

# The Analysis of Dumai-Riau-Indonesia Senior High School Productivity Based On Input Orientation and Output Orientation

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## Abstract

Each parent will provide the best education for their children, one of the ways is to choose the school that has the quality and productivity. Based on the observations and interviews that were conducted, it was found that no scientific studies that show productivity of Senior High School (SMA) in Kota Dumai. Therefore, this study will discuss the analysis of the productivity of Senior High School (SMA) in Kota Dumai using DEAP 2.1 through input orientation and output orientation. The Input were the number of teachers, number of students and the amount of classrooms, while the output is the level of the students that passed National Examination. The data used is from Dumai Department of Education academic year 2012/2013.

**Keywords:** *Productivity, Input Orientation, Output Orientation*

## 1. Introduction

Productivity is a measure of school and made reference to the actual quality of the school. Evaluation of school performance can not be done only through the perceptions and assumptions of society. One of them is education in Dumai, through studies and observations made an assessment of the productivity of the school was carried out only through perception, therefore it is necessary to conduct scientific studies to look at the actual level of productivity.

## 2. Literature Review

Mulyasa (2007) argue that productivity is concerned with how schools produce graduates both quantitatively and qualitatively, and eventually gained the quality graduates according to the needs of

## 3. Methodology

The study was performed using DEAP 2.1 software. Data input and output of this study was taken from data collected from the Department of Education of Indonesia Dumai, Riau province. This study was

society and the times. Another definition of school productivity presented by Cheng (1996), the effective school shows to the school's ability to function in maximum, good economic function, a function of socio-economic, political functions, cultural functions or function of education. The economic function of the school is to provide supplies to students in order to conduct economic activities so as to live well. School social function is as a medium for students to adapt to life in society. The political function of the school is as a vehicle to acquire knowledge about their rights and obligations as citizens. Culture media function is to transmit and transform culture. The function of education is the school as a vehicle for the maturing process and the formation of the personality of students.

Productivity school is the efficient use of existing resources, teachers, principals, non-academic staff, buildings, facilities, curriculum and information management. Productivity teacher will affect the quality of a student's academic. Productivity teacher has in producing quality graduates in terms of academic and competitive in the global market. When productivity is high, then teachers will increase student achievement. According Mulyasa (2005), the productivity of teaching can be influenced by teachers' professionalism, leadership of school principals and teacher training.

Productivity in education related to the overall planning, structuring and use of resources to create educational goals efficiently and effectively. School productivity gains can be seen from the output of performance. Productivity school visits from effectiveness.

conducted to evaluate the efficiency and productivity of schools in Dumai city for the year 2013.

### Input

There are three inputs involved in the study were:

- i) Number of teachers

Total number of teachers is the number of teachers who teach in High School in the town of Dumai

ii) Number of students

The number of students is the number of students who receive the learning process and listed in National High School in the town of Dumai

iii) Number of classrooms

The total study area is the number of buildings available for teaching and learning in High School in the town of Dumai.

**Output**

In this study there is only one output, which involved the number of students who pass the national exam. The number of students who pass the national exam is the number of students who passed during the announcement of the results of national tests and was awarded a high school graduation certificate by the Ministry of National Education of the Republic of Indonesia.

**PERFORMANCE DATA FOR THE EFFICIENCY OF ACHIEVEMENT TEST NATIONAL SECONDARY SCHOOLS TO SCHOOL IN CITY DUMAI**

Schedule 4.1 Data Input and Output High School Dumai

No	school	Input			Output
		number of teachers	number of students	Number of classrooms	The number of students who passed the National Examination
1	SMAN BINSUS	37	288	15	137
2	SMAN 1	46	221	21	221
3	SMAN 2	87	328	31	328
4	SMAN 3	55	220	21	225
5	SMAN 4	32	134	10	129
6	SMAN 5	40	93	11	93
7	SMA PGRI	20	70	8	53
8	SMA MUHAMMADIYAH	19	21	3	14
9	SMA LANCANG KUNING	17	38	5	36
10	SMA BUDI DHARMA	40	274	24	271

11	SMA YKPP	52	271	22	271
12	SMA S. TARCISIUS	20	136	12	136

**4. Results Analysis**

**Summary of Technical Skills-Based Input and Output Data**

Table 4.2 Summary of the technical competence of the national achievement test high school in the town of Dumai

School	technical efficiency (te)
1	0.737
2	0.987
3	0.979
4	1.000
5	1.000
6	0.978
7	0.740
8	0.652
9	0.926
10	0.996
11	1.000
12	1.000

Summary data efficiency Table 4.2 shows the results of the DEA model results regarding the efficiency in achieving the National Examination (UN) Secondary schools on the state in Dumai, Riau province of Indonesia for the year 2012. Based on the technical efficiency (TE) can be seen that the schools have the technical competence is otherwise sufficiently 1,000. Meanwhile, the value is less than 1,000 indicate inefficiencies that need improvement from the aspect of the input and output studied. Referring to the above analysis, it was found that the School 4, 5 School, School 11, School 12 is more efficient that reached the 1000 efficiency compared with other schools. This is influenced by the values of input and output that is used as the basis of this model study.

**Summary of Peers**

Table 4.3 Summary of input-based groups for orientation

School	group
1	5
2	4
3	4
4	4
5	5
6	4
7	4

8	4
9	4
10	12
11	11
12	12

Summary Table 4.3 shows the group at a school in Dumai expressed efficiently used as a benchmark to schools inefficient. Based on the above data it can be concluded that the School 4 is better than 5 Schools, Schools and School 11 12. This refers to the use of more of these schools as a benchmark that is six times more than others, namely less than five times of use. This means, School 4 is more efficient.

**Output-Based Orientation**

**Summary of Weighting Group**

Table 4.4 Summary of ballast groups

firm	ballast group	
1	0.185	0.598
2	0.596	0.661
3	1.392	0.080
4	1.000	
5	1.000	
6	0.423	
7	0.318	
8	0.095	
9	0.173	
10	2.000	
11	1.000	
12	1.000	

Based on Table 4.4 above, a summary of the ballast groups showed a shadow price (shadow price) for each medium schools. This shadow price used for improvements to schools to generate Academic Performance (output) more efficient and better.

**Group Election Summary**

Table 4.5 Summary of calculations set

School	Election group
1	0
2	0
3	0
4	6
5	1
6	0
7	0
8	0
9	0
10	0

11	2
12	2

Table 4.5 provides an overview of the schools more efficient and frequency of its use as a benchmark for improvements to an inefficient. It can be seen that the School 4 is better than other schools based on the frequency of use of a lot more than other benchmarks.

School results : 1  
 Technical Skills : 0.737

Table 4.6 Results 1 school for output-based orientation

variable	the original value	radial movement	slack movement	Rate projections
Output	137.000	48.848	0.000	185.848
Input 1	37.000	0.000	0.000	37.000
Input 2	288.000	0.000	-101.228	186.772
Input 3	15.000	0.000	0.000	15.000

**group list**

Group	lambda weights
5	0.185
11	0.598

For output-based orientation, to achieve perfect efficiency for schools 1 in Table 4.6, the improvement of the output must be maximized. For improvement, all the output needs to be improved. In this analysis there is an output of the number of students who pass a national exam that needs to be improved by 35.66%.

School results : 2  
 Technical Skills : 0.987

Table 4.7 Result school 2 for output-based orientation

variable	the original value	radial movement	slack movement	Rate projections
Output	221.000	2.981	0.000	223.981
Input 1	46.000	0.000	0.000	46.000
Input 2	221.000	0.000	0.000	221.000
Input 3	21.000	0.000	-0.553	20.447

**Group list**

Group	Lambda weights
4	0.596
12	0.661

Table 4.7 shows the results for school improvement 2 where the output should be increased by 1.35% to reach perfect.

School results : 3  
 Technical Skills : 0.979

Table 4.8 Results of school-based output 3 for orientation

variable	the original value	radial movement	slack movement	Rate projections
Output	328.000	6.962	0.000	334.962
Input 1	87.000	0.000	-6.259	80.741
Input 2	328.000	0.000	0.000	328.000
Input 3	31.000	0.000	0.000	31.000

**Group list**

Group	Lambda weights
4	1.392
12	0.080

To achieve perfect efficiency for schools 3 in Table 4.8, the improvement of the output must be maximized. For improvement, all the output needs to be improved. In this analysis there is an output of the number of students who pass a national exam that needs to be increased by 2.12%.

School results : 4  
 Technical Skills : 1,000

Table 4.9 Result 4 schools for output-based orientation

variable	the original value	radial movement	slack movement	Rate projections	variable
Output	1	225.000	0000	0.000	225.000
Input	1	55.000	0.000	0.000	55.000
Input	2	220.000	0.000	0.000	220.000
Input	3	21.000	0.000	0.000	21.000

**Group list**

Group	Lambda weights
4	1.000

Table 4.9 shows the efficiency of the four schools from three inputs in the production of an output. Technical efficiency value for this school is 1,000. The above analysis shows 4 School had 55 teachers, 220 students, 21 classrooms for producing academic performance excellence include students who pass the national exam of 225 people for the year 2013.

School results : 5  
 Technical Skills : 1,000

Table 4.10 Results of school 5 for output-based orientation

variable	the original value	radial movement	slack movement	Rate projections	variable
Output	1	129.000	0000	0.000	129.000
Input	1	32.000	0.000	0.000	32.000
Input	2	134.000	0.000	0.000	134.000
Input	3	10.000	0.000	0.000	10.000

**Group list**

Group	Lambda weights
5	1.000

School 5 in Table 4.10 shows the efficiency of the three inputs in the production of an output. Technical efficiency value for this school is 1,000. The above analysis shows 5 School has 32 teachers, 134 students, 10 classrooms for producing academic performance excellence include students who passed the exam as many as 129 people for the year 2013.

School results : 6  
 Technical Skills : 0978

Table 4.11 Results for the six school-based orientation output

variable	the original value	radial movement	slack movement	Rate projections
Output	93.000	2.114	0.000	95.114
Input 1	40.000	0.000	-16.750	23.250
Input 2	93.000	0.000	0.000	93.000
Input 3	11.000	0.000	-2.123	8.877

**Group list**

Group	Lambda weights
4	0.423

For output-based orientation, to achieve perfect efficiency for school 6 at 4:11 Jadul the improvement of the output must be maximized. For improvement, all the output needs to be improved. In this analysis there is an output of the number of students who pass a national exam that needs to be increased by 2.27%.

School results : 7  
 Technical Skills : 0.740

Table 4.12 Results of school 7 for output-based orientation

variable	the original value	radial movement	slack movement	Rate projections
Output	53.000	18.591	0.000	71.591
Input 1	20.000	0.000	-2.500	17.500
Input 2	70.000	0.000	0.000	70.000
Input 3	8.000	0.000	-1.318	6.682

**Group list**

Group	Lambda weights
4	0.318

Table 4.12 shows the results for the improvement of school 7 output must be maximized. For improvement, all the output needs to be improved. In this analysis there is an output of the number of students who pass a national exam that needs to be improved by 35.08%.

School results : 8  
 Technical Skills : 0.652

Table 4.13 Results 8 school for output-based orientation

variable	the original value	radial movement	slack movement	Rate projections
Output	14.000	7.477	0.000	21.477
Input 1	19.000	0.000	-13.750	5.250
Input 2	21.000	0.000	0.000	21.000

Input 3	3.000	0.000	-0.995	2.005
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**Group list**

Group	Lambda weights
4	0.095

For output-based orientation, to achieve perfect efficiency for school 8 in Table 4.13, the improvement of the output must be maximized. For improvement, all the output needs to be improved. In this analysis there is an output of the number of students who pass a national exam that needs to be improved by 53.41%.

School results: 9  
 Technical Skills: 0926

Table 4.14 Results for the nine school-based orientation output

variable	the original value	radial movement	slack movement	Rate projections
Output	36.000	2.864	0.000	38.864
Input 1	17.000	0.000	-7.500	9.500
Input 2	38.000	0.000	0.000	38.000
Input 3	5.000	0.000	-1.373	3.627

**Group list**

Group	Lambda weights
4	0.173

For orientation output based on Table 4.14, to achieve perfect efficiency for the improvement of school 9 output must be maximized. For improvement, all the output needs to be improved. In this analysis there is an output of the number of students who pass a national exam that needs to be increased by 7.96%.

School results : 10  
 Technical Skills : 0.996

Table 4.15 Results for the 10 school-based orientation output

variable	the original value	radial movement	slack movement	Rate projections
Output	271.000	1.000	0.000	272.000
Input 1	40.000	0.000	0.000	40.000

Input 2	274.000	0.000	-2.000	272.000
Input 3	24.000	0.000	0.000	24.000

**Group list**

Group	Lambda weights
12	2.000

For orientation output based on Table 4.15, to achieve perfect efficiency for the improvement of school 10 must be maximized output. For improvement, all the output needs to be improved. In this analysis there is an output of the number of students who pass a national exam that needs to be increased by 0.37%.

School results : 11  
 Technical Skills : 1,000

Table 4.16 Results for the 11 school-based orientation output

variable	the original value	radial movement	slack movement	Rate projections	variable
Output	1	271.000	0.000	0.000	271.000
Input	1	52.000	0.000	0.000	52.000
Input	2	271.000	0.000	0.000	271.000
Input	3	22.000	0.000	0.000	22.000

**Group list**

Group	Lambda weights
11	1.000

Table 4.16 shows the efficiency of 11 schools from three inputs in the production of an output. Technical efficiency value for this school is 1,000. The above analysis shows that 11 School has 52 teachers, 271 students, 22 classrooms for producing academic performance excellence include students who pass the national exam of 271 people for the year 2013.

School results : 12  
 Technical Skills : 1,000

Table 4.17 Results 12 schools for output-based orientation

variable	the original value	radial movement	slack movement	Rate projections
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Output	136.000	0.000	0.000	136.000
Input	20.000	0.000	0.000	20.000
Input	136.000	0.000	0.000	136.000
Input	12.000	0.000	0.000	12.000

**Group list**

Group	Lambda weights
12	1.000

4.17 can be seen from Table 12 shows the efficiency of school three inputs in the production of an output. Technical efficiency value for this school is 1,000. The above analysis shows that 12 schools with 20 teachers, 136 students, 12 classrooms for producing academic performance excellence include students who passed the exam as many as 136 people for the year 2013.

**Orientation Based Input**

**Results by School**

School results : 1  
 Technical Skills : 0.737

Table 4.18 Results for school-based orientation input

variable	the original value	radial movement	slack movement	Rate projections
Output	137.000	0.000	0.000	137.000
Input 1	37.000	-9.725	0.000	27.275
Input 2	288.000	-75.697	-74.622	137.681
Input 3	15.000	-3.943	0.000	11.057

**Group list**

Group	Lambda weights
5	0.136
11	0.551

Table 4.18 shows the inefficiency of the three input involved in the production of school output 1. Improvements need to be made to the three input values School 1. Input 1 (number of teachers) should be reduced by 26.3% to achieve efficiency. Whereas, for input 2 (number of students) value should be reduced is by 52.19%. In addition, the reduction should be done on input 3 (total study area) of 26.3%.

School results : 2  
 Technical Skills : 0.987



Table 4.19 Results for school-based orientation input

variable	the original value	radial movement	slack movement	Rate projections
Output	221.000	0.000	0.000	221.000
Input 1	46.000	-0.612	0.000	45.388
Input 2	221.000	-2.941	0.000	218.059
Input 3	21.000	-0.279	-0.546	20.175

**Group list**

Group	Lambda weights
4	0.588
12	0.652

4.19 Table 2 shows the inefficiency in the school of the three input involved in the production of output. Improvements need to be made to the three input values School 2. Analysis shows Input 1 (number of teachers) need and input 2 (number of students) should be reduced by 1.33% in order to achieve efficiency. Whereas the reduction should be done on input 3 (total study area) which amounted to 3.93%.

School results : 3  
 Technical Skills : 0.979

4.20 Results Table 3 for school-based orientation input

variable	the original value	radial movement	slack movement	Rate projections
Output	328.000	0.000	0.000	328.000
Input	87.000	-1.808	-6.128	79.063
Input	328.000	-6.818	0.000	321.182
Input	31.000	-0.644	0.000	30.356

**Group list**

Group	Lambda weights
4	1.364
11	0.078

School 3 in Table 4.20 shows the inefficiency of the three input involved in the production of an output. Improvements need to be made to the three input values School 3. Input 1 (number of teachers) should be reduced by 9.12% in order to achieve efficiency. Whereas, for input 2 (number of students) and input 3 (total study area) value should be reduced is by

2.08%.

School results : 4  
 Technical Skills : 1,000

4.21 Results Table 4 for school-based orientation input

variable	the original value	radial movement	slack movement	Rate projections	variable
Output	1	225.000	0.000	0.000	225.000
Input	1	55.000	0.000	0.000	55.000
Input	2	220.000	0.000	0.000	220.000
Input	3	21.000	0.000	0.000	21.000

**Group list**

Group	Lambda weights
4	1.000

4.21 Table 4 shows the efficiency of the school of three input in the production of an output. Technical efficiency value for this school is 1,000. The above analysis shows 4 School teacher has 55 employees, 220 students, 21 classrooms and to produce excellence in academic achievements include students who pass the national exam of 225 people for the year 2013.

School results : 5  
 Technical Skills : 1,000

4.22 Results Table 5 for school-based orientation input

variable	the original value	radial movement	slack movement	Rate projections	variable
Output	1	129.000	0.000	0.000	129.000
Input	1	32.000	0.000	0.000	32.000
Input	2	134.000	0.000	0.000	134.000
Input	3	10.000	0.000	0.000	10.000

**Group list**

Group	Lambda weights
5	1.000

School 5 in Table 4.22 shows the efficiency of the three inputs in the production of an output. Technical

efficiency value for this school is 1,000. The above analysis shows 5 School teacher has 32 staff, 134 students, 10 classrooms and to produce excellence in academic achievements include students who passed the exam as many as 129 people for the year 2013.

School results : 6  
 Technical Skills : 0978

4.23 Results Table 6 for school-based orientation input

variable	the original value	radial movement	slack movement	Rate projections
Output	93.000	0.000	0.000	93.000
Input 1	40.000	-0.889	-16.378	22.733
Input 2	93.000	-2.067	0.000	90.933
Input 3	11.000	-0.244	-2.076	8.680

**Group list**

Group                      Lambda weights  
 4                              0.413

Table 4.23 shows the inefficiency in six schools from three inputs involved in the production of an output. Improvements need to be made to the three input values School 3. Input 1 (number of teachers) should be reduced by 43.2% to achieve efficiency. Whereas, for input 2 (number of students) was reduced by 2.22% and input 3 (total study area) value should be reduced is by 21.1%.

School results : 7  
 Technical Skills : 0.740

Table 4.24 Results for orientation 7 school-based input

variable	the original value	radial movement	slack movement	Rate projections
Output	53.000	0.000	0.000	53.000
Input 1	20.000	-5.194	-1.851	12.956
Input 2	70.000	-18.178	0.000	51.822
Input 3	8.000	-2.077	-0.976	4.947

**Group list**

Group                      Lambda weights  
 4                              0.236

School 7 in Table 4.24 shows the inefficiency of the three input involved in the production of an output. Improvements need to be made to the three input values School 3. Input 1 (number of teachers) should be reduced by 43.2% to achieve efficiency. Whereas, for input 2 (number of students) was reduced by 2.22% and input 3 (total study area) value should be reduced is by 21.1%.

School results : 8  
 Technical Skills : 0.652

Table 4.25 Results for orientation 8 school-based input

variable	the original value	radial movement	slack movement	Rate projections
Output	14.000	0.000	0.000	14.000
Input 1	19.000	-6.615	-8.963	3.422
Input 2	21.000	-7.311	0.000	13.689
Input 3	3.000	-1.044	-0.649	1.307

**Group list**

Group                      Lambda weights  
 4                              0.062

Table 8 shows 4.25 on school inefficiency of the three input involved in the production of an output. Improvements need to be made to the three Schools input value 8. Input 1 (number of teachers) should be reduced by 82% in order to achieve efficiency. Whereas, for input 2 (number of students) was reduced by 34.8% and input 3 (total study area) value should be reduced is by 56.4%.

School results : 9  
 Technical Skills : 0926

Table 4.26 Results for the nine school-based orientation input

variable	the original value	radial movement	slack movement	Rate projections
Output	36.000	0.000	0.000	36.000
Input 1	17.000	-1.253	-6.947	8.800
Input 2	38.000	-2.800	0.000	35.200
Input 3	5.000	-0.368	-1.272	3.360



**Group list**

Group	Lambda weights
4	0.160

School 9 in Table 4.26 shows the inefficiency of the three input involved in the production of an output. Improvements need to be made to the three Schools input value 8. Input 1 (number of teachers) should be reduced by 48.2% to achieve efficiency. Whereas, for input 2 (number of students) was reduced by 7.4% and input 3 (total study area) value should be reduced is by 32.8%.

School results : 10  
 Technical Skills : 0.996

Table 4.27 Results 10 school-based input for orientation

variable	the original value	radial movement	slack movement	Rate projections
Output	271.000	0.000	0.000	271.000
Input 1	40.000	-0.147	0.000	39.853
Input 2	274.000	-1.007	-1.993	271.000
Input 3	24.000	-0.088	0.000	23.912

**Group list**

Group	Lambda weights
12	1.993

School 10 on Table 4.27 shows the inefficiency of the three input involved in the production of output. Improvements need to be made to the three Schools input value 8. Input 1 (number of teachers) should be reduced by 0.37% in order to achieve efficiency. Whereas, for input 2 (number of students) was reduced by 1.09% and input 3 (total study area) value should be reduced is by 0.37%.

School results : 11  
 Technical Skills : 1,000

Table 4.28 Results 11 school-based input for orientation

variable	the original value	radial movement	slack movement	Rate projections
Output	1	271.000	0.000	0.000
				271.000

Input 1	1	52.000	0.000	0.000	52.000
Input 2	2	271.000	0.000	0.000	271.000
Input 3	3	22.000	0.000	0.000	22.000

**Group list**

Group	Lambda weights
11	1.000

School 11 in Table 4.28 shows the efficiency of the three inputs in the production of an output. Technical efficiency value for this school is 1,000. The above analysis shows that 11 School has 52 teachers, 271 students, 22 classrooms for producing academic performance excellence include students who pass the national exam of 271 people for the year 2013.

School results : 12  
 Technical Skills : 1,000

Table 4.29 Results 12 school-based input for orientation

variable	the original value	radial movement	slack movement	Rate projections
Output	1	136.000	0.000	0.000
Input 1	1	20.000	0.000	0.000
Input 2	2	136.000	0.000	0.000
Input 3	3	12.000	0.000	0.000

**Group list**

Group	Lambda weights
12	1.000

School 12 in Table 4.29 shows the efficiency of the three inputs in the production of an output. Technical efficiency value for this school is 1,000. The above analysis shows that 12 schools with 20 teachers, 136 students, 12 classrooms for producing academic performance excellence include students who passed the exam as many as 136 people for the year 2013.

**5. Conclusions**

The results showed that the firm 4 (School 4) of School District 3 school Dumai is the most efficient. This is evidenced by the frequency of use of the school as a benchmark for other schools that are not sufficient for the improvement of academic achievement.

To produce excellent academic performance, the use of output is very appropriate orientation to maximize the output to achieve technical efficiency. Output involved in this study is the academic performance of the students who passed the National Examination (UN). Thus, each school must improve academic achievement by earning new initiative to allow students to get excellent results for the certificate.

This is because the school is under the administration of the government of the Republic of Indonesia is therefore not suitable if the use of input orientation applied here. Input involved in this study is the number of teachers, number of students, and the total study area. If the use of input orientation is used, then the school had to reduce all the inputs involved to achieve technical efficiency. The findings indicate that teachers tied to an agreement with the government. Their employment status is permanent. The school can not take tindakan the impunity to dismiss them for reducing the input to achieve efficiency. Similarly, the study area, the school can not reduce the number of study because it is one of the facilities offered by the school and became one of the considerations for parents to enroll their children in school. Nevertheless, the number of students can be written down in order to achieve technical efficiency. This is because, the school has the right to determine the necessary number of students in their schools with guidelines from the Department of Education.

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