three subjects for their examination. As different subjects are with different difficulty levels, it was identified that the Selection Method using average of raw marks is not suitable because, students can earn high marks by offering easy subjects for their examination. Therefore Z-Score method was introduced as a solution. This study emerged as a result of public criticism levelled at this method and also the Parliamentary Select Committee request for amendments to make the Z-Score method fair and transparent. This is an in-depth study of possible selection methodologies for university admission in which these methods have been mathematically and statistically analysed to study the fairness and suitability.

Seven selection indices including the Average and the Z-Score are studied mathematically. It is revealed that indices linearly proportional to average of raw marks select the students independent of problems such as difficulty level of subject contents, difficulty level and drawbacks existing in question papers etc. in a particular combination. It was also found that none of the methods are suitable for the selection of students from two or more different combinations. Consequently a new method is developed named as Common Currency Index method (CCI method) which converts different types of combination marks to one type of combination marks, similar to conversion of currencies. All the methods were evaluated using descriptive techniques based on the generated marks from the distribution tables of the actual subject raw marks of GCE(A/L) examination in the year 2001 using a MATLAB computer program. It was seen that the new method selects almost similar number of students from each combination as Z-Score does. But the new method preserves the average ranking order within the students in a combination where as Z-Score does not, suggesting that the CCI method is better.

In order to confirm the evidence obtained under descriptive study, a statistical experiment was developed to compare different ranking methods. In the experiment the real situation of the subjects raw marks were simulated by generating marks based on a mixed model taking the students' ability and the error component as random and the subject effects as fixed. Seven different shapes of subject raw marks distributions were generated. For each data set, three combinations were formed and ranked according to the average, Z-Score and the new method. Box plot diagrams, correlation analysis and Friedman tests were used to study how closely the