Small-Medium Industries, which should be Labeled First-Rate?

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Abstract: Having the first-rate is a privilege since it means it will be the priority above all. The common practice of the government to define the first-rate small-medium industries is by projecting the value-added of excess primary product which can be converted into industrial products. In fact, this way does not bring significant improvement to the perceived first-rate industries. Thus, this paper aims to propose a more appropriate way in defining the first-rate of industry sector from existing industries instead of projection of value-added of primary product. Using Free Disposal Hull (FDH) Analysis consists of six indicators as the output and one indicator as the input, the first-rates of small-medium industries in Nusa Tenggara Barat Province are determined. The result is, only three regions where the perceived first-rate industry are verified by the FDH analysis namely for Lombok Barat region, Lombok Tengah region, Lombok Timur region. Three other regions, namely Sumbawa Barat region, Kabupaten Bima region, and Kota Bima regions even show the opposite result, where the perceived first-rate industries are actually the exception in the FDH analysis result.

Keywords: first-rate; small-medium industry; free disposal hull analysis

1. Introduction

In 1998 through the presidential decree, food & beverage have been specified as the core competence of Dompu and Kabupaten Bima. On 2011, handicraft has been specified as the core competence of Kota Mataram and Lombok Barat through the ministry of industry regulation, as well as food & beverage of Lombok Timur and Sumbawa. On 2012, food & beverage again specified as the core competence of Sumbawa Barat. Then in 2013, handicraft has been specified as the core competence of Lombok Tengah. It has also been specified that fabric & clothing is the core competence of Kota Bima, and food & beverage is the core competence of Lombok Utara. Despite continual program with the focus on those core competencies, industry sector contribution to Nusa Tenggara Barat Province's GDP never far from the range 4,41 % - 7,78%, with average 6,08 % on a decade. The numbers even decreasing to the latest years.

The common practice of defining the core competence of a region is using Location Quotient Analysis (LQ Analysis) and Shift-Share Analysis (Sanjaya, 2014; Wicaksono, 2011). LQ Analysis defines the sector's contribution, while Shift-Share Analysis defines the sector's competitiveness, in the specific region compared to the respective sectors on a larger scale, i.e. local compared to national.

Those two approaches especially LQ Analysis, furthermore adapted to define the core competence of the industry sector. When there is a primary product with high LQ, it is often assumed that the industrialized product will also have a high LQ and defined as the first-rate industrial product of the region. It is a drawback because it is not always the case, since to produce a good quality product, an industry has to have good technology, reliable workforce, an effective method, an efficient budget, and not just abundance of raw materials. However, contribution and competitiveness of industry also show the predominance of an industry. Thus, this paper aims to propose a more appropriate way in defining the first-rate of industry sector which produces secondary product (processed primary product), using input-output analysis called Free Disposal Hull (FDH) Analysis (Marchand et al., 1984). All factors that affect the contribution, competitiveness, and even potential of industry taken as an output, while the budgets to keep those industries alive taken as an input.

FDH Analysis shows that the ones deserved to be labeled first-rate are those with minimum input yet give maximum output. By graph, it is positioned on the FDH hull. This analysis can support for better governance, in a sense that objective and reasonable planning will be delivered for effective development. Refer to the strategic planning, the government can decide to focus its program either for the betterment of the first-rate industry or development of other industries.

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As for the organization of this paper, methodology including indicators and scoring scheme are discussed in the next section. In the third section, result and discussion are depicted, showcasing the application of the proposed approach. As for the closing, the conclusion is given at the end of the paper.

2. Method

The first-rate industry was determined following the concept of Free Disposal Hull analysis (FDH) where it is taking into account the input and output of the observed unit, to assess its efficiency. Thus, it is also important to determine the indicators of input and output to assign efficiency of the observed unit appropriately.

1.1 Indicators

In selecting the indicators, it needs to be considered whether the indicators are related to the purpose of use, does the indicator contain important information not contained in other indicators, does it contain information that could interfere the notion of technical efficiency, is the data available and reliable? [7]. In more simple terms, it is called RACER (Relevant, Accepted, Credible, Easy, Robust) [8]. These indicators are then classified into input indicators and output indicators. Only one indicator is determined as an input indicator. It is the government budget where it shows the intervention of a government to guarantee the establishment of an industry sector.

Output indicators consist of six items, i.e. number of industries, number of manpower, unit price, total production value, monthly consumption, and the ratio of consumption-local production. Number of industries shows how popular some industry in particular region. This popularity could either influenced by tradition, primary product available, or the skill of manpower in the area. Number of manpower shows how big the workforce is in doing the same kind of thing, the bigger the number, the more uniform the skill is. For instance, in some area people more likely to have the ability to make handicraft, while in other area people more skillful in making food products. Unit price is somehow related to the type of product. Common product for daily consumption relatively has a lower price compared to construction material/ electronic products. Every type of industry has a product as the output of its economic activity, and the total production value shows how much it is produced per year. This total production value will be recorded as GDP. Thus, it will determine which industry type contribute better to the region's GDP. An industry with high unit price seemed the best to be developed as it is expected to contribute to high GDP. This not always true, because how often a product is consumed and produced also affects GDP. For instance, a low-price product which frequently produced and consumed is possible to record the same GDP with a high-price product which occasionally produced and consumed. Thus, the indicator of monthly consumption taken into account. High production projects a high GDP, but production will be a waste if the monthly consumption is low. The opposite way, if the consumption is high, there is an opportunity to push more production by developing the respective industry. Thus, the ratio of consumption-local production also taken into account.

1.2 Scoring Scheme

The scoring reflects the positive effects or benefits of industry activities that consumed up some cost (expenditure), expressed through the mentioned output indicators which later on regarded as performance (P_i)[9].

In gaining the score, we first need to normalize the value of all indicators, for all types of the observed units (types of industries), by dividing it by the average value of the respective indicator. Then, the final performance score of the observed unit or industry (i) itself may be obtained by

$$P_i = \sqrt[M]{\prod_{m=1}^{M} Y_{im}} \quad (1)$$

where Y_{im} is the normalized value of indicator m in the observed industry i.

As seen, we suggest a geometric mean (over arithmetic mean, for instance) because from the public sector's perspective, as there is no barrier, indicators are not independent of one another or external factors. Thus, it is felt important to incorporate their interplay to a certain extent [10].

By the performance (P_i) measurement, the decision maker had an outlook on the performance index of one industry type. However, it is not strong enough to be the basis to justify the first-rate industry, because to reach such performance index, there must have been some expenditures spent. Thus, we also need to measure the industry efficiency by a tool called Free Disposal Hull (FDH) analysis.

In the FDH analysis, we compare all industry types in the region. Every industry type carry information about their cost or expenditure as its input and performance index as its output. The plot of this information allows us to see which ones are good with their efficiency (the ones lies on the hull) and which ones are not so good (the ones lies relatively far from the hull), as shown in Figure 1.

3. Result and Discussion

This analysis applied to the industry units in Nusa Tenggara Barat Province, which majority is a small-medium industry. Those industries categories into five different type, i.e. food and beverage; fabric and clothing; chemical and construction material; metal and electronic; and handicraft. Data collected for the performance calculation are from a decade (2006-2016).

The performance index of every small-medium industry type, for all-region in Nusa Tenggara Barat Province shown in Table 1. Refer only to the performance index, if we compare the type industry among the regions, Lombok Timur is the best for food & beverage industry; Lombok Tengah is the best for fabric & clothing industry

as well as chemical & construction material industry and handicraft industry; Kota Mataram is the best for metal & electronic. If we look into a particular region, food & beverage industries become the first-rate in Lombok Timur. Fabric & clothing industries become the first-rate in Kabupaten Bima. Chemical & construction material industries become the first-rate in Sumbawa Barat. Metal & electronic industries become the first-rate in Kota Mataram, Lombok Utara, Sumbawa, Dompu, and Kota Bima. Handicraft industries become the first-rate in Lombok Barat and Lombok Tengah. However, if we take into account the expenditure that has been spent by the government to support those small-medium industries, the result might be different.

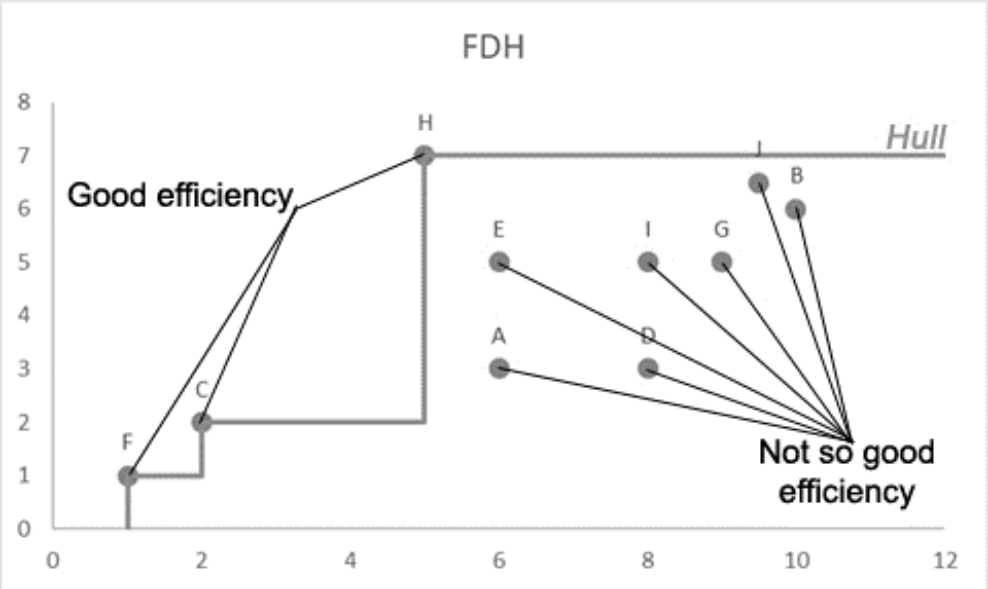

Figure 1. Free Disposal Hull Analysis

Table 1: Performance Index

Industry & Indicator		A	B	C	D	E	F	G	H	I	J
Food & Beverage	1	0,98	0,66	2,94	3,11	0,33	0,23	0,47	0,20	0,92	0,17
	2	0,93	0,81	2,02	4,38	0,07	0,15	0,55	0,21	0,66	0,22
	3	0,05	1,12	0,80	6,89	0,06	0,07	0,16	0,16	0,06	0,63
	4	3,97	1,06	1,11	1,90	0,14	0,13	0,81	0,05	0,55	0,28
	5	1,12	0,97	0,97	0,97	0,97	0,97	0,97	0,97	0,97	1,12
	6	3,51	0,90	0,70	0,71	0,63	0,75	0,70	0,10	0,69	1,31
	P_i	*0,94*	*0,91*	*1,24*	*2,23*	*0,22*	*0,25*	*0,53*	*0,18*	*0,48*	*0,46*
	In	*0,90*	*0,93*	*0,98*	*1,33*	*0,58*	*0,73*	*1,58*	*0,93*	*1,26*	*0,80*
Fabric & Clothing	1	0,33	0,29	5,79	1,43	0,09	0,28	0,46	0,24	0,83	0,26
	2	1,14	0,80	4,25	1,30	0,02	0,30	0,46	0,22	1,06	0,45
	3	1,24	1,73	0,88	0,63	1,13	1,31	1,23	0,38	0,51	0,96
	4	3,96	0,55	2,32	0,91	0,09	0,33	0,29	0,10	1,04	0,41
	5	1,28	0,93	0,93	0,93	0,93	0,93	0,93	0,93	0,93	1,28
	6	3,07	0,40	1,03	0,33	0,35	1,10	0,37	0,15	1,34	1,87
	P_i	*1,39*	*0,66*	*1,91*	*0,83*	*0,19*	*0,58*	*0,54*	*0,26*	*0,91*	*0,69*
	In	*0,86*	*0,80*	*1,12*	*1,36*	*0,48*	*0,45*	*0,75*	*0,82*	*1,13*	*2,23*
Chemical & Construction Material	1	0,45	1,24	2,60	1,49	0,70	0,70	1,15	0,26	0,94	0,46
	2	0,48	0,62	3,50	1,84	0,10	0,85	1,37	0,26	0,69	0,30
	3	0,25	2,33	3,39	1,17	0,43	0,53	0,27	0,73	0,59	0,32

Industry & Indicator		A	B	C	D	E	F	G	H	I	J
	4	5,26	0,33	1,15	0,68	0,34	0,52	1,46	0,15	0,49	0,30
	5	1,44	0,89	0,89	0,89	0,89	0,89	0,89	0,89	0,89	1,44
	6	3,19	0,37	0,83	0,25	0,94	1,89	1,12	0,21	0,65	0,55
	P_i	*1,04*	*0,76*	*1,72*	*0,89*	*0,45*	*0,81*	*0,92*	*0,33*	*0,69*	*0,47*
	In	*1,02*	*0,77*	*1,55*	*1,67*	*0,37*	*0,72*	*1,20*	*0,87*	*0,97*	*0,87*
Metal & Electronic	1	2,81	0,57	1,85	1,20	0,74	0,17	0,75	0,23	0,87	0,81
	2	3,18	0,49	1,95	1,46	0,27	0,13	1,03	0,18	0,72	0,58
	3	0,97	2,26	0,43	0,34	0,25	0,35	1,21	3,42	0,24	0,53
	4	2,49	1,26	2,19	0,47	0,63	0,18	1,24	0,08	0,58	0,89
	5	1,31	0,92	0,92	0,92	0,92	0,92	0,92	0,92	0,92	1,31
	6	1,80	0,83	1,00	0,42	1,55	0,87	1,06	0,19	0,56	1,72
	P_i	*1,93*	*0,92*	*1,21*	*0,69*	*0,60*	*0,32*	*1,02*	*0,35*	*0,60*	*0,89*
	In	*3,08*	*0,58*	*1,17*	*1,60*	*0,36*	*0,28*	*0,69*	*0,47*	*0,79*	*0,96*
Handicraft	1	0,15	0,84	6,07	2,31	0,22	0,07	0,08	0,08	0,17	0,01
	2	0,26	1,44	5,38	2,44	0,02	0,10	0,09	0,06	0,16	0,04
	3	2,53	1,72	0,53	0,33	0,21	3,06	0,09	0,04	0,33	1,17
	4	3,26	0,77	3,94	2,44	0,21	0,15	0,06	0,01	0,07	0,02
	5	1,47	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	1,47
	6	3,09	0,93	1,88	1,91	1,23	0,70	0,04	0,03	0,10	0,08
	P_i	*1,07*	*1,05*	*2,20*	*1,40*	*0,24*	*0,36*	*0,10*	*0,06*	*0,20*	*0,11*
	In	*0,95*	*1,52*	*2,10*	*1,20*	*1,28*	*0,42*	*0,68*	*0,44*	*0,71*	*0,71*

Notes: A : Kota Mataram ; B : Lombok Barat ; C : Lombok Tengah; D: Lombok Timur; E: Lombok Utara; F: Sumbawa Barat; G: Sumbawa; H: Dompu; I: Bima; J: Kota Bima
1: Number of Industry; 2: Number of Manpower; 3: Unit Price; 4: Total Production Value; 5: Monthly Consumption; 6: Consumption over Local Production
P_i: Performance index as a composite of input indicators; *In*: Input indicator in term of expenditure

The plot of data via FDH for every region shown in Figure 2-11. Based on the FDH, first-rate of Kota Mataram region are fabric & clothing industries as well as metal & electronic industries. However, if we compare the efficiency score (output/ input) of both type, fabric & clothing industries will be the best. The first-rate of Lombok Barat region is metal & electronic industries as well as handicraft industries. However, if we compare the efficiency score of both type, metal & electronic industries will be the best. The first-rate of Lombok Tengah region are food & beverage; fabric & clothing; and handicraft industries. However, if we have to choose only one, fabric & clothing industries will be the best based on its efficiency. The first-rate of Lombok Timur region are handicraft and food & beverage industries. However, comparing its efficiency, food & beverage industries will be the best. The first-rate of Lombok Utara region is metal & electronic industries. As for Sumbawa Barat region and Kabupaten Bima region, among all industry types, only food & beverage industries do not lie on the FDH envelope. However, if we have to choose only one first-rate industry based on its efficiency, fabric & clothing industries will be the best in both regions. The first-rate of Sumbawa region and Dompu region are handicraft industries as well as metal & electronic industries. However, if we compare the efficiency score of both type in both region, metal & electronic industries will be the best. As for Kota Bima region, among all industry types, only fabric & clothing industries do not lie on the FDH envelope. However, if we have to choose only one first-rate industry, metal & electronic industries will be the best based on its efficiency.

Table 2 shows a comparison between what is perceived as the first-rate industry in Nusa Tenggara Barat province's regions and the evaluation result through FDH analysis. Among those comparisons, only three regions show the same result for the first-rate industry namely for Lombok Barat region, Lombok Tengah region, Lombok Timur region. Three other regions, namely Sumbawa Barat region, Kabupaten Bima region, and Kota Bima regions even show the opposite result, where the perceived first-rate industries are actually the exception of the FDH analysis result.

4. Conclusion

This paper shows a more appropriate way of defining first-rate of an industry in the region using Free Disposal Hull (FDH) analysis. The FDH analysis shows different result with the LQ analysis that usually been used to determine the first-rate industry of a region, because LQ analysis only focused on the primary product as the indicator, while FDH analysis utilized varies of indicators related to the processes and efficiency of the industrial system. Thus, selecting an indicator to describe the condition of such industrial system is crucial. Indicators mentioned in this paper can be adapted for the FDH analysis of industry sector in other provinces. Otherwise, they can take into account some other suitable indicators as long as it fits to the RACER principles.

This approach can support a better governance, in a sense that objective and reasonable planning will be delivered for effective development in industry sector. Refer to the strategic planning, the government can decide to focus its program either for the betterment of the first-rate industry or development of other industries.

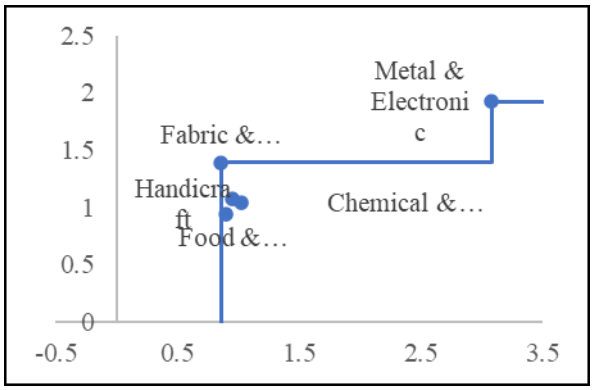

Figure 2. Performance of Industries in Kota Mataram

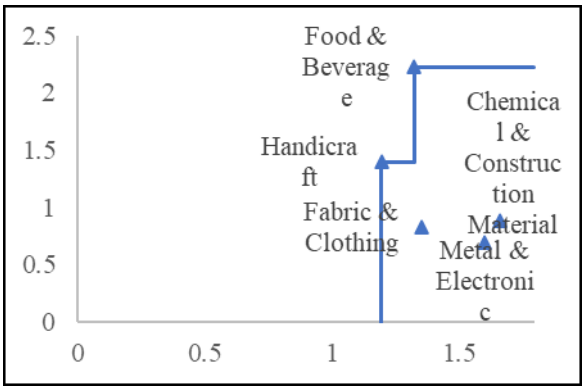

Figure 5. Performance of Industries in Lombok Timur

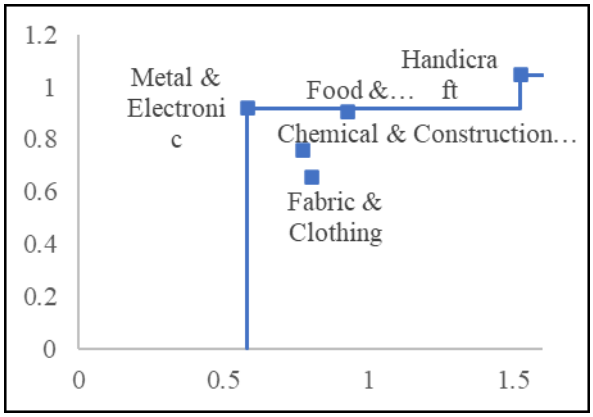

Figure 3. Performance of Industries in Lombok Barat

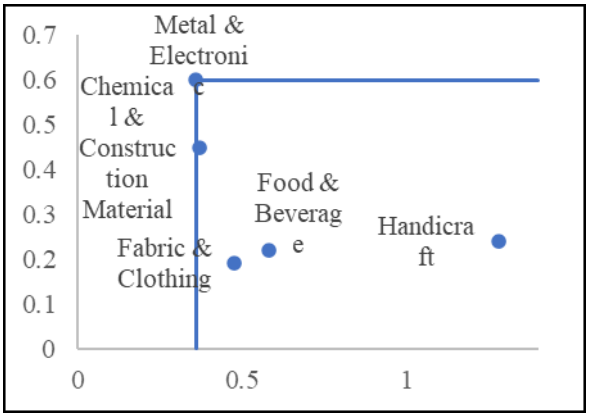

Figure 6. Performance of Industries in Lombok Utara

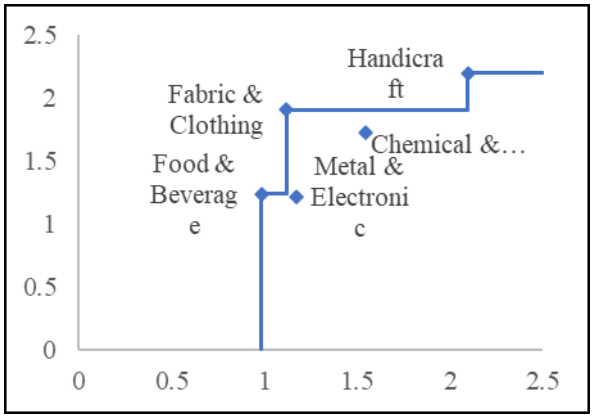

Figure 4. Performance of Industries in Lombok Tengah

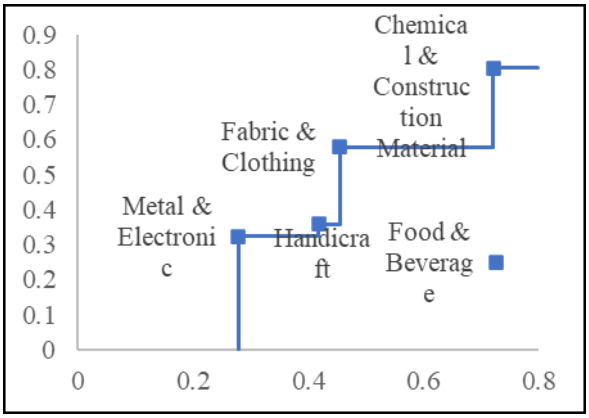

Figure 7. Performance of Industries in Sumbawa Barat

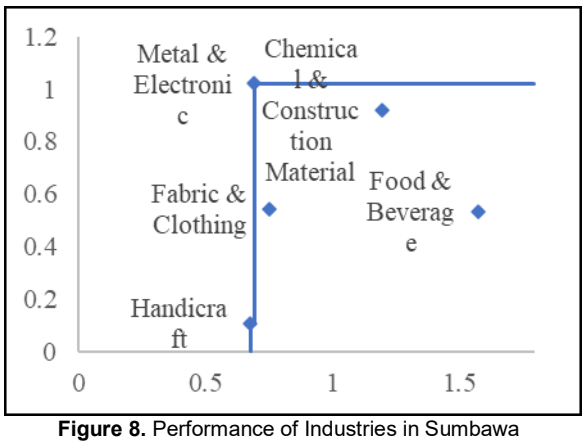

Figure 8. Performance of Industries in Sumbawa

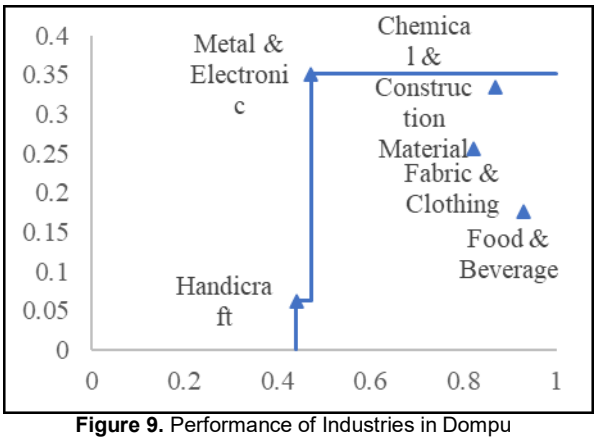

Figure 9. Performance of Industries in Dompu

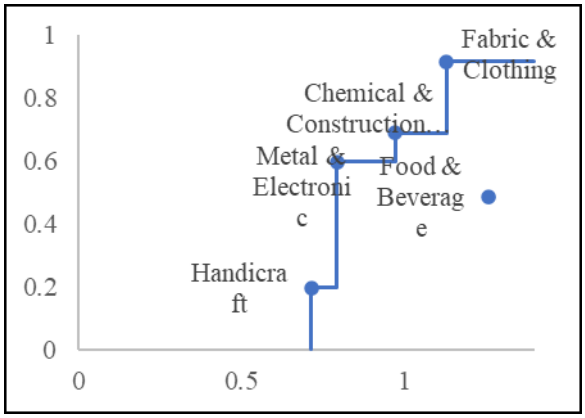

Figure 10. Performance of Industries in Kabupaten Bima

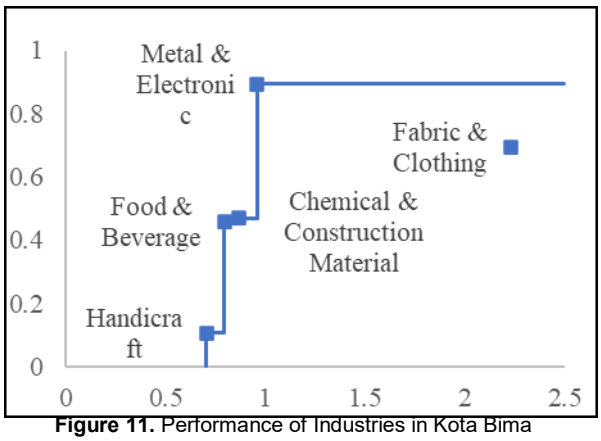

Figure 11. Performance of Industries in Kota Bima

Table 2: Comparison of the first-rate industries

No.	Region	FDH Analysis	Perceived First-Rate
1	Kota Mataram	Fabric & Clothing; Metal & Electonic	Handicraft
2	Lombok Barat	Metal & Electonic; Handicraft	Handicraft
3	Lombok Tengah	Food & Beverage; Fabric & Clothing; Handicraft	Handicraft
4	Lombok Timur	Handicraft; Food & Beverage	Food & Beverage
5	Lombok Utara	Metal & Electonic	Food & Beverage
6	Sumbawa Barat	Fabric & Clothing; Chemical & Construction Material; Metal & Electonic; Handicraft	Food & Beverage
7	Sumbawa	Handicraft; Metal & Electonic	Food & Beverage
8	Dompu	Handicraft; Metal & Electonic	Food & Beverage
9	Kabupaten Bima	Fabric & Clothing; Chemical & Construction Material; Metal & Electonic; Handicraft	Food & Beverage
10	Kota Bima	Food & Beverage; Chemical & Construction Material; Metal & Electonic; Handicraft	Fabric & Clothing

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