"...to ensure that this tourism development strategy will produce the expected outcomes; i.e. the target aimed for by 2019, Indonesia needs to thoroughly research its tourism development strategy, its implementation and various other aspects of the tourism sector."

Dr. Ir. Arief Yahya, M.Sc, Minister of Tourism, Republic of Indonesia

UNPAD PRESS

Unpad Press
Gedung Rektorat Unpad, Lantai IV
Jl. Ir. Soekarno Km 21, Jatinangor- 45363
Telp (022) 84288812 Fax (022) 84288896
Email pressunpad@unpad.ac.id
Web http://press.unpad.ac.id

ISBN 9786026242532
9 786026 242532

Tourism and Sustainable Regional Development in Indonesia
IRSA Book Series on Regional Development No. 14
UNPAD PRESS

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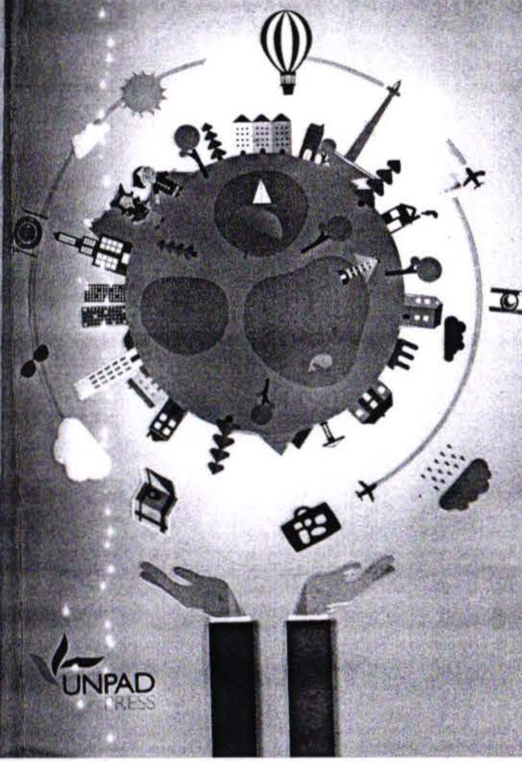
TOURISM & SUSTAINABLE REGIONAL DEVELOPMENT IN INDONESIA



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1 MEASURING PROVINCIAL ECONOMIC EFFICIENCY IN INDONESIA[1)]

Ivantia S. Mokoginta and Miryam L. Wijaya

INTRODUCTION

Regional efficiency is the outcome of jurisdictional competition and regional autonomy (Tiebout 1956; Brennan & Buchanan 1980). When regions are fragmented, people and capital will choose a region to reside. In this case, mobility of people and capital among the regions will create constrains for the government to increase taxes. Tiebout (1956) argued that jurisdictions compete to attract people and capital by providing public goods that are suitable to the needs of the people and capital. On the contrary, these people and capital are likely to move out of the regions that collect taxes at relatively higher rates than other regions which provide comparable quantity of public goods. By so doing, they compete in a similar way producers do in a competitive market situation. As a result, the most efficient jurisdictions could attract the most number of people and capital to reside in pertinent jurisdictions at the least tax rates.

1) We would like to thank the Institute of Research and Community Services, Parahyangan Catholic University, Bandung for providing research funds and Anne-Marie Hilsdon from AUSTRADE and a visiting professor at the Faculty of Social Science and Politics, Parahyangan Catholic University for her invaluable comments. Also to our colleagues at the Center for Economic Studies, reviewers and audiences at IRSA conference in Denpasar, thank you for the comments. Nevertheless, the content of this paper is fully our responsibility.

Furthermore, regional competition disciplines regions to demonstrate Leviathan government behaviour. Brennan and Buchanan (1980) defined the behaviour as maximising revenues or rents by collecting taxes and levies beyond the needs to undertake the basic responsibilities as public goods provider. The behaviour to collect rents is known as rent-seeking activities. Since these activities pull out resources from the economy that could have been allocated for productive activities, there is inefficient usage of economic resources. The rents are equal to the amount of outputs that are foregone from the economy (Buchanan 1980). When people and capital are free to select their residences, government cannot maximise revenues. As such, regional proliferation as well as mobility of people and capital will encourage regional competition, discourage Leviathan government behaviour and, therefore, promotes regional efficiency.

The arguments for regional proliferation and regional efficiency above are based on certain assumptions. The assumption, among others, is that each region should have sufficient autonomy to manage their own affairs. Given the assumption, decentralisation policy can promote efficiency providing free movement of people and capital across regions and regions have sufficient autonomy to manage their own affairs. Balaguer-Coll, Prior, & Tortosa-Ausina (2010) confirmed this argument. Their study on local government in Spain found that regions can be more efficient if they are granted more power or autonomy to manage their own regional affairs.

This study aims to analyse economic efficiency of provinces in Indonesia and identifying the sources of inefficiency. As inputs in the production process, this study will also include roles of government. The role of government in the production process in the new-classical growth theory was first introduced by Barro (1990). Based on this theory, inputs for regional output consist of labour, capital and government.

Efficiency measurement in production processes was introduced by Farrell (1957). This framework has been used to measure efficiency level of various issues including regional economic, public expenditure allocations and public policies. Some studies apply the framework in

conjunction with other issues, such as the roles of economic integration in improving efficiency level of member countries in European Union (Malhotra and Malhotra 2009) and the role of power in promoting regional efficiency in Spain prefectures (Balaguer-Coll, Prior and Tortosa-Ausina 2010). Other studies investigate efficiency level of public expenditure allocations in promoting economic growth in Indonesia's provinces (Tirtosuharto 2009) and in seven East Asia countries (Wang and Alvi 2011). Halkos and Tzeremes (2010) applied the analysis to measure efficiency of investment policies in Greece.

Our study is the first one that measures economic efficiency of provinces in Indonesia and treats government as an input rather than public policy decision-makers. By so doing, this study is focused on analysing the efficiency of regional economic as an entity. This study argues that: first, nationwide efficiency level of provinces in Indonesia was low and declining during the period of 2006 – 2011. Second, regional proliferation policy should also consider economic efficiency level of regions prior proliferations since there is an indication that proliferations in provinces that operated at low efficiency tend to produce new provinces with low level of efficiency.

This study uses DEA, a non-parametric approach that applies Linear Programming technique. The approach is suitable to estimate efficiency level of non-profit organisation, such as regional economy. In this type of organisation, market mechanism does not fully operate in allocating resources or inputs. As a result, measuring absolute efficiency of each region is difficult. DEA proposes relative efficiency principle to overcome the difficulty (Ramanathan 2003, 25-26). This study applies dynamic DEA technique based on window analysis with a three-year-data period in each window or window analysis with width three (see Table 1) to identify the changes of regional economic efficiency overtime. However, since DEA uses Linear Programming rather than econometric modelling, it cannot identify causal relationship between variables. As such, while it can evaluate relative efficiency, it cannot explain the reasons why there is under-utilization of inputs in one area while not in others. This should become other areas for further studies that require different technique of analysis.

This paper will be organized as follows. Part II will explain the frameworks used in this study. These frameworks are the role of government in neoclassical growth theory proposed by Barro (1990) and the efficiency measurement introduced by Farrell (1957). Data and research method will be elaborated in Part III. Part IV presents the reality of regional autonomy which explains the analysis and discussion of findings and some policy proposals to improve efficiency level. Finally the conclusion and limitations of this study will be presented at the end of this paper.

ECONOMIC GROWTH AND EFFICIENCY MEASUREMENT

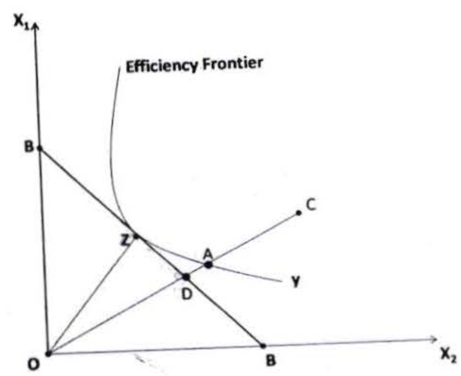
The role of government in economic is first introduced by John Maynard Keynes. He argues that the engine of economic growth is aggregate demand in the economy. Government role affects aggregate demand by increasing government expenditure. The impact of the expenditure on economic will translate into output production. The extent of the impact on output production is determined by a multiplier effect. Keynesian cross explains the way government spending affects the level of output in macroeconomic framework.

While Keynes laid down the importance of government roles in the economy, it does not explain the way or mechanism the roles affect economic growth. Barro (1990) explained that the role of government in production process is the basic framework to understand the way government affects economic growth. He linked the roles of government as public services provider where the services are inputs for private production. He argued that private inputs are not close substitutes for public inputs, particularly when non-rivalry and non-excludability nature of public services are strong. As a result, private sector will not produce these services since earning profits are difficult to achieve. By including the role of government in the production function, he proposed government, besides capital and labour, as an input in production function and, hence, a framework to identify optimum government size. This size measures government efficiency in a production process.

His frameworks have been applied in many studies with mixed results. Aleksandrovich and Upadhyaya (2015) identified the impact of government size on economic growth in three OECD countries, namely USA, Canada and United Kingdom. They found that the size had negative impact on the growth in Canada and United Kingdom, possibly due to crowding-out effect, whereas in the USA, the size did not have significant effect on economic growth. Other studies used disaggregated government expenditure data as determinants of economic growth. These data included government investment, expenditure on education and transfer payments in 14 OECD countries (Hansson and Henrekson 1994), human capital and economic and community services in Pakistan (Asghar, Azim and Rachman 2011). Different types of expenditure result in different impact on economic growth. Despite the differences, all studies agree that government role in economic is essential.

The basic concept of measuring overall (productive) efficiency is first introduced by Farrell (1957). The concept follows the production function-cost theory and frontier analysis. Figure 1 explains the concept. For illustrative purposes, the function represents a case of two inputs, x1,x2, to produce an output, y.

Figure 1. Efficiency Measurement



Economic efficiency (EE) reflects the most efficient production level (y) at the least cost production process in a given relative input costs (BB). In Figure 1, the efficiency is represented by Z. The EE comprises overall technical efficiency (OTE) and allocative efficiency (AE). Based on Figure 1, at C, $OTE = OA/OC$, whereas $AE = OD/OA$. As such, the economic efficiency level of C is $EE = OD/OC$, which is the product of OTE x AE. Figure 1 also explains that Z operates at economic efficiency level whereas C operates at both technical inefficiency and allocative inefficiency. The distance AC is technical inefficiency whereas the distance AD is allocative inefficiency at C. This efficiency framework is the basis of DEA technique.

DEA was first introduced by Charnes, Cooper and Rhodes (CCR model) in 1978 (Sufian and Majid 2007). The aim of DEA technique is to produce envelopment efficiency frontier that serves as production location of entities (production units). These entities are known as Decision Making Unit (DMU) since each entity behaves as a centre of production decision-making unit. The location of data points in the frontier corresponds to DMUs' economic efficiency level. CCR model assumes constant returns to scale (CRS). As such, DMUs that lay along the efficiency frontier are economically efficient since the DMUs operate at CRS. On the contrary, the DMUs lay below the frontier are economically inefficient.

The relative efficiency principle in DEA works as follows: Figure 1 shows that the peer for DMU at C is A since this is the closest peer to DMU at C that operates efficiently. As such, DMU at C needs to reduce the amount of inputs (Xs) to produce the same level of output (y) as DMU at A. By eliminating the inefficiencies in the production process, C will obtain the level of economic efficiency OA, which is at the same level as A. The implications of relative efficiency principle are: first is the characteristics of the DMUs should be relatively homogenous. Second is the reference DMUs does not necessarily meet Pareto efficient criteria.

DEA uses non-parametric technique, namely linear programming model to identify technical efficiency of DMUs under study. The objective function is the weighted average of inputs' utilization of DMUm as measured by θ_m, where m can be any DMU in the sample. This is an input oriented model since it aims at addressing the issue of proportionally reducing the actual utilization of inputs to produce a given quantity of output. The linear programming model is written as follows:

Objective function:

$min_{\theta,\lambda}\theta_m$

Subject to:

Output constraint: $Y\lambda \geq Y_m$

Input constraint: $X\lambda \leq \theta_m X_m$

$\lambda \geq 0$

The Charnes, Cooper and Rhodes (CCR) model above assumes constant returns to scale. As such, the model is also known as Constant Returns to Scale (CRS) DEA model. The assumption becomes the limitation of CRS model since in reality the DMUs can also operate under different production stage, namely increasing or decreasing returns to scale. Adding convexity constraint (λ) into the model relaxes the assumption. The modified model is known as Banker, Charnes and Cooper (BCC) model or Variable Returns to Scale (VRS) DEA model. The constraints corresponds to the scale efficiency of DMUs, i.e. non-decreasing returns to scale (NDRS) i.e. $\sum_{i=1}^{N} \lambda_i \geq 1$ or non-increasing returns to scale (NIRS), i.e. $\sum_{i=1}^{N} \lambda_i \leq 1$. The modified model (BCC model) becomes:

Objective function:

$min_{\theta,\lambda}\theta_m$

Subject to:

Output constraint: $Y\lambda \geq Y_m$

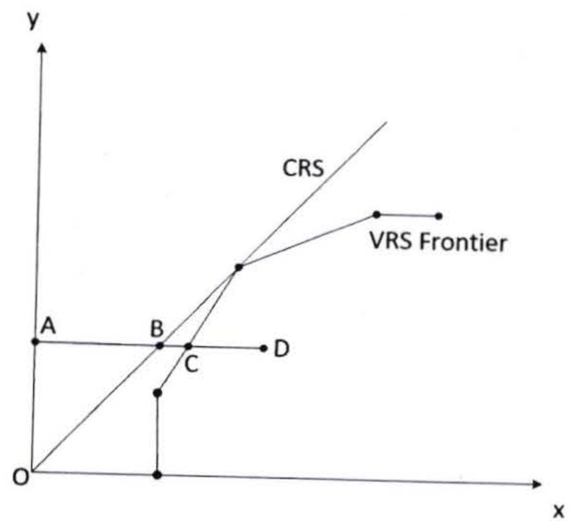
Input constraint: $X\lambda \leq \theta_m X_m$

Convexity (VCR) constraint: $N1'\lambda = 1$

$\lambda \geq 0$

where λ is an $N \times 1$ constant vector and N1 is an $N \times 1$ identity vector. CCR and VCR models provide overall technical efficiency (OTE) and pure technical efficiency (PTE), respectively. The discrepancy of OTE over PTE indicates scale inefficiency. Overall technical efficiency refers to efficiency level of total production process. Pure technical efficiency refers to management efficiency, whereas scale efficiency refers to efficiency due to the size of DMUs (regional provinces). Figure 2 depicts the scale efficiency of DMU at D.

Figure 2. Scale Efficiency



At D, the distance BD refers to technical inefficiency under CRS and CD is technical inefficiency under VRS. Likewise, AB is technical efficiency under CRS and AC is technical efficiency under VRS. The latter is known as pure technical efficiency (PTE). As such, $OTE_{D,CRS} = AB/AD$; $PTE_{D,VRS} = AC/AD$ and $SE_D = AB/AC$ where BC is the scale inefficiency of DMU_D. The ratios above show that $OTE_{D,CRS} = PTE_{D,VRS} \times SE_D$.

DATA AND RESEARCH METHOD

In this study, region is defined as geographical regions, namely provinces in Indonesia where each province comprises of many *kota* (municipalities) and *kabupaten* (districts). The number of provincial regions in this study is 32. DKI Jakarta Province is excluded since four *kota* in Jakarta do not have regional autonomy such as in the case of other *kota* in other provinces. Since these *kota* serve as administrative regions for DKI Jakarta Province, the way inputs are allocated in this province differs from that of the rest of provinces nationwide. By excluding this province, characteristics of the provinces in this study are relatively homogenous. Once the provinces are relatively homogeneous, relative efficiency principle to analyse efficiency level of provinces by using reference DMUs is applicable.

The output is measured by Gross Regional Domestic Product (GRDP) whereas the inputs are labour (population age 15 years or older who have a job), capital (gross capital formations) and government consumptions (government employees' salary, fringe benefits, transportation expenditures, goods and services purchases and other routine expenditures). All variables, except labour which is in number of people, are measured in constant 2000 price. This study used provincial regions' panel data from 2006 – 2011. Secondary data were collected from the statistic office, Badan Pusat Statistik (2010 & 2012b).

The technique of data analysis in this study is dynamic Data Envelopment Analysis (DEA). Each region is treated as a production entity or a Decision-making Unit (DMU). DEA uses linear programming technique to determine the level of input utilization to produce a given amount of output in each province. The most efficient provinces are the best practice provinces in the sample. These are the reference provinces in the sample. In this study, the dynamic DEA technique used is Window Analysis with width three so that the analysis represents inter-temporal efficiency analysis by applying a three-year moving average analysis. As such, the performance of each province is compared to other provinces in a given time as well as its changes in performance over time. Table 1 shows the breakdown of the analysis.

Table 1. Window Breakdown

Window 1	2006	2007	2008			
Window 2		2007	2008	2009		
Window 3			2008	2009	2010	
Window 4				2009	2010	2011

As the Table shows, the analysis is broken down into four windows for each province. By so doing, the number of degree of freedom increases significantly to 192. Data were processed by using Efficiency Measurement System (EMS) software version 1.3 developed by Scheel (2000) which is available at the public domain.

Since DEA is developed based on Farrell's efficiency measurement, it allows decomposition of economic efficiency into allocative efficiency and overall technical efficiency (Sufian and Majid 2007). The former is concerned with selecting the most optimum set of inputs used in the production process, given price of inputs. The latter refers to maximising output given available inputs. DEA technique can measure allocative efficiency provided that prices of inputs are available. This study does not provide the efficiency since the price data are not available. For this reason, this study limits the analysis on overall technical efficiency.

In addition, DEA can also decompose overall technical efficiency into pure technical efficiency and scale efficiency. If overall technical inefficiency is larger than pure technical inefficiency, then there is scale inefficiency in the production process. Pure technical inefficiency could be the results of production plan in converting inputs into outputs, whereas scale inefficiency can be due to the divergence of the decision making units (DMUs) from their most productive scale size. Technically, CRS constraint in the model measures overall technical efficiency, whereas VRS constraint does pure technical efficiency. As such, scale efficiency is the gap between the overall technical efficiency and pure technical efficiency. While all DMUs experience both types of efficiencies, decomposing overall technical efficiency can give insight into the main (dominant) source of inefficiency.

Based on the decomposition, DEA can further analyse the production stages of provinces (Fare et al in Ramanathan 2003, 83-84). Providing that p = optimum value of TE based on CCR; q = optimum value of TE when a CRS constraint is introduced into the model; r = optimum value of PTE when an NIRS constraint is introduced into the model and t = optimum value of PTE when an NDRS constraint is introduced into the model, then:

1. If $p = q$, then the scale efficiency is constant returns to scale;
2. If $q > r$, then the scale efficiency is increasing returns to scale;
3. If $q = r$, then the scale efficiency is decreasing returns to scale. However, if $q < r$, then a new constraint VRS should be added to the model so that
   a. If $q < t$, then the scale efficiency is decreasing returns to scale;
   b. If $q = t$, then the scale efficiency is increasing returns to scale

The scale efficiency indicates the position of provinces' production stage in the production function, namely the early stage if IRS, maturity stage if CRS and saturation stage if DRS. Based on the arguments above, decomposing overall technical efficiency and identifying the stage of scale efficiency as explained above can help public policy makers to propose regional specific policies to improve regional economic performance.

THE REALITY OF REGIONAL AUTONOMY IN INDONESIA

Indonesia has been implementing a decentralization policy since 2000. This policy is guided by Law No.23/2014 on Regional Autonomy previously Law No.22/1999 amended by Law No. 32/2004. The purpose of the policy is to give authority to local governments to manage their own affairs. The argument for the policy is that these governments have more knowledge than the central government about local issues. As such, they should be able to produce regional policies that are relevant to the needs of their people.

As required by the law, the central government delegated most of governmental functions except macroeconomic policies, religious affairs, international relations and security and defence to the second tier of government level, i.e., districts *(Kabupaten)* and municipalities *(Kota)*. Based on the law, provinces as the first tier of government level do not have a hierarchical authority to districts and municipalities since the heads of both tier levels are directly responsible to the Ministry of Home Affairs. In this case, the roles of provinces are limited to supervision and coordination functions within as well as between municipality and district.

Following these new functions, the central government also introduced inter-regional fiscal transfer arrangements known as Balancing Funds. The transfer of funds is guided by Government Regulation 55/2005 on Balancing Fund that complemented Law 33/2004 on Balancing Funds previously Law 25/1999. The financial implication of the authority arrangement above is that district and municipality receive more inter-regional fiscal transfer including block grant, revenue sharing and matching grant, than provinces. The regulation guides the allocations of the funds for all tiers of government level.

Law No. 23/2014 on Regional Autonomy previously Law 22/1999 amended by Law No. 32/2004 also regulates the formation of new jurisdictions. According to the law, the formation should be based on both economic and non-economic factors such as potential of region, capacity of economic, social-cultural and political factors, the number of population and area of geography. Since 2002, the number of regions has increased significantly. By December 2005, the numbers of provinces, districts and municipalities were 33 (from 26 in 1999), 349 (from 268 in 1999) and 91 (from 73 in 1999), respectively (Badan Pusat Statistik 2008). By December 2011, the number of districts and municipalities were 399 and 98, respectively (Badan Pusat Statistik 2014). Finally, by 2013 the number of districts was 413 (Badan Pusat Statistik 2015). These facts indicate that regional proliferations have increased the number of alternative regions that people and capital can choose to reside, which in turn makes those regions compete each other.

Overall Technical Efficiency of Provinces

After more than a decade of implementing regional autonomy, economic performances of provinces remain problematic as demonstrated by economic efficiency of provinces (see Table 2).

Table 2. Overall Technical Efficiency of Provinces

No	PROVINCES	Overall Technical Efficiency				
		2006-2008	2007-2009	2008-2010	2009-2011	Trend
1	NANGGROE ACEH DARUSSALAM	0.641	0.482	0.462	0.449	↓
2	SUMATRA UTARA	0.689	0.464	0.472	0.479	↓
3	SUMATRA BARAT	0.529	0.420	0.435	0.444	↓
4	RIAU	0.642	0.616	0.684	0.656	↑
5	JAMBI	0.854	0.686	0.620	0.484	↓
6	SUMATRA SELATAN	0.516	0.410	0.433	0.433	↓
7	BENGKULU	0.674	0.559	0.545	0.532	↓
8	LAMPUNG	0.519	0.285	0.289	0.299	↓
9	BANGKA BELITUNG[a]	0.327	0.320	0.347	0.379	↑
10	KEPULAUAN RIAU[a]	0.947	0.965	0.944	0.925	↓
11	JAWA BARAT	0.829	0.464	0.473	0.486	↓
12	JAWA TENGAH	0.577	0.286	0.305	0.314	↓
13	DI JOGJA	0.455	0.267	0.281	0.296	↓
14	JAWA TIMUR	0.813	0.431	0.446	0.468	↓
15	BANTEN[a]	0.829	0.522	0.511	0.528	↓
16	BALI	0.480	0.304	0.317	0.322	↓
17	NUSA TENGGARA BARAT	0.344	0.222	0.233	0.237	↓
18	NUSA TENGGARA TIMUR	0.464	0.243	0.236	0.221	↓
19	KALIMANTAN BARAT	0.422	0.315	0.334	0.339	↓
20	KALIMANTAN TENGAH	0.338	0.305	0.330	0.329	↓
21	KALIMANTAN SELATAN	0.612	0.400	0.421	0.424	↓
22	KALIMANTAN TIMUR	0.981	0.957	0.986	0.972	↓
23	SULAWESI UTARA	0.469	0.372	0.403	0.415	↓
24	SULAWESI TENGAH	0.433	0.333	0.351	0.364	↓
25	SULAWESI SELATAN	0.485	0.352	0.359	0.367	↓
26	SULAWESI TENGGARA	0.336	0.261	0.267	0.273	↓
27	GORONTALO[a]	0.205	0.157	0.162	0.171	↓
28	SULAWESI BARAT[a]	0.551	0.255	0.252	0.268	↓
29	MALUKU	0.967	0.805	0.759	0.717	↓
30	MALUKU UTARA[a]	0.754	0.499	0.454	0.428	↓
31	PAPUA BARAT[a]	0.427	0.387	0.448	0.536	↑
32	PAPUA	0.375	0.329	0.319	0.302	↓
	NATIONAL AVERAGE	0.578	0.427	0.434	0.433	↓

Notes: aprovinces established after 1999; highlighted provinces are benchmark provinces
Source: Authors' data processing

Table 2 shows that overall technical efficiency nationwide has been low with the level below 60% since 2006 up to 2011. This level indicates that nationwide regions required only about 60% of existing inputs to produce the same amount of output during the period of study. Furthermore, the efficiency level was declining from 57.8% to 43.3%. However, there were three provinces with increasing overall technical efficiency, albeit low. These provinces were Riau, Bangka Belitung and Papua Barat.

Table 2 also shows wide spread of individual provinces efficiency level nationwide. The efficiency levels of Kepulauan Riau and Kalimantan Timur provinces were above 90% which was well above the level of the rest of provinces. These two provinces were reference provinces nationwide. However, there were provinces with below nationwide efficiency level. These provinces were Bangka Belitung in Sumatra Island, DI Jogjakarta, Bali, all provinces in Nusa Tengggara Island (Nusa Tenggara Barat, Nusa Tenggara Timur), all provinces in Kalimantan Island except Kalimantan Timur (Kalimantan Barat, Kalimantan Tengah, Kalimantan Selatan), all provinces in Sulawesi Island (Sulawesi Utara, Sulawesi Tengah, Sulawesi Selatan, Sulawesi Barat, Sulawesi Tenggara and Gorontalo) and all provinces in Papua (Papua and Papua Barat).

Technical efficiency in some provinces have declined significantly during the period of study. They were Jambi, Jawa Barat, Banten and Jawa Timur. The efficiency level of Jambi was declining from 0.854 to 0.484, Jawa Barat from 0.829 to 0.486, Banten from 0.829 to 0.528 and Jawa Timur from 0.813 to 0.468. These findings seem to suggest that while most of below nationwide efficiency level provinces were out of Java Island, most of provinces in Java Island experienced rapid declined in their efficiency level. Further study might shed light on the factors that underpinned these findings.

In addition, low efficiency level of parent province is likely to produce low efficiency level new province. The level of efficiency of both new province (Papua Barat) and its parent region (Papua) were low. Sulawesi Utara (parent region) and Gorontalo (new region) provinces as well as Sulawesi Selatan (parent region) and Sulawesi Barat (new region) provinces seem to follow similar pattern. It seems that when economic performance (i.e., efficiency level) of a region is already below the national average, there is an indication that regional proliferation seems to make the efficiency level worse. Based on these arguments, it can be inferred that regional proliferation policy should consider regional economic efficiency level of the initial province.

The overall technical efficiency can also be used to evaluate the outcomes of regional proliferation policy by comparing the efficiency level of each province to the national efficiency level (see Table 3 and Table 4). The highlighted provinces were those with efficiency level above the national average. As the Tables show, the number of provinces with above average efficiency level was changing over time. However, the two provinces, i.e., parent and new provinces that consistently had above national average efficiency level during the period of study at more than 60% efficiency level. These provinces were Riau and Kepulauan Riau. Kepulauan Riau was a fragmented province of Riau. This is a case where regional fragmentations do not necessarily bring down the efficiency level of the parent and new province to below national average.

Furthermore, there were fewer provinces with efficiency level at or above the national average in 2011 compared to 2006. In 2006, the number of provinces with efficiency level above national average was 15. By 2011, the number was declining to 12 provinces. At the same time, the level of efficiency nationwide was also declining from 63.55% in 2006 to 42.25% in 2011. These facts show the extent of regional economic inefficiency during the period of study is worsening. These findings also suggest that after more than a decade of decentralisation policy implementation, regional efficiency remains an issue.

Decomposing Overall Technical Efficiency of Provinces

Decomposing overall technical efficiency into pure technical efficiency and scale efficiency could shed lights on the causes of low overall technical efficiency. The decomposition shows that each province has

Table 4. Efficiency Level of Provinces (2009 – 2011)

Ranking	2009		Ranking	2010		Ranking	2011	
1	BENGKULU	1	1	KALIMANTAN TIMUR	0.9636	1	KALIMANTAN TIMUR	0.9447
2	KALIMANTAN TIMUR	0.9768	2	KEPULAUAN RIAU	0.8781	2	KEPULAUAN RIAU	0.8849
3	KEPULAUAN RIAU	0.9604	3	MALUKU	0.7126	3	MALUKU	0.6597
4	MALUKU	0.7773	4	RIAU	0.673	4	PAPUA BARAT	0.6478
5	JAMBI	0.7768	5	PAPUA BARAT	0.5492	5	RIAU	0.597
6	RIAU	0.6494	6	BANTEN	0.5137	6	BANTEN	0.5359
7	BANTEN	0.5173	7	JAWA BARAT	0.4864	7	JAWA BARAT	0.4941
8	JAWA BARAT	0.4666	8	JAWA TIMUR	0.4716	8	SUMATRA UTARA	0.4881
9	SUMATRA UTARA	0.4659	9	SUMATRA UTARA	0.4694	9	JAWA TIMUR	0.4863
10	NANGGROE ACEH DARUSSALAM	0.4436	10	NANGGROE ACEH DARUSSALAM	0.447	10	SUMATRA BARAT	0.4517
11	JAWA TIMUR	0.4354	11	SUMATRA BARAT	0.4424	11	NANGGROE ACEH DARUSSALAM	0.4515
12	SUMATRA SELATAN	0.4352	12	MALUKU UTARA	0.4407	12	KALIMANTAN SELATAN	0.4266
13	SUMATRA BARAT	0.4324	13	SUMATRA SELATAN	0.4302	13	SULAWESI UTARA	0.4219
14	MALUKU UTARA	0.425	14	SULAWESI UTARA	0.4264	14	SUMATRA SELATAN	0.4184
15	KALIMANTAN SELATAN	0.4167	15	KALIMANTAN SELATAN	0.4241	15	MALUKU UTARA	0.4178
16	PAPUA BARAT	0.4005	16	BANGKA BELITUNG	0.3972	16	BANGKA BELITUNG	0.4085
17	SULAWESI UTARA	0.3903	17	SULAWESI TENGAH	0.3692	17	SULAWESI SELATAN	0.3762
18	SULAWESI SELATAN	0.3535	18	SULAWESI SELATAN	0.3669	18	SULAWESI TENGAH	0.3707
19	PAPUA	0.3524	19	KALIMANTAN TENGAH	0.341	19	JAMBI	0.3481
20	SULAWESI TENGAH	0.3493	20	KALIMANTAN BARAT	0.3401	20	KALIMANTAN BARAT	0.3432
21	KALIMANTAN BARAT	0.3257	21	JAMBI	0.3232	21	BALI	0.327
22	BANGKA BELITUNG	0.3167	22	BALI	0.3214	22	JAWA TENGAH	0.3234
23	KALIMANTAN TENGAH	0.3156	23	JAWA TENGAH	0.3159	23	KALIMANTAN TENGAH	0.322
24	BALI	0.3123	24	DI JOGJA	0.3013	24	LAMPUNG	0.3164
25	JAWA TENGAH	0.2998	25	BENGKULU	0.3002	25	DI JOGJA	0.3065
26	LAMPUNG	0.2942	26	PAPUA	0.2862	26	BENGKULU	0.2972
27	DI JOGJA	0.2744	27	LAMPUNG	0.2851	27	SULAWESI BARAT	0.2867
28	SULAWESI TENGGARA	0.2674	28	SULAWESI BARAT	0.2723	28	SULAWESI TENGGARA	0.2784
29	SULAWESI BARAT*	0.2436	29	SULAWESI TENGGARA	0.2695	29	PAPUA	0.26
30	NUSA TENGGARA BARAT	0.233	30	NUSA TENGGARA BARAT	0.2348	30	NUSA TENGGARA BARAT	0.2387
31	NUSA TENGGARA TIMUR	0.2305	31	NUSA TENGGARA TIMUR	0.2212	31	NUSA TENGGARA TIMUR	0.211
32	GORONTALO	0.1551	32	GORONTALO	0.1742	32	GORONTALO	0.1808
	AVERAGE EFFICIENCY	0.4466		AVERAGE EFFICIENCY	0.4201		AVERAGE EFFICIENCY	0.4225

Note: efficiency of highlighted provinces is higher than national average efficiency
Source: Authors' calculations

both pure technical efficiency and scale efficiency issue. However, one of the issues dominates the other (see Table 5).

Table 5 indicates that both pure technical efficiency and scale efficiency were declining nationally. Furthermore, the main cause of low and declining overall technical efficiency nationwide is pure technical efficiency. However, the cause of inefficiency by provinces differs. Table 5 shows that 20 out of 32 provinces under study were experiencing pure technical inefficiency whereas 12 provinces were having scale inefficiency.

As explained in the previous section, pure technical efficiency concerns with production process of converting inputs into outputs. Consequently, pure technical inefficiency might be due to, among others, quality of inputs. An indicator to measure this quality is the productivity of inputs (see Table 6).

Table 5. Decomposition of Overall Technical Efficiency

No	PROVINCES	Pure Technical Efficiency (PTE)					Scale Efficiency (SE)					Main Source of Inefficiency
		2006-2008	2007-2009	2008-2010	2009-2011	Average	2006-2008	2007-2009	2008-2010	2009-2011	Average	
1	NANGGROE ACEH DARUSSALAM	0.657867	0.487733	0.469367	0.453967	0.51723	0.974483	0.987197	0.983792	0.98923	0.98368	PTE
2	SUMATRA BARAT	0.543967	0.427667	0.450033	0.469533	0.4728	0.972631	0.981534	0.967612	0.945818	0.9669	PTE
3	RIAU	0.743733	0.6851	0.817233	0.748667	0.74868	0.894327	0.902491	0.837127	0.879703	0.87841	PTE
4	JAMBI	0.9055	0.834033	0.772267	0.6014	0.7783	0.940662	0.834928	0.806193	0.816792	0.84964	PTE
5	SUMATRA SELATAN	0.5782	0.547467	0.5932	0.589667	0.57713	0.891426	0.749711	0.729735	0.735185	0.77651	PTE
6	BENGKULU	0.7382	0.716667	0.728	0.707767	0.72266	0.917934	0.726423	0.689796	0.688252	0.7556	PTE
7	LAMPUNG	0.525633	0.393367	0.428467	0.4623	0.45244	0.989108	0.726399	0.677964	0.64781	0.76032	PTE
8	KEPULAUAN RIAU	0.968767	0.9685	0.958033	0.957733	0.96326	0.978199	0.99693	0.984847	0.965302	0.98132	PTE
9	DI JOGJA	0.5226	0.343033	0.351667	0.3623	0.3949	0.870961	0.781286	0.799615	0.81691	0.81719	PTE
10	BALI	0.523	0.335233	0.342633	0.3444	0.38632	0.91975	0.90796	0.924403	0.934059	0.92154	PTE
11	NUSA TENGGARA BARAT	0.4141	0.2977	0.3071	0.306467	0.33134	0.831969	0.746352	0.761329	0.773055	0.77818	PTE
12	NUSA TENGGARA TIMUR	0.4947	0.266433	0.271767	0.269333	0.32556	0.939654	0.914203	0.867956	0.820012	0.88546	PTE
13	KALIMANTAN BARAT	0.446267	0.336767	0.3532	0.357733	0.37349	0.94605	0.935079	0.946753	0.948907	0.9442	PTE
14	KALIMANTAN TENGAH	0.443667	0.4445	0.484533	0.483833	0.46413	0.761531	0.687506	0.68099	0.679351	0.70234	PTE
15	KALIMANTAN SELATAN	0.6576	0.426333	0.442933	0.439667	0.49163	0.929602	0.937067	0.951482	0.964246	0.9456	PTE
16	SULAWESI UTARA	0.602967	0.537633	0.578133	0.577933	0.57417	0.778062	0.69194	0.697936	0.718347	0.72157	PTE
17	SULAWESI TENGAH	0.553233	0.4617	0.486	0.485533	0.49662	0.782312	0.721424	0.722382	0.750664	0.7442	PTE
18	SULAWESI SELATAN	0.530367	0.486633	0.488167	0.496933	0.50053	0.91259	0.72344	0.735061	0.738439	0.77738	PTE
19	SULAWESI TENGGARA	0.5368	0.462567	0.486267	0.481833	0.48437	0.664353	0.565081	0.550239	0.566888	0.58664	PTE
20	PAPUA	0.4811	0.439167	0.414767	0.374067	0.42728	0.779572	0.749787	0.772608	0.809942	0.77798	PTE
21	SUMATRA UTARA	0.8539	0.805533	0.808633	0.8054	0.81837	0.802993	0.576789	0.58325	0.595295	0.63958	SE
22	BANGKA BELITUNG	0.822333	0.809367	0.8382	0.822067	0.82299	0.397088	0.395146	0.418052	0.46549	0.41894	SE
23	JAWA BARAT	1	1	0.9987	1	0.99968	0.828833	0.464433	0.473979	0.486233	0.56337	SE
24	JAWA TENGAH	0.8944	0.8904	0.8874	0.884633	0.88921	0.645274	0.321337	0.343842	0.355232	0.41642	SE
25	JAWA TIMUR	1	1	0.9979	1	0.99948	0.812933	0.430933	0.447025	0.468033	0.53973	SE
26	BANTEN	0.895467	0.893733	0.939333	0.978	0.92663	0.923921	0.583883	0.54395	0.540003	0.64794	SE
27	KALIMANTAN TIMUR	1	0.998167	1	1	0.99954	0.980867	0.958804	0.9857	0.971567	0.97423	SE
28	GORONTALO	0.929033	0.883333	0.932267	0.8986	0.91081	0.221232	0.178481	0.174507	0.190427	0.19116	SE
29	SULAWESI BARAT	0.895567	0.875233	0.931767	0.9111	0.90342	0.610266	0.291746	0.271892	0.297329	0.36781	SE
30	MALUKU	0.984433	0.954033	0.9515	0.9123	0.95057	0.982608	0.843508	0.798331	0.786059	0.85263	SE
31	MALUKU UTARA	0.982333	0.9632	0.988033	0.970167	0.97593	0.766624	0.516823	0.459242	0.441446	0.54603	SE
32	PAPUA BARAT	0.974467	0.9378	0.990933	1	0.9758	0.438612	0.41346	0.451833	0.535567	0.45987	SE
	NATIONWIDE	0.720944	0.653407	0.671514	0.661042	0.67673	0.815201	0.695065	0.688732	0.69755	0.72414	PT

Note: data in highlighted columns are used to identity sources of inefficiency
Source: Authors' data processing

Table 6 shows that while labour productivity was increasing, this was not the case for capital and government productivities. Labour productivity was increasing from 18.53 to 19.22 during the period of study. However, capital and government productivities were declining from 6.94 to 5.56 and 9.69 to 9.01, respectively. The data in Table 6 seems to suggest that increasing labour productivity could not compensate declining productivities of capital and government. As a result, nationwide economic efficiency was also declining.

Table 6. Input Productivity of Provinces (Rp per Unit Input)

INDICATORS	2006	2007	2008	2009	2010
GRP/LABOR	18.53	18.84	18.78	19.92	18.66
GRP/CAPITAL	6.94	6.43	6.17	6.65	5.74

In the era of regional autonomy, the role of local government becomes critical. Despite the importance of the role, Tirtosuharto (2009) found that after the implementation of regional autonomy, the allocation of provincial government expenditures as measured by current expenditure and capital expenditure did not significantly contribute to economic growth. His finding was also supported by: First, overall local government budget allocations were more concentrated on routine expenditures than development expenditures. In 2011, about 67.5% of local government spending was allocated for routine expenditures and only 32.5% for development expenditures (Kementrian Keuangan 2012, 2). These findings indicate inefficient budget allocations.

Second, the capacity of local government to manage their regions remains an issue. The capacity is measured by using Economic Governance Index (EGI)2) developed by Regional Autonomy Watch or *Komite Pemantauan Pelaksanaan Otonomi Daerah (KPPOD)*. The national average index at provinces is 62.6 on the scale from 0 to 100. Bali province has the highest index at 70.88 and Maluku province has the lowest index at 51.85 (Calculated from *Komite Pemantauan Pelaksanaan Otonomi Daerah,*, 2008 & 2011). Low level of local government capacity to manage their regions is a concerned.

Third, rent-seeking activities due to business uncertainty (Kuncoro 2006). Some forms of the activities include lobbying to win a particular project and gaining protections and exclusive monopoly rights. In some cases, government regulations seem to be designed to extract rents, such as large number of permits that must be obtained to open and run a business. These regulations might encourage bribery to reduce the number of permits required by businesses. Based on the arguments above, rents take out resources and lower production level in the economy. All of the above factors might contribute to provincial government inefficiency which in the era of regional autonomy is also a concern.

DEA technique can also identify the stage of scale efficiency (Table 7).

2) EGI comprises nine sub-indices, including management of infrastructure, local government programmes to stimulate business activities, land access, local government – business interactions, transaction costs (related to businesses' fees), business permit, security and conflict resolutions, capacity and integrity of local government heads and quality of local government regulations (Komite Pemantauan Pelaksanaan Otonomi Daerah 2008, 6).

Table 7 shows that the scale efficiency of some provinces was IRS. This scale corresponds to the early stage of production process. Consequently, these provinces can still increase their outputs by utilizing their idle inputs. On the contrary, other provinces have entered saturation stage as indicated by DRS scale efficiency. For these provinces increasing input utilization is unlikely to increase their output. At this stage, these provinces need innovations in sciences, technology and strategies to manage their provinces to improve productivity level of existing inputs or increase the amount of inputs to increase production.

Table 7 Scale Efficiency of Provinces

No	PROVINCES	Economies of Scale											
		Window 1			Window 2			Window 3			Window 4		
		2006	2007	2008	2007	2008	2009	2008	2009	2010	2009	2010	2011
1	NANGGROE ACEH DARUSSALAM	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
2	SUMATRA BARAT	IRS	IRS	IRS	IRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
3	RIAU	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
4	JAMBI	IRS	IRS	CRS	IRS	DRS	DRS	DRS	DRS	IRS	DRS	IRS	IRS
5	SUMATRA SELATAN	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
6	BENGKULU	IRS	IRS	IRS	IRS	IRS	CRS	IRS	CRS	IRS	CRS	IRS	IRS
7	LAMPUNG	IRS	IRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
8	KEPULAUAN RIAU	CRS	IRS	IRS	CRS	DRS	IRS	CRS	IRS	DRS	CRS	DRS	DRS
9	DI JOGJA	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
10	BALI	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
11	NUSA TENGGARA BARAT	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
12	NUSA TENGGARA TIMUR	IRS	DRS	DRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
13	KALIMANTAN BARAT	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
14	KALIMANTAN TENGAH	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
15	KALIMANTAN SELATAN	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
16	SULAWESI UTARA	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
17	SULAWESI TENGAH	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
18	SULAWESI SELATAN	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
19	SULAWESI TENGGARA	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
20	PAPUA	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
21	SUMATRA UTARA	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
22	BANGKA BELITUNG	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
23	JAWA BARAT	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
24	JAWA TENGAH	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
25	JAWA TIMUR	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
26	BANTEN	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS
27	KALIMANTAN TIMUR	CRS	CRS	DRS	CRS	DRS	DRS	CRS	CRS	DRS	CRS	DRS	DRS
28	GORONTALO	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
29	SULAWESI BARAT	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
30	MALUKU	CRS	DRS	DRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
31	MALUKU UTARA	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS
32	PAPUA BARAT	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS

Notes: Constant Returns to Scale (CRS); Increasing Returns to Scale (IRS); Decreasing Returns to Scale (DRS)
Source: Authors' data processing

Most of provinces with below national average overall technical efficiency were at the early stage of production process (IRS). This stage indicates that these provinces can increase their production level by utilising more of their idle inputs. In other words, they do not need to increase the amount of inputs to produce more outputs. However, the case is different for Sulawesi Selatan province. While this province is one of the provinces with below national average efficiency level, its production stage was at declining stage since its scale efficiency was DRS. As a result, Sulawesi Selatan needs innovations in the production process to increase the productivity of existing inputs or additional inputs to produce more outputs. Based on the arguments above, different scale efficiency requires different public policy design since the production issues on hand differs.

CONCLUSIONS

This study confirms that the economic efficiency level of provinces nationwide is low and declining. In 2006, the level was 57.8%. This level declined to 43.3% in 2011. These findings suggested that less than 60% of available inputs were utilized to produce existing outputs. The idle capacity indicated that the stage of production process nationwide was increasing returns to scale. However, the efficiency level by province is varied significantly. There were two provinces that serve as benchmarks for the rest of provinces since their inputs utilization was above 90%. These two provinces were Kepulauan Riau and Kalimantan Timur provinces. However, their scale efficiency (decreasing returns to scale) suggested that these two provinces were on saturated production stage which indicated that they need to innovate to increase productions.

This study also shows that the main sources of inefficiency in provinces might be due to either pure technical inefficiency or scale inefficiency. Twenty out of 32 provinces experienced pure technical inefficiency whereas the rest 12 provinces had scale inefficiency. These main sources of inefficiency should be used as a basis to design public policy proposals aiming at improving the economic efficiency level. The proposals could include innovations in managing these

provinces such as new strategies to improve the quality of inputs used in the productions of public goods and services. In the era of regional autonomy, the roles of local government in designing public policies are crucial. As a result, these governments have to manage their regions professionally.

In addition, this study shows that regional proliferations in inefficient regions tend to create inefficient new regions. This is the case with Sulawesi Selatan and Sulawesi Barat provinces, Sulawesi Utara and Gorontalo provinces and Papua and Papua Barat provinces. These findings seem to suggest that regional proliferation policies should also consider the efficiency level of initial regions.

Finally, there are areas for further studies to complement the above findings. First is to explore causative factors that can explain the reasons why certain provinces such as Riau, Bangka Belitung and Papua Barat had increasing overall technical efficiency whereas the rest of the provinces had not. Second is to explore allocation efficiency of regional economies provided that prices information (or their proxies) for all inputs are available. Third is to identify causative factors of why some regions have high efficiency level whereas others do not. More information regarding these issues could improve public policy proposal.

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