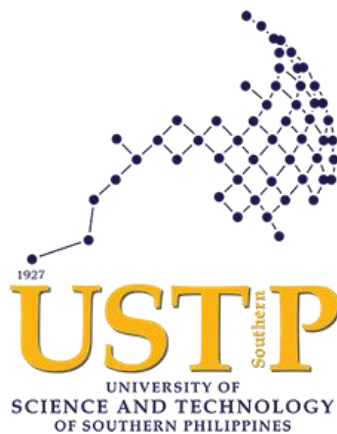


**A MULTIDIMENSIONAL SCALING ANALYSIS OF STATISTICAL INDEX  
CONSTRUCTION USING MAJOR ECONOMIC INDICATORS IN THE PHILIPPINES**

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An Undergraduate Thesis Presented to the  
Faculty of the Department of Mathematical Sciences  
College of Science and Mathematics  
University of Science and Technology of Southern Philippines  
CM Recto Avenue Lapanan, Cagayan de Oro City



In Partial Fulfillment  
of the Requirements for the Degree  
Bachelor of Science in Applied Mathematics

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**Celmar P. Bacasma**

February 2018

## **APPROVAL SHEET**

In partial fulfillment of the requirements for the degree of Bachelor of Science in Applied Mathematics, this thesis entitled "**A Multidimensional Scaling Analysis of Statistical Index Construction using Major Economic Indicators in the Philippines**", prepared and submitted by **CELMAR P. BACASMA** is hereby endorsed for oral examination.

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## ABSTRACT

Economists have formulated different kinds of indexes that assess development. So far, Human Development Index (HDI) is the only existing composite index for every province in the Philippines that measures the basic dimensions of development and has been criticized on a number of grounds including the measurement error of the underlying statistical method which leads to a severe misclassification in the ranking of development. Considering this, the aim of this study was to construct an alternative measure of a region's economic performance using economic indicators. The variables that were considered in the study are the 10 selected economic indicators used by the Philippine Statistics Authority (PSA) for monitoring progress of the economy in 17 regions in the Philippines. The analysis of data considered only a time frame of 10 years. Variables then underwent standardization to address measurement units. Standardized variables were subjected to multidimensional scaling (MDS) analysis to place each variable in 2-dimensional space while the between-variable distances were preserved as well as possible. The highest stress-tested coordinate in every variable were collected and used in the construction of the statistical index, the Economic Development Index (EDI), of a particular region in the Philippines. Bootstrap resampling was performed to check the statistical properties of the constructed indices such as unbiasedness and consistency. On the other hand, provincial HDI were being ranked carefully. The rankings of the EDI and the HDI were comprehensively presented. Based on the findings, Region 4-A: CALABARZON got the highest EDI value of 30.76581% while region 1: ILOCOS REGION got the lowest EDI value of 27.49474%. And for the provincial HDI, Manila got the highest value of 83.7% and Sulu got the lowest value of 27.6%. Evidently, the Economic Development Index (EDI) was found to possess desirable statistical characteristic of a good estimator.

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## **CURRICULUM VITAE**