Projecting college and grade 11 students' population of UMDC for the S.Y. 2016-2017

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ABSTRACT

This study applied a coherent use of time-series analysis and survey to forecast and project trends in the expected population of students in the University of Mindanao Digos College. The study emphasized the movements of enrollment trends of college students and a survey to create a projection of school and field preferences of upcoming Grade 11 students. The basic and logical method of forecasting was used to provide coherent and explainable results for forecasting college students' population. These methods were Average and Ratio Analysis, Regression Analysis, and Naive Method of Forecasting. Survey method and analysis were used to create a projection on Grade 11 students in UMDC for the SY 2016-2017. Combining the results from both projections in forecasted values of college students and the expected number of Grade 11 students would create another projection for the expected total number of UMDC students for the school year 2016-2017.

Keywords: time – series, ARIMA, enrollment trends, UM Digos College

INTRODUCTION

The projection of college and Grade 11for the K-12 implementation of students' population requires proper computation and process to determine the possible scenarios and utilize the projected changes, especially for the incoming school year. This study is needed to answer the problems of enrollment trends in making up the plans for budgeting, allocation, facility progression, and curriculum development in any academic institution. This is beneficial for the whole institution to properly administer the demand and supply for quality education.

In a world of culturally diverse students, forecasting and predicting enrolment trends were very useful to respond to worldwide needs of education like globalization. Identifying the problems about the scarcity of resources was used to respond to the students' unlimited demands with the institutions. Enrolment projection methods, giving seminars based on enrollment projection models such as tuition models, will create reliable administrative works (Annual Conference Toronto, Canada, 2004).

In the Philippines, the government's systematized actions and plans to changes in education will dictate the nation's budget, allocation, and curriculum crafting. The implementation of the K-12 curriculum in the country gave many issues about the country's future economic and educational status as of the years 2016 and 2017. The group Council of Teachers and Staff of Colleges and Universities projected (GMA News, 2012).

As one of the leading colleges in the Philippines, the University of Mindanao Digos College will not be excluded from the great changes brought by the K-12 curriculum. As projected, there will be a very small number of enrollees in colleges and universities for the school year 2016-2017. This causes the UMDC administration to prepare for the upcoming years of great changes.

This study aimed to forecast the expected number of college students of UM Digos College using forecasting methods to describe the semestral enrolment trends and project the expected number of Grade 11 students from the areas of Digos, Hagonoy, and Matan-ao High Schools to be catered in UM Digos College. This study's outputs will be very helpful in management optimization, utilization, allocation, and budgeting to support and strengthen the vision, mission, and goals of this beloved university to give high-quality education.

METHOD

The researchers used the quantitative, observational, and descriptive research design. Quantitative values were observed and underwent analyses to describe and project students' population in UM Digos College. Quantitative data from the registrar's office of UMDC contains the semestral enrollment population of college students at every year level. Furthermore, observational research was conducted on different public high schools through survey questionnaires to get substantial information to answer the expected school and field preferences of Grade 11 SHS students.

The research banks on the secondary data coming from the registrar and guidance office of UM Digos College. The enrollment data of all college courses in UMDC with maximum trend traced from the school year 1995-1996. Formal letters of permission and request were secured before the gathering of data. Moreover, primary data were also gathered through the survey conducted to expected feeder public high schools for upcoming Senior High School. The public high schools that responded to the survey were DICNHS, Igpit Annex. Matti Annex, Balabag Annex, Ruparan High School, Hagonoy National High School, Lapulabao Annex, Sacub National High School, Sinawilan National High School, Matanao National High School, New Katipunan Annex, Manga Annex, and Bangkal Annex. The survey questionnaires primarily sought to ask the school and field preferences of upcoming Grade 11 students. Formal letters of permission and requests were secured before conducting the survey.

The exact grouping and segregation of vital information created a coherent trend analysis and even created a naive projection for future values, such as what to be used in extracting the data gathered in survey questionnaires. It also used Average Ratio Analysis, which can also be a time-series analysis method of enrollment that makes ratio relationship of observed values. Observing the average drop and population growth per semester can generate a forecast for expected semesters. In statistics, regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables when focusing on the relationship between a dependent variable and one or more independent variables (or 'predictors'). Creating a linear trend based on observed values segregated per semester can create a formula used in projection. There will be instances that regression analysis will create unreliable formulas, especially when it results in a negative forecasted value. When this happens, average ratio analysis and naïve method of forecasting will be the options—estimating technique in which the last period's

actuals are used as this period's forecast, without adjusting them or attempting to establish causal factors. It is used only to compare the forecasts generated by the better (sophisticated) techniques.

RESULTS AND DISCUSSION

Enrolment trend of UMDC college students

Figures 2 to 6 depict college students' enrollment trend in different courses from reliable historical data of the school year 1995-1996 up to the present and their forecasted trends. The basis for this data came from the institution's guidance and registrar's office. As observed from the graphs, there are differences in school years used in different data trends. It is based on the fact that the changing of courses offered per school year and the unsuitable number of enrollees per school year can create lapses in generating the generalized observable trends and forecasted trends.

It can be noticed that there are only three series of trends that were illustrated in each graph. Series 1 stands for 2nd-year trend, series 2 for 3rdyear trend, and series 3 for 4th-year trend. Only the 2nd, 3rd, and 4th-year college students were given illustrations. Due to the projection that there will be no fresh graduates of high school that will enter a tertiary level of schooling, which is a result of the implementation of the K-12 curriculum.

Each course was processed and analyzed individually by observing its movement of a trend to make a reliable input and output for processing. The numbers of enrollees in courses were totaled to create a generalized historical and forecast trend for the number of college students in UMDC.

Based on K-12 implementation augury, another type of analysis is given to enrollees of a 1st-year level. This analysis examines the number of new college-level enrollees who are not fresh graduates of high school. A single school year late of college enrollment can be considered a fresh graduate and part of the tally of the population to be observed and undergo simple time-series analysis.

The tally for the population of not fresh high school graduates was segregated and underwent a modified type of forecasting analysis. This analysis compares Average and Ratio Analysis performed per school year.

Commerce courses are the leading courses offered at UM Digos College. As seen in figure 2, the increasing trend of commerce courses such as the Accounting Technology (ACT) course shows a high entry of enrollees every school year. Even Commerce courses can be traced back to 1995-1996. Reliable data points are chosen to start from 2007-2008 as the earliest school year, such as Human Resource Management (HR).
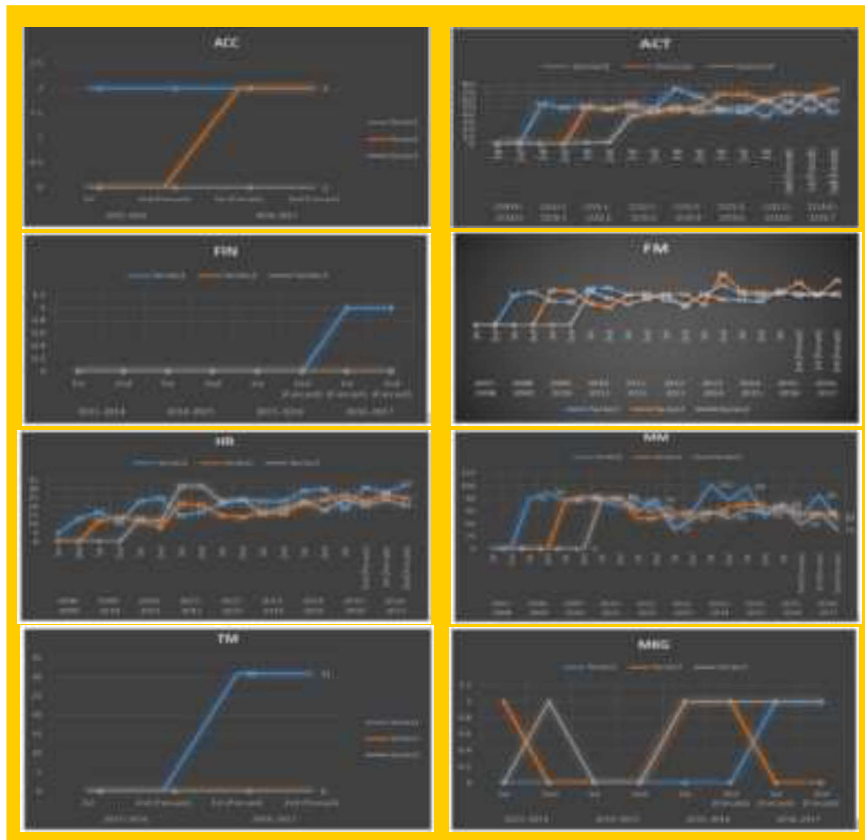
Legend: Series 1 = 2nd Year, Series 2 = 3rd Year, Series 3 = 4th Year
Figure 2. Semestral Enrollment Trends of Commerce Courses

In these cases, regression trend analysis for forecasting future data points can be generated. Other courses under Commerce such as Accountancy and Tourism management show few or only 1 data point under the school year 2015-2016 of 1st semester. Naïve forecasting an average ratio analysis per semester and school year is the best option for forecasting trends.

Legend: Series 1 = 2nd Year, Series 2 = 3rd Year, Series 3 = 4th Year
Figure 3. Semestral Enrollment Trends of Liberal Arts Courses and IT

Figure 4 exposes scattered data points of courses except for the ENG, BS, and MATH courses by which these three courses show more likely less dispersed data points. General Education (ED) course has the longest span of school years observed in making trends. This long span of trending gives us an idea that ED course has its leading demand in courses as offered in UMDC. Regression analysis was used in making forecasts in a long span of data points. Moving average and ratio analysis were used to create forecasts if there is an unreliable regression analysis result.

In some other courses, short trends can be observed. This short trend results from making reliability in semestral data point and the result of the year of offering the course. The later the offering means the shorter the trend.
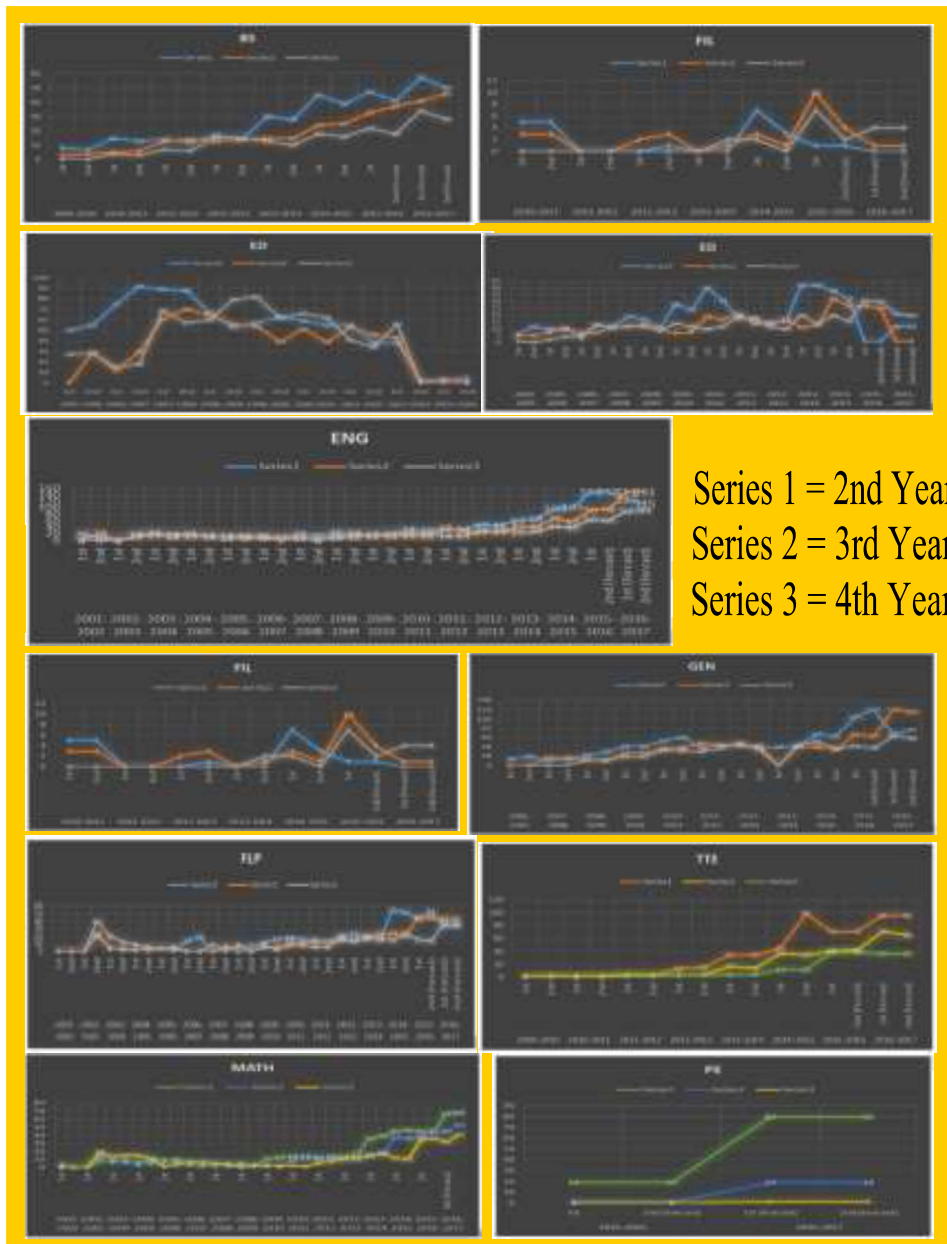
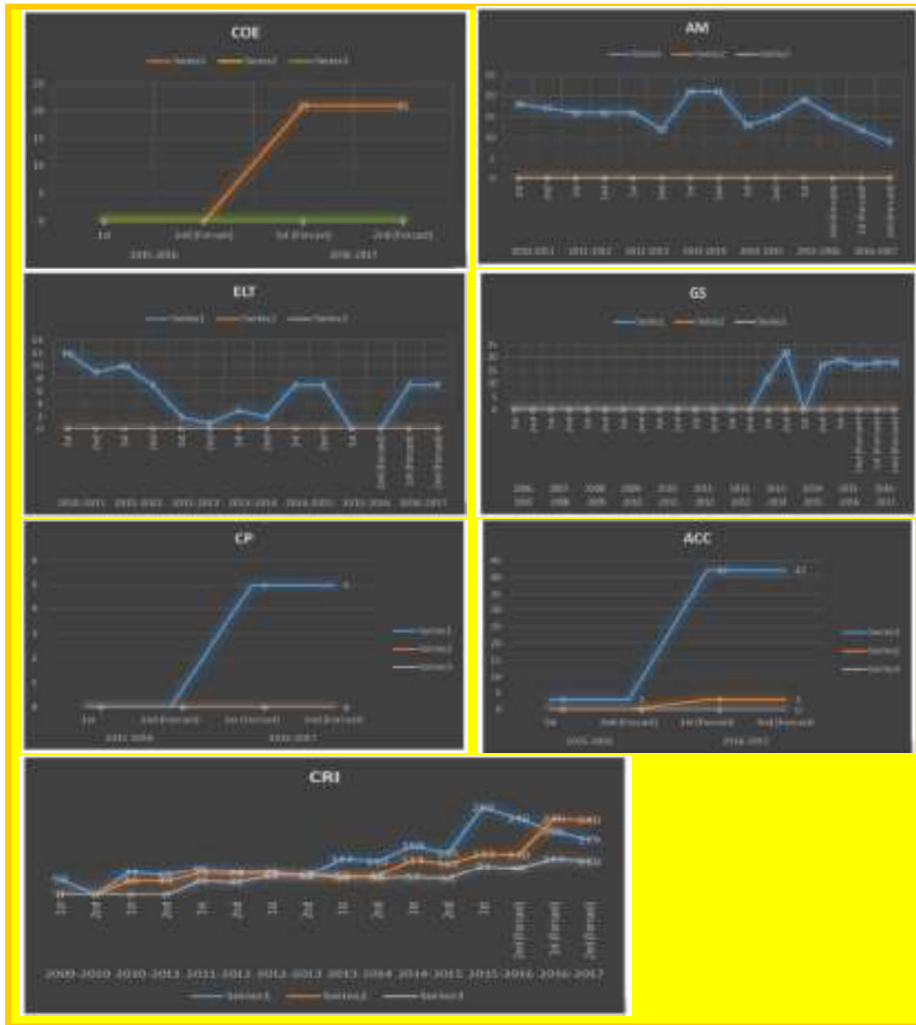Figure 4. Semestral Enrollment Trends of Education Courses

Figure 5. Semestral Enrollment Trends of Other Courses

As shown in figure 5, there is a relatively great increase in the the Criminology (CRI) enrollment trend. This positive relation shows increasing demand and preference for the course.

Graduate Studies course shows long trend only in 1st-year level (not shown). As observed in the graph, only the 2nd year trend has values greater than zero. This implies that it only gives a relationship in per school year entry but never in semestral and year level.

Other courses show only a short time tend to be observed and even a few series trends. These courses are vocational and were offered from the school year 2010-2011 and above. These courses were examined, analyzed, and forecasted using the modified type of analysis, the Average Ratio Analysis. When Average Ratio Analysis produces a biased result, Naïve Forecasting is the safest option to be used.

The first-year level of college is segregated for making time-series analysis. Due to the future results of the implementation of the K-12 Curriculum, there will be no fresh high school enrollees for colleges and universities, which will create a loss in institutions.

Making a trend analysis of enrollees in the 1st-year level that are not fresh high school graduates is the greatest chance to create a forecast for the 2016-2017 projected number of 1st-year college students. In tallying, a student with one school year delay of enrolling 1st-year college is considered as not fresh high school graduate and will be a part of respondents.

Simple moving average and naïve forecasting were used in creating a projected number of 1st-year college students for the school year 2016-2017.

Table 1. Average Number of Freshmen that are not Fresh or New Graduates of High School from School Year 2012- 2013 up to the Present

1st Year	2012-2013	2013-2014	2014-2015	2015-2016	Forecast
Unfresh Grad of HS	304	359	308	301	318
Total Population	1000	1209	1542	1361	1292

Forecasting the Number of College Students for SY 2016-2017

In Forecasting, there are plenty of techniques that can be used to forecast enrolment populations. In this study, based on the observed data of enrollment per school year, it is better and simpler to use Average Ratio Analysis, Regression Analysis, and Naïve Forecasting.

Average Ratio Analysis was used to create forecasts on short data trends such as in new courses. It is the combination of generating the Moving Average and Ratio

to form a modified analysis. Averaging the semestral points' ratios can create a coherent expectation of growth and decay of enrollment population per semester, especially when lapses are observed.

Regression Analysis was used to create forecasts on long data trends such as in Commerce courses. This type of analysis gives the exact formula or mathematical equation to represent the population's changes over time for forecasting purposes. Creating a Linear Trend of data gives a projected population for another expected time. New courses such as ACC, TM, and PS courses are not included in regression analysis. Their number of data points is not reliable for regression.

Figure 6 exposes an example of Regression analysis. The equation can be seen at the upper left of the figure. R squared describes the dispersion of data points in each time series. The greater the R squared, the greater the accuracy of forecasting. But not in all cases the R squared is reliable for describing the accuracy. That is why coherent observation and using a modified type of analysis should be drawn out.
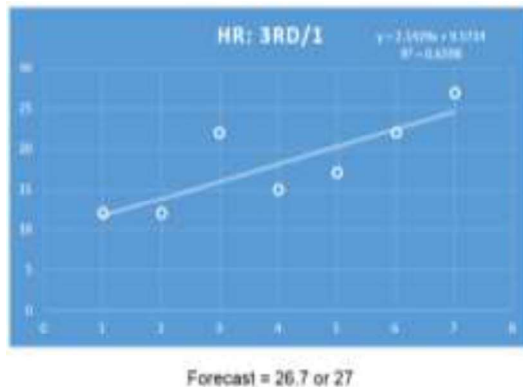

Forecast = 26.7 or 27

Figure 6. An Example of Regression Analysis (Human Resource Course)

If there are obvious unreliable results from Regression and Average Ratio Analysis, then the Naive Method of Forecasting is the best option. Courses with only one or two data points also underwent the Naïve Method of Forecasting.

As shown in figure 7, the trends in 2nd-year 3rd year and 4th-year levels are quite in line with averages, while the trend in the 1st-year level is suddenly dropping during the expected school year 2016-2017. The present population of 1361 1st year students forecasted naively for the second semester, which remains 1361

students. From the results of the segregated tally, the 1st year population will suddenly drop to 318 students in both semesters in the school year 2016-2017.
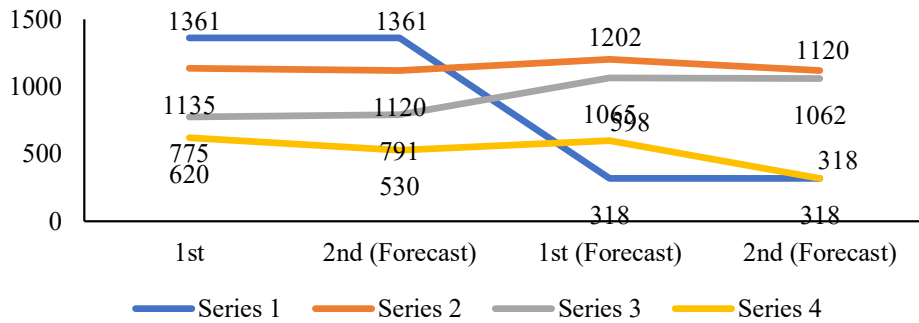

Figure 7. Forecasted Enrolment Trend in Every Year Level

Figure 8 clearly shows the expected number of college students for the next school year. At present, from 3,891 college students, it will have an expected drop which will result in 3,892 next semester, 3,283 for next school year's 1st semester, and 3,135 in its second semester.
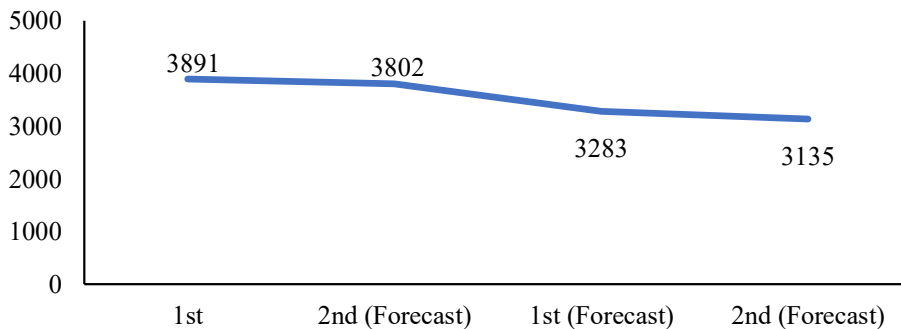

Figure 8. Forecasted College Students Enrollment Trend

Projecting the number of and preferred field/programs of Grade 11 Students in UMDC

After the data were gathered from different public high schools, that information was processed coherently. Segregation, tally, analysis, and solving systematically were used to extract and generate vital information. The data includes the future

Grade 11 students' school and field preferences. The results of the data are very useful in holistic administration in institutions.

Table 2 unveils the data gathering results through given questionnaires that were conducted to grade 10 students of different public high schools as respondents. The results gave the expected number of students to be tapped and enter different schools or institutions. As seen in the table, the expected share of UMDC is 599 Grade, 11 students out of 1,898 respondents. This is 31.6 % of the total population who responded. CJC got 476 (25.08 %), Polytechnic got 122 (6.4%), SPAMAST got 120 (6.3%), 278 (14.7 %) will remain in their schools, 77 (3.8%) will go to other public HS, 163 (8.59%) will go to other colleges and universities, and there is a remaining 68 (3.6%) which belongs to an undecided group.

Table 2. *The Totality of School and Field Preferences of Grade 11 Students*

Fields		UMDC	CJC	PCDS	SPAMAST	Remain in School	Other Public Highschool	Other	Undecided	Total
Academic Track	GAS	65	50	13	12	23	11	13	10	197
	ABM	121	108	16	16	56	10	25	4	356
	HUMSS	52	40	10	15	27	11	10	7	172
	STEM	95	112	18	12	55	10	64	11	377
TECH VOCH	Industrial Arts	31	41	18	14	19	14	8	14	159
	ICT	74	27	13	16	29	6	6	6	177
	HE	30	22	6	4	24	3	11	2	102
	Agri-Fishery	12	6	2	4	13	3	1	6	47
	Welding	18	4	2	7	1	1	3	2	38
	Automotive	4	4	2	3	0	2	1	0	16
	Cookery	51	21	13	10	18	0	10	4	127
	Carpentry	0	0	0	0	0	0	0	0	0
	Beauty Care	6	3	1	2	0	0	0	0	12
	Pastry	2	0	0	0	0	0	0	0	2
	Electrical	4	0	0	0	6	0	1	0	11
Sports Track		21	20	4	4	5	1	5	1	61
Arts and Design Track		13	18	4	1	2	0	5	1	44
TOTAL		599	476	122	120	278	72	163	68	1898

As they go on with data gathering, they later found out that the SPAMAST has back-out on their senior high school offering (SHS). This newly gathered information will tell them that the students who chose SPAMAST as their SHS institution will become hanging. This means that there is a probability that the expected 120 students will be distributed in different schools, including UMDC.

Figure 9 shows a graph for the expected distribution of Grade 11 students regarding their school and field preferences. It can be observed that most of the students in different schools primarily chose STEM as their preferred field or program of study. It is shown that most of the students in UMDC choose the ABM strand.

In figures 10 , a visible distribution can be observed in field/program preferences of Grade 11 students. ABM strand got the highest expected share and number of students, 121 or 20% of the total population in UMDC Grade 11 students. Followed by STEM with 16%, ICT 12 %, GAS 11%, and Pastry got the lowest percentage which is only 1%.
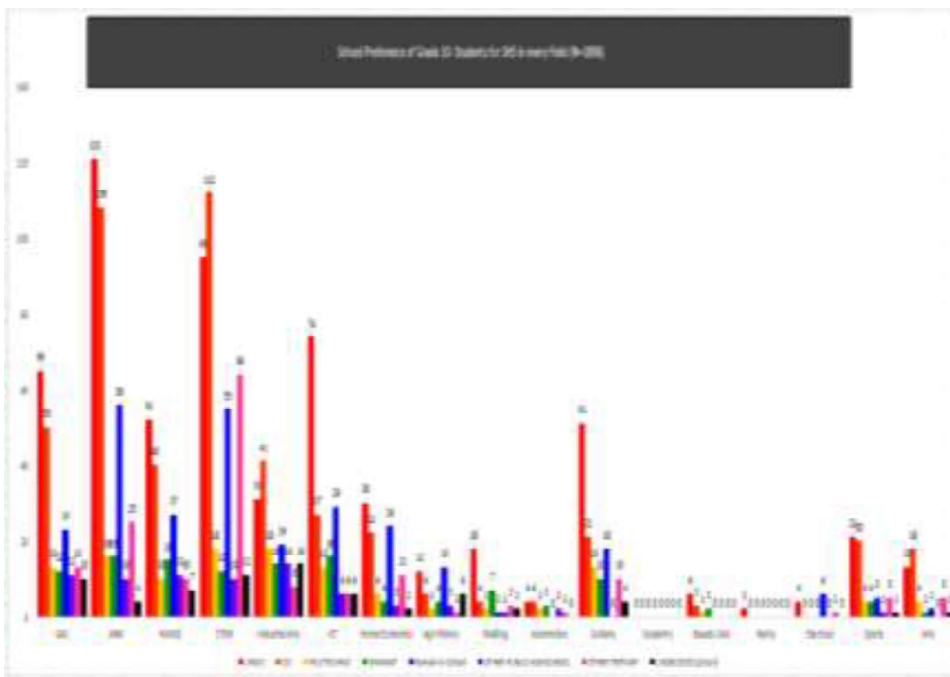

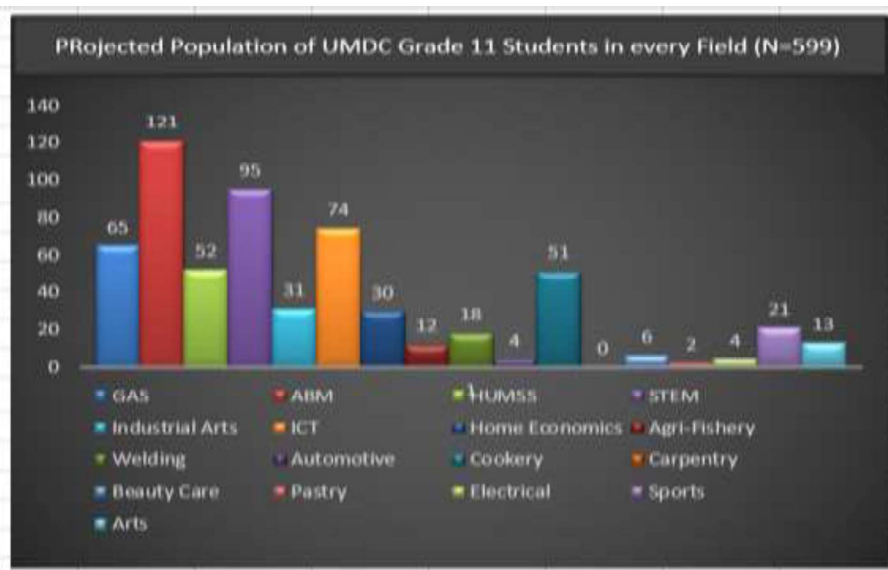Figure 9. Expected School and Field/Program Preferences 11 Students

Figure 10. Projected Field/Program Preferences of Upcoming Grade 11 Students in UMDC

Expected Overall Population of College and Grade 11 UM Digos College Students for the School Year 2016-2017?

In making an overall projection for the college and Grade 11 students in UMDC for the next school year, they can simply add the projected number of Grade 11 students and forecast several college students for 2016-2017. This assumption will give a coherent prediction based on forecasts and surveys' logical and reliable projections.

Table 3 and figure 12 show the total number of students in every year level for the school year 2016-2017 in every semester. Naive forecasting was used in creating projections for the 1st year and Grade 11 population for the SY 2016-2017 2nd semester. As projected, there will be 318 1st year students for every semester next year. For the 2nd year level, 1,202 is expected for the 1st semester and 1,120 for the 2nd. For the 3rd year level, there will be 1,065 students in 1stsem and 1,062 students in the second sem. For the 4th year level, 698 students are expected for the 1stsem and 635 students in the 2nd sem. For Grade 11, the expected number is 599 students in all semesters. Generally, there will be 3,882 students in UMDC for 1st semester and 3,734 for the 2nd semester.

Table 3. *Projected Over – all Population of UMDC Students*

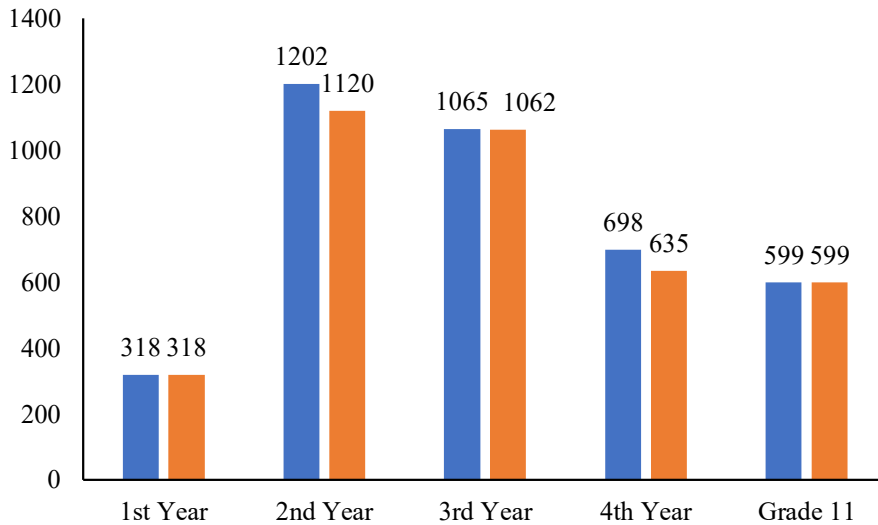|	2016 - 2017	
	1st (Forecast)	2md (Forecast)
1st Year	318	318
2nd Year	1202	1120
3rd Year	1065	1062
4th Year	698	635
Grade 11	599	599
TOTAL	3882	3734

Figure 11. Projected Semestral Population of UMDC Students

Other results of the study

This study comprises outcomes that were used to make generalizations and answer the problem's statement. Behind those results to answer the stated problems, the findings can also answer the questions involving describing the specific enrollment trends and forecasts per course and department. The survey among Grade 10 students can also give specific data of tally in every public high school.

CONCLUSIONS AND RECOMMENDATIONS

In the prior summary of results, the researchers derived these conclusions: Using the reliable results gathered, it can be concluded that there are variations in enrollment trends for different courses in UMDC due to their varied characteristics in data length and the dispersion of data points. Most of these trends show a positive relationship. This means an increasing entry of students in most of the courses. These movements required a coherent time-series analysis to arrive at more reliable results. As shown in previous results, there will be an expected great drop in the number of students in the next school year as a predicted effect of K-12 implementation. From 3,891 students in the present 1st semester, it will drop to 3,283 students for the next school year's 1st semester. This sudden drop will create a shift of plans in utilization and management in UMDC administration for college students. Based on the outcomes of the survey conducted to Grade 10 students, the researchers conclude that the projected number of Grade 11 students to be tapped in UMDC has 599 students that will make the whole student population not far from the present population when added. This result shows that UMDC admin can expect a very small loss of students' total population for the School year 2016-2017. The 599 grade 11 students that will enter UMDC have different preferences. Most of the students chose the ABM strand as their program to be entered with 121 students. Followed by STEM with 95 students, ICT with 74 students, GAS with 65 students, HUMSS with 52 students, Cookery with 51 students, Industrial Arts with 31 students, Home Economics with 30 students, Sports with 21 students, Welding with 18 students, Arts with 13 students, Agri-Fishery with 12 students, Beauty Care with six students, Automotive with four students, Electrical with four students, and Pastry with two students. The projected number of students in UMDC for the school year 2016-2017 is combined from the Grade 11 and College students' population. From 3,891 students of this school year's 1st semester, it will expectedly turn into a total of 3 802 for the 2nd semester. The forecasted total population for the S.Y. 2016-2017 will be 3,882 for the 1st semester and 3,734 for the 2nd semester.

In this study, the time-series analysis of college students, even they had their coherent and reasonable analysis in generating trends and forecast, the researchers recommend having further explorations in utilizing solutions and methods of time-series analysis, especially the methods that will fit to describe trends of UMDC courses. Benchmarking recent studies will greatly help achieve forecasting with high probabilities.

The forecasted number of college students in UMDC for the school year 2016-2017 that resulted from this research paper could be a guideline for management in UMDC courses when handling the expected population in every course. Using the results of the survey conducted in different public high schools with Grade 10 students as respondents, and as the researchers observed the institutions, it created an apprehension that there is a need for UM Digos College to conduct seminars as an advertisement for the offering of Senior High School for the school year 2016-2017. UM, Digos College must set its high regard in handling specific programs preferred by the upcoming Grade 11 students. Giving more focus to ABM, STEM, ICT, GAS, and HUMSS strands with the most populated program will help the administration. The generated conclusions of the projected total number of UMDC students lead to a recommendation to create a systematized plan for budgeting, allocation, utilization, and management for UM Digos College administration. These plans will give answers on how to serve the expected number of college students and the expected number of Grade 11 students in different fields or programs of studies.

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