



## Efficiency of Local Government Units in North Western Philippines as to the Attainment of the Millennium Development Goals

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**Abstract.** This study entitled “Efficiency of Local Government Units in Northwestern Philippines as to the Attainment of the Millennium Development Goals” determined the performance of the four provinces and eight cities in Region I, Philippines, vis-à-vis their efficiency along the eight goals and 21 targets of the Millennium Development Goals (MDGs) for 2012-2015. Furthermore, it determined the peer groups and weights of the DMUs (Decision Making Units – the different provinces and cities), the virtual inputs/outputs or potential improvements of the DMUs to be in the efficient frontier, the input and output slacks (input excesses and output shortfalls) needed in the different indicators and the best practices to be considered by the inefficient and weak efficient DMUs. The “best practice” in the frontier is the basis to calculate the adjustments necessary for the DMUs. Different indicators showed varied performance levels in the different years but there are best practices from the “efficient” DMUs which could be adapted by the “weak efficient” and “inefficient” ones.

**Keyword:** Millennium Development Goals, efficiency, local government units, northwestern Philippines.

**Abstrak.** Penelitian ini berjudul "Efisiensi Unit Pemerintahan Daerah yang terletak di barat laut Filipina untuk Pencapaian Tujuan Pembangunan Milenium" menentukan kinerja dari empat provinsi dan delapan kota di Wilayah I Filipina, dengan efisiensi mereka beserta delapan tujuan dan 21 target tujuan Pembangunan Milenium (Millennium Development Goals / MDGs) untuk Tahun 2012-2015. Selanjutnya, penelitian ini menentukan kelompok dan bobot DMU (Decision Making Units - Provinsi dan Kota berbeda), input / output virtual atau peningkatan potensial DMUs masuk dalam batas yang efisien, kelemahan input dan output (input berlebihan dan kurang output) yang dibutuhkan dalam berbagai indikator dan praktik terbaik harus dipertimbangkan dengan inefficient dan weak efficient DMUs. "Praktik terbaik" dalam batas yang dimaksud menjadi dasar untuk menghitung penyesuaian yang dibutuhkan oleh DMUs. Indikator yang berbeda menunjukkan tingkat kinerja yang bervariasi dalam rentang tahun yang berbeda-beda, namun ada praktik terbaik dari DMU "efisien" yang dapat disesuaikan dengan "weak efficient" dan "inefficient".

**Kata Kunci:** Millennium Development Goals, Efisiensi, Unit Pemerintahan Daerah, Barat laut Filipina.

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## **1. Introduction**

Building on the United Nations global conferences of the 1990s, the Millennium Declaration of 2000 marked a strong commitment to the right to development, peace and security, gender equality, eradication of the many dimensions of poverty and to sustainable human development. Embedded in that Declaration, which was adopted by 147 heads of state and 189 countries, were what have become known as Millennium Development Goals, including the 18 time-bound targets [1].

To monitor progress towards these goals and targets, the United Nation system, including the World Bank and the International Monetary Fund, as well as the Development Assistance Committee of the Organization for Economic Cooperation and Development, came together under the Office of the Secretary General and agreed on 48 quantitative indicators. The indicators built upon an inter-governmental process to identify relevant indicators in response to global conferences. The UN Secretary General presented the goals, targets and indicators to the General Assembly in September 2001 in the “Road Map towards the Implementation of the United Nations Millennium Declaration”[2].

The goals and targets are interrelated and represent a partnership between the developed and developing countries as the Declaration states, “to create an environment – at the national and global levels alike – which is conducive to development and the elimination of poverty”. The member nations represented by the heads of the states committed to help achieve the following Millennium Development Goals by 2015. The eight goals are: (1) to eradicate extreme poverty and hunger; (2) to achieve universal primary education; (3) to promote gender equality and empower women; (4) to reduce child mortality; (5) to improve maternal health; (6) to combat HIV/AIDS, malaria, and other diseases; (7) to ensure environmental sustainability; and (8) to develop a global partnership for development [2].

The Millennium Development Goals consist of eight (8) goals, 21 targets, whose general focus and scope is on social aspect. It targeted the developing countries particularly the poorest ones. Furthermore, it was formulated by a group of experts.

MDG monitoring is taking place globally through annual reports of the UN Secretary General and through periodic country reporting. For global reporting, use is made of indicators compiled by international organizations. Internationally compiled indicators, based on standard concepts, definitions and methodologies more readily facilitate cross-country comparisons. For country reporting, use is generally made of indicators compiled from national sources, generally by national statistical system.



**Figure 1.** Formulation of MDGs

Table 1 reflects the MDG indicators categorized as high, medium and low where indicators under high category need to be addressed immediately, followed by those in the medium and low category.

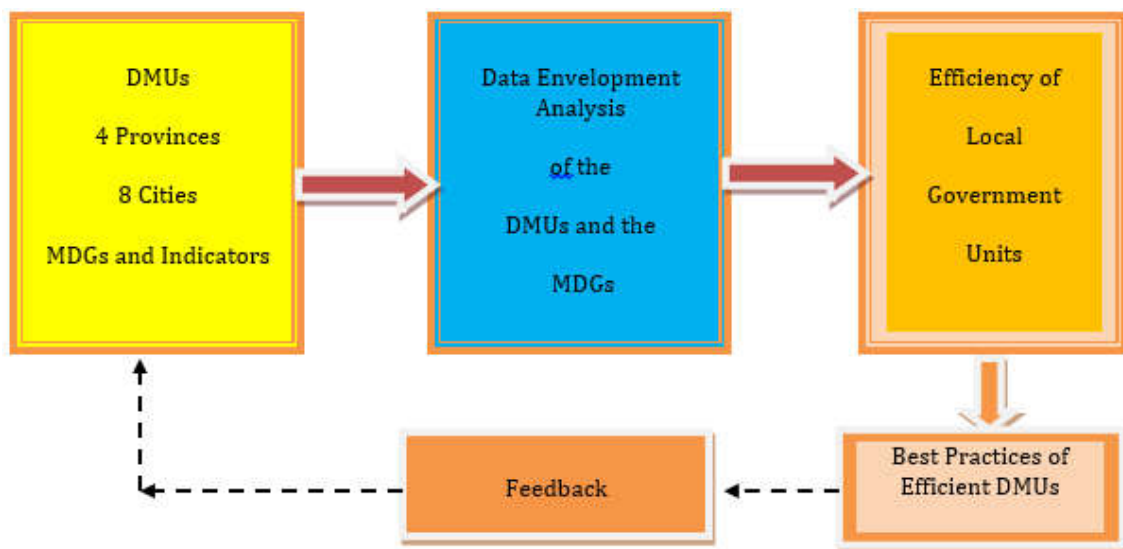
Since the findings presented were at the national level, the researcher needs to look into the problems in the regional level in relation to the efficiency of local government units.

**Table 1.** Status of MDG indicators as of September 2015 (Source: PSA)

<b>High</b>	<b>Medium</b>	<b>Low</b>
Poverty Gap Ratio	Income poverty	Proportion of household with per capita < 100% adequacy
Food Poverty	Underweight children	Cohort survival rate
Ratio of literate females to males 15-24 y/o	Proportion of 1 y/o children immunized against measles	Primary completion rate
Infant and under-5 mortality	Proportion of births attended by skilled health personnel	Literacy rate (15-24 y/o)
Ratio of girls to boys in elementary participation		Ratio of girls to boys in primary education
Ratio of girls to boys in secondary education and participation rates		Share of women in wage employment in non-agriculture
Ratio of girls to boys in tertiary education		Proportion of seats held by women in national government

**Table 1.** Status of MDG indicators as of September 2015 (Source: PSA) - Continued

High	Medium	Low
Prevalence and death rate associated with malaria		Prevalence and death rate associated with tuberculosis
Proportion of tuberculosis Cases detected and cured under DOTS		Contraceptive prevalence rate
Access to safe water		Maternal mortality ratio
Access to sanitary toilet facility		Adolescent birth rate

**Figure 2.** Paradigm of the Study

## 2. Objective of the Research

The main objective of the study is to determine the efficiency of the local government units of the four provinces and eight cities of North Western Philippines along the Millennium Development Goals.

Specifically, based on the different indicators, this study will seek answers to the following questions:

1. What is the efficiency of the local government units based on the DEA analysis?
2. What are the peer groups and weights of the DMUs?
3. What are the virtual inputs/outputs or improvements of the provinces/cities to be in the efficient frontier?
4. What are the input and output slacks needed in the different indicators?
5. Based on the findings, what are the best practices to be considered by the efficient DMUs?

### 3. Methodology

This study utilized the descriptive evaluative research design. It is also a documentary analysis as it analyzed the efficiency of the four (4) provinces and eight (8) cities of Northwestern Philippines in terms of the different MDG indicators.

The researcher considered several entities for evaluation using a non-parametric approach called Data Envelopment Analysis (DEA) in Decision Making Units (DMUs) to evaluate and compare the efficiency of the local government units.

It employed the Input Oriented Multi - Stage Data Envelopment Analysis (DEA) Constant Returns-to-Scale (CRS) Model to find out the most favorable weight and the efficiency of a DMU equivalent to improving the efficiency of this DMU by minimizing its inputs while producing at least the observed output levels [3,4].

Furthermore, this study also utilized Time Series Analysis in terms of their efficiency scores for the calendar years 2012-2015.

### 4. Findings of the Study

The following are the findings of the study:

1. The efficiency of the provinces/cities is as follows:
  - a. As to the eradication of extreme poverty and hunger, only Ilocos Sur was found to be inefficient.
  - b. Under achieving universal primary education, only San Fernando City was found to be fully efficient.
  - c. As to the promotion of gender equality and empowerment of women, only five (5) cities namely Alaminos City, Laoag City, San Fernando City, Urdaneta City and Vigan City were found to be fully efficient.
  - d. In terms of reduction of child mortality, only Ilocos Sur was inefficient.
  - e. As to the improvement of maternal health, only the province of Ilocos Sur was found to be fully efficient.
  - f. Under the goal - to combat HIV/AIDS, malaria, and other diseases, all the DMUs are fully efficient.
  - g. In terms of ensuring environmental sustainability, only two (2) provinces were found to be fully efficient: Ilocos Sur and Pangasinan.
  - h. As to the of global partnership for development, Ilocos Norte and La Union, Ilocos Sur and Pangasinan, were fully efficient and weak efficient respectively.
2. The efficient peers and weights of the inefficient DMUs are:
  - a. As to Goal #1- To eradicate extreme poverty and hunger: Ilocos Norte, La Union and Pangasinan.

- b. Under Goal #2 - To achieve universal primary education: only San Fernando City was found to be fully is the efficient peer and weight.
  - c. As to Goal #3 – To promote gender equality and empower women: five (5) cities namely Alaminos City, Laoag City, San Fernando City, Urdaneta City and Vigan City are the efficient peers and weights.
  - d. In terms of Goal #4 – To reduce child mortality: Ilocos Norte, La Union and Pangasinan are the efficient peers and weights of Ilocos Sur.
  - e. As to Goal #5 – To improve maternal health: only the province of Ilocos Sur is the efficient peer and weight of the other three (3) provinces.
  - f. Under Goal #6 – To combat HIV/AIDS, malaria and other diseases: all the DMUs are fully efficient so they don't need an efficient peer and weight.
  - g. In terms of Goal #7 – To ensure environmental sustainability: Ilocos Sur and Pangasinan serve as efficient peers and weights of the other two (2) provinces.
  - h. As to Goal #8 – To develop global partnership for development: Ilocos Norte and La Union serve as efficient peers and weights of Ilocos Sur and Pangasinan.
3. The virtual inputs/outputs or improvements of the provinces/cities to be in the efficient frontier (Potential Improvement of the DMUs) are the following:
- a. Under Goal #1, Ilocos Sur needs potential improvements in the proportion of population below poverty and food threshold to have a corresponding improvement in the poverty gap ratio.
  - b. In Goal #2, except San Fernando City, all the DMUs need potential improvements under net enrolment ratio in elementary education and proportion of pupils starting grade 1 who reach grade 6 to have a corresponding improvement in the primary completion rate.
  - c. As to Goal #3, except for the five (5) cities namely Alaminos City, Laoag City, San Fernando City, Urdaneta City and Vigan City, all the other DMUs need potential improvements
  - d. In terms of Goal #4, Ilocos Sur needs potential improvements in proportion of 1-year old children immunized against measles and proportion of fully immunized children (9-11 months) to have a reduction in the under-five and infant mortality rates.
  - e. Under Goal #5, Ilocos Norte, La Union and Pangasinan need to increase the proportion of births attended by skilled health personnel to have a decrease in maternal mortality.
  - f. As to Goal #6, all the DMUs are fully sufficient so there is no need to have potential improvements in the different input indicators.
  - g. In terms of Goal #7, Ilocos Norte and La Union need to have potential improvements in ratio of area protected to maintain biological diversity to surface area and proportion of households using solid fuels for cooking to have improvements in the corresponding outputs.

- h. In Goal #8, Ilocos Sur and Pangasinan are weak efficient DMUs so they still need potential improvements in the number of botika sa barangay to have corresponding improvements in the outputs.
4. The input/output slacks are the input excesses and output shortfalls.
- No slacks are needed in Goal #1.
  - Input slacks are needed under Goal #2 except for San Fernando City.
  - Input slacks are needed by Candon, Dagupan and San Carlos Cities while output slacks are needed by Ilocos Sur and La Union as to Goal #3.
  - In terms of Goal #4, only Ilocos Sur needs to decrease its input slacks.
  - As to Goal #5, there is no need to have input/output slacks.
  - There is no need to have input/output slacks in Goal #6.
  - In terms of Goal #7, La Union needs to have input slacks while Ilocos Norte needs input/output needs output slacks while Pangasinan needs input and output slacks.
5. Based on the findings, all the best practices of fully efficient DMUs should be adopted by weak efficient and inefficient DMUs for them to be in the efficient frontier and have an efficiency score of 1.00.
6. Best Practices of the efficient DMUs

GOAL	LGU	Best Practices
1. Eradicate Extreme Poverty and hunger	DMU1-Ilocos Norte	Has reduced the proportion of population below food threshold and poverty gap ratio. It achieved target on reducing by 50% the prevalence of underweight children. Has provided decent work for the people
	DMU3-La Union	The province achieved target on reducing by 50% the prevalence of underweight children. Has provided decent work for the people
	DMU4-Pangasinan	Has reduced the proportion of population below food threshold and poverty gap. The province achieved target on reducing by 50% the prevalence of underweight children. Has provided decent work for the people
2. Achieve universal primary education	DMU9-San Fernando City	Has increased the proportion of pupils starting grade 1 who reach grade 6. Most children have completed full course of primary schooling
3. Promote gender equality and empower women	DMU9 San Fernando City	Highly promote gender equality and women empowerment by involving them in the different programs and projects
	DMU11-Alaminos City	Has decreased gender disparity in primary and secondary education
	DMU1-Laoag City	

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		DMU13-Urdaneta City	Share of women in wage employment in the non-agricultural sector
		DMU6-Vigan City	Proportion of seats held by women in the government
4. Reduce mortality rates	child	All LGUs except	Achieved target on the infant mortality rate and under five mortality rate
		DMU2-Ilocos Sur	Higher proportion of one-year old children immunized against measles
5. Improve health	maternal	DMU2-Ilocos Sur	Achieved target on the proportion of births attended by skilled health personnel and improvement of maternal health Has decreased maternal mortality rate
6. Combat HIV/AIDS, malaria, and other diseases		All DMUs	Have achieved higher proportion of cured TB cases under DOTS; achieved targets on prevalence rate with malaria, proportion of TB cases detected under DOTS, death rate associated with rabies, incidence rate and death rate with cholera
7. Ensure environmental sustainability		DMU2-Ilocos Sur DMU4-Pangasinan	Achieved proportion of households with level I, II, II water works and sanitary toilet. Increasing ratio on area protected to maintain biological diversity Decreased proportion of households using solid fuels for cooking.
8. Develop partnership for development	global for	DMU1-Ilocos Norte DMU3-La Union	Increased proportion of barangays with <i>botica sa barangay</i> Increased use of telecommunications through telephone density in communications Increased linkages with internal and external agencies

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## REFERENCES

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- [1] Baldemor, Milagros R. (2010) Performance Efficiency of DMMMSU Colleges and Institutes: A Data Envelopment Analysis Study. Unpublished Dissertation. DMMMSU, La Union
- [2] <http://www.psa.gov.ph>
- [3] Banker, R.D., A. Charnes and W.W. Cooper (1984). Some Models for Estimating Technical and Scale Efficiencies in Data Envelopment Analysis, *Management Science*, 30, 1078–1092.
- [4] Charnes, A., W.W. Cooper and E. Rhodes (1978). Measuring the Efficiency of Decision Making Units, *European Journal of Operational Research*, 2, 429–444.
- [5] Cook, W. and L.M. Seiford (2009). Data Envelopment Analysis (DEA) – Thirty Years on, *European Journal of Operational Research*, 192, 1–17.
- [6] Emrouznejad, A. (2005) Measurement Efficiency and Productivity in SAS=OR, *Journal of Computers and Operation Research*, 32, 1665–1683.
- [7] Emrouznejad, A. and E. Thanassoulis (2005). A Mathematical Model for Dynamic Efficiency Using Data Envelopment Analysis, *Journal of Applied Mathematics and Computation*, 160, 363–3