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Examining linkage for national economic policy development

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Purpose. To study critically examines links as a criterion in shaping Indonesia's economic policy and to evaluate the relationship between sectors' forward linkages and sectors' contribution to net export earnings, employment generation, and value-added creation of Indonesia's manufacturing.

Design/Method/Approach. Statistical analysis of the industries sectors' forward linkages and sectors' contribution to net export earnings, employment generation, and value-added creation of Indonesia's manufacturing between 1995 and 2005.

Findings. The policies based on intersectoral input linkages have been prevalent and implemented in many developing countries. Indonesia's Government has frequently introduced the policies based on linkages. It is established that a sector with high linkages does not always provide a greater contribution to the economy. During the research window, sectors with lower forward linkages significantly contributed to Indonesian net export earnings, job creation, and value-added. However, this study does not mean that high connections are bad. This study argues that policymakers should also take into account factors other than relationships.

Practical implications. The results of analysis links of Indonesia`s performance in the industries from 1995 to 2000 suggest that the policies based on interconnections, such as policies to provide greater domestic added value, are unwarranted, and but there is no need to place too much emphasis by forward linkages in policymaking.

Originality/Value. This study emphasizes that all factors that are direct in the formulation of economic policy should be considered as comparative advantages.

Paper type. Empirical.

Keywords: intersectoral; linkage; Indonesia's government; policy making; export earning.

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Вивчення зв'язків для розробки національної економічної політики

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Мета роботи. Критично вивчити зв'язки як критерію формування економічної політики Індонезії.

Дизайн/Метод/План дослідження. Статистичний аналіз прямих зв'язків галузей промисловості та внеску секторів у чистий експортний дохід, створення зайнятості та створення доданої вартості виробництва Індонезії у період між 1995 та 2005 роками.

Результати дослідження. Політика, заснована на міжгалузевих зв'язках, була поширеною і застосовувалась у багатьох країнах, що розвиваються. Уряд Індонезії часто запроваджував політику, засновану на зв'язках. Встановлено, що сектор з високими зв'язками не завжди забезпечує більший внесок в економіку. У періоді дослідження сектори з нижчими прямими зв'язками суттєво сприяли чистим прибуткам від експорту Індонезії, створенню робочих місць та доданій вартості. Однак це дослідження не означає, що високі зв'язки погані. У цьому дослідженні стверджується, що політикам також треба враховувати інші фактори, крім відносин.

Практичне значення дослідження. Результати аналізу зв'язків діяльності Індонезії в галузях промисловості з 1995 по 2000 рр. свідчать, що політика, що базується на взаємозв'язках, така як політика забезпечення більшої внутрішньої доданої вартості, необгрунтована, та немає необхідності занадто акцентувати увагу до прямих зв'язків під час формування політики.

Оригінальність/Цінність/Наукова новизна дослідження. У цьому дослідженні підкреслюється, що всі фактори, які є безпосередніми при формуванні економічної політики, слід розглядати як порівняльні переваги.

Обмеження дослідження/Перспективи подальших досліджень. У наступних статтях доцільно критично вивчити основні макроекономічні показники, що дозволить оцінити актуальність і високу здійсненність зміни або трансформації економічної політики Індонезії.

Тип статті. Емпіричний.

Ключові слова: міжгалузевий; поєднання; Уряд Індонезії; вироблення політики; експортний дохід.

Изучение связей для разработки национальной экономической политики

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Цель работы. Критически изучить связи как критерий при формировании экономической политики Индонезии.

Дизайн/Метод/План исследования. Статистический анализ прямых связей между отраслями промышленности и их вклада в чистую экспортную выручку, создание рабочих мест и создание добавленной стоимости в обрабатывающей промышленности Индонезии в период с 1995 по 2005 год.

Результаты исследования. Политика, основанная на межсекторальных связях ресурсов, широко распространена и реализована во многих развивающихся странах. Правительство Индонезии часто вводило политику, основанную на связях. Установлено, что сектор с высокими связями не всегда вносит больший вклад в экономику. В течение периода исследования секторы с более низкими прямыми связями внесли значительный вклад в чистую экспортную выручку Индонезии, создание рабочих мест и добавленную стоимость. Однако это исследование не означает, что высокие связи – это плохо. В этом исследовании утверждается, что директивным органам также следует принимать во внимание и другие факторы, помимо взаимоотношений.

Практическое значение исследования. Результаты анализа связей показателей Индонезии в отраслях с 1995 по 2000 гг. показывают, что политика, основанная на взаимосвязях, такая как политика по обеспечению большей внутренней добавленной стоимости, не оправдана, и нет необходимости значительно акцентировать внимание на прямые связи в разработке политики.

Оригинальность/Ценность/Научная новизна исследования. В данном исследовании подчеркивается, что все факторы, непосредственно влияющие на формулирование экономической политики, следует рассматривать как сравнительные преимущества.

Ограничения исследования/Перспективы дальнейших исследований. В следующих статьях целесообразно критически изучить основные макроэкономические показатели, что позволит оценить актуальность и высокую осуществимость изменения или трансформации экономической политики Индонезии.

Тип статьи. Эмпирический.

Ключевые слова: межотраслевой; Правительство Индонезии; создание политики; экспортный доход.

1. Introduction

Intersectoral input linkages ('linkages' for short) have been very popular among developing countries as a policymaking tool. As a result, the policies based on domestic backward and forward linkages are rapidly being implemented in these countries. Linkages-based policies go by many names, such as import-substituting industries, increasing value-added, beneficiation, and promoting "downstream" industries *(Hausmann, Klinger, & Lawrence, 2008)*. ISI is a policy based on domestic backward linkages, while others are based on domestic forward linkages.

In Indonesia, the policies based on backward linkages have also been popular. For example, Indonesia pursued import-substituting industrialization (ISI) during 1970-1985. During this period, state-owned enterprises played an important role by establishing new plants or expanding existing factories' capacity in the iron basic/steel, oil refining, and non-ferrous metal sectors. On the other hand, the private sector drove the ISI in the yarn spun and transport equipment sectors (*Ishida, 2003*). In the next decade, Indonesia implements beneficiation (based on forward linkages). This regulation states that all minerals that are being extracted from Indonesian soil need to be processed further before being exported. The policy aims to ensure that the exploitation of mineral resources from Indonesian soil provides a higher contribution than before. Implementing this regulation is expected to benefit the Indonesian economy, mainly by giving the domestic economy cheaper input. Hence, domestic industries are expected to grow faster (*Dudley, 2004; Kim, 2010; Price & Nance, 2010*).

The idea of the policies above is in line with the strategy offered by Hirschman (*Hirschman, 1958*). He initially points out that focusing the economic development on a highly forward linked sector, such as the iron and steel manufacturing sector, will have a larger effect on the economy by increasing domestic value-added and stimulating a downstream industry. However, the forward linkages-based policy, especially in the form of export restriction of unprocessed strategic material, is still questionable. Even though some scholars above find that this policy is beneficial, others conclude that it harms the economy (*Kishor, Mani, & Constantino, 2004; Gellert, 2005; Resosudarmo & Yusuf, 2006*). Generally, they have found that the policy causes a decline in net export earnings and employment generation. Moreover, some scholars also argue that traditional comparative advantage factors play more roles in determining patterns of growth rather than linkages. Therefore, they conclude that this kind of policy is fundamentally flawed (*Riedel, 1975; Athukorala & Santosa, 1997; Hausmann et al., 2008*).

Despite these concerns, in Indonesia, the policies based on linkages are rarely questioned by the researcher. Perhaps because of the consensus among decision-makers and researchers about linkages' appropriateness as a tool for policymaking *(Athukorala & Santosa, 1997)*. Therefore, the policy based on the linkages has always been embodied in Indonesia's five-year development planning (*Repelita*), from *Repelita* IV (1984/85-1988/89) until the latest *Repelita* (2009-2014) (*Kementerian Perindustrian, 2012*).

This research aims to provide another piece of evidence about the use of linkages as a tool for policymaking. Unlike the previous study by *Athukorala & Santosa (1997)*, this essay examines the relationship between the sector's forward linkages and the sector's contribution to net export earnings, employment generation, and value-added creation. This essay applies input-output analysis to examine the relationship by utilizing three of Indonesia's IO (Input-Output) tables between 1995 and 2005. The researcher chooses the project of investment and financial support beginning from 1995, 2000 and 2005. Since the IO table consists of 66 industrial sectors, it is sufficient for this research as this research focuses only on examining the average historical trend of forward linkages and comparing sectoral performance.

2. Theoretical background

The concept of linkages was grounded by *the unbalanced growth theory* proposed by *Hirschman* (*1958*) and *Singer* (*1958*). They argue that unbalanced growth should be deliberately created to foster an economic growth in developing countries. They believe that this idea is suitable for developing countries since most developing countries are limited in terms of resources and capital. Furthermore, due to limited resources and money, developing countries can only afford to finance one major project or one primary industry. They believe that one primary industry, which will create imbalances, can increase demand from other domestic industries and increase supply to other domestic industries.

In line with Hirschman, other proponents of the unbalanced growth theory also argue that imbalances will stimulate the pressure required to induce investment *(Meier, 1976; Weber & Shaikh, 2020)*. To demonstrate the unbalanced growth theory's potential, especially in determining the most effective industries as a leading power to push other industries, *Hirschman* (*1958*) uses the concept of Linkages. He explains that the way an industry affects other sectors can be measured from its backward and forward linkages.

Using the concept of linkages above, *Hirschman* (*1958*) proposes an idea which implies that the industry with the highest linkages should be selected to create the imbalances. He reveals that the imbalances will create a "big push" to other industries. A study conducted by Hirschman himself finds that iron and steel manufacture had the highest total linkages; meanwhile agriculture had the weakest total linkages. Determining the highest linked industry can only be conducted by empirical studies using an input-output model. One reason is because the industry with the highest linkages may vary for each country and for each time (*Ezeala-Harrison, 1996*).

The idea of using linkages as a tool to pick the highest linked industry has been very popular among developing countries as a ground to formulate a policy *(Ngan et al., 2019; Hauge, 2020; Kwatra et al., 2020)*. One well-known policy, based on choosing a manufacturing sector with the highest backward linkages, is import-substitution industrialization (ISI). Most of the ISI is implemented by encouraging domestic industries to produce finished goods that were previously imported. Recently, the policy based on backward linkages such as ISI has been widely abandoned by most developing countries. The main reason is because the policy, which is usually combined with several central governments planning, is viewed as a policy that leads to stagnation and macroeconomic crises (*Bruton, 1998*).

In contrast with backward linkages-based policies, the policies based on forward linkages are still popular among developing countries (*van Neuss, 2019*). The forward linkages-based policies are established under various types and names, such as increasing domestic value added, promoting downstream industries, or beneficiation *(Hausmann et al., 2008)*. These kinds of policies mainly aim to encourage and promote domestic industries to process the raw material that has been exported before. The policy is based on the idea that shifting the industry from a raw material exporter into a high value-added goods exporter can increase net export earnings and generate more employment. The increase in output for the selected sector will also provide additional supply for other domestic industries, increasing the output for overall industries. These policies are mostly implemented by restricting export for unprocessed raw material and allocating this raw material as input for domestic manufacturing industries.

The policy based on forward linkages, especially export restriction, can be found in many developing countries. The Solomon Islands has imposed export taxes on unprocessed timber and fish, while Ghana and Gabon maintain log export restrictions to promote downstream processing. In the mining

sector, Zambia is trying to increase their domestic value added in the manufacturing sector of copper and other metals by restricting the export of related raw materials (*Terheggen, 2011*). Also, Botswana is trying to limit the export of diamonds so that raw diamonds can be processed further within domestic industries. However, recently Botswana has removed this barrier (*Korinek, 2014*). In developed countries, one example is provided by Australia where the Australian government intends to increase the value-added of their uranium by encouraging downstream processing. Empirical studies that evaluate the linkage-based policy produce mixed results. Those who conclude that this policy benefits find that the policy may benefit the economy in two ways. First, this policy will lower prices of raw materials and provide a comparative advantage for domestic industries. These domestic industries can receive more profit, and more growth can be contributed to the economy. Secondly, the growth of domestic industries will need more employees to run their business. Therefore, more work opportunities are available in the economy *(Dudley, 2004; Kim, 2010; Price & Nance, 2010*). However, other scholars find opposite results. They conclude that an increase in value-added, net export earnings, and employment generation are not efficiently achieved. Some find that these kinds of policies may lead to a shrinkage in production since low domestic price provides less incentives for existing companies to produce and invest (*Kim, 2010; Korinek & Kim, 2011*). Another researcher expresses concern since it might take some years before domestic industries become internationally competitive (Goodland & Daly 1996 cited in *(Fooks, Dundas & Awokuse, 2013*)). Also, there is an indication that the policy may exacerbate the unemployment problem in developing countries (*Dean & Gangopadhyay, 1997; Gilbert & Wahl, 2001; Kishor et al., 2004*). Past studies regarding the linkage-based policy in Indonesia have generally found that export restriction on logs, applied in the 1980s, induced the growth in plywood and sawn wood industries, and generated higher profit from the forestry sector during 1979-1989 (*Lindsay, 1989; Togu Manurung & Buongiorno, 1997; Gellert, 2005*). Nevertheless, these studies have also found that timber export restriction caused negative net exports from plywood and sand wood. In addition, other research found that even though it might provide more job opportunities in the long term, the generation of employment will plummet in the short term. Therefore, it was considered as not being beneficial (Aziz 1992 in (*Lo & Akrasanee, 1992; Resosudarmo & Yusuf, 2006*)).

While the economic impact of the policy is unclear, the policies are argued to be fundamentally flawed. *Athukorala and Santosa* (*1997*) argue that emphasizing linkages for policymaking is fundamentally flawed because it does not suit the traditional factor proportion considerations and ignores a comparative advantage. *Riedel* (*1975*) also argues that the existence of high linkages as a single criterion is not sufficient to ensure that induced mechanisms will be created. Furthermore, *Hausmann et al.* (*2008*) argue that linkages-based policies, rather than using a systematic analysis, are based only on logic, anecdotes, and self-evident truth. They explain that the policy is based only on a belief that it is a natural and logic way to obtain more profit.

3. Problem statement

The purpose of this research is to study critically examines links as a criterion in shaping Indonesia's economic policy and to evaluate the relationship between sectors' forward linkages and sectors' contribution to net export earnings, employment generation, and value-added creation of Indonesia's manufacturing.

4. Methodology and Data

The methodological basis of the study is the basic tools, strategic goals of interdisciplinary relations between countries. Feedback-based policies are popular for Indonesia. The used method is an analysis, synthesis, process modelling, and statistical generalization. The only way to compute the linkages and decide which sector of industries has the highest linkages is by conducting an input-output analysis (*Ezeala-Harrison, 1996*). This research conducts an input-output analysis using the Indonesian IO table. There are two reasons why using the Indonesian IO table is relevant. First, the Indonesia IO table separates the number of imports in the intermediate input matrix. This is useful in computing the total net export earnings. Second, Indonesia has frequently implemented the policy based on linkages. Therefore, it is essential to see whether this kind of policy is warranted or not. In this research, three Indonesian IO tables (1995, 2000, 2005) are used. Each IO table classifies the Indonesian industries into 66 industrial sectors. The IO table, which consists of 66 industrial sectors, is sufficient for this research since this research focuses only on examining the average historical trend of forward linkages and comparing sectoral performance. In the future, this research can be improved using a more disaggregated table. The methodology used in this research involves examining the relationship between sectors' forward linkages and sectors' performance in the Indonesian manufacturing industries. This essay focuses more on the manufacturing sector for two reasons. First, the manufacturing sector is viewed to have higher forward linkages, and Hirschman himself found that iron and steel manufacturing had the highest linkages among all. Second, it is more suitable to compare the iron and steel manufacturing sectors' performance with other manufacturing sectors rather than compare it with the non-manufacturing sector. Sector performances are measured by their contribution to net export earnings, employment creation, and value-added generation. These three criteria are variables that are targeted by the increasing domestic value-added policy in Indonesia.

4.1. Measuring Forward Linkages

The most common method in measuring the forward linkages is using Leontief model. In the IO table, the gross output vector (x) is equal to the sum of intermediate input matrix (Z) and final demand matrix (F).

$$x = Z + F \quad (1).$$

The intermediate input matrix represents part of the output that is used as input in the domestic industries. Therefore, the intermediate input matrix can be represented in another way: the technology coefficient matrix (A) times the gross output vector.

$$Z = Ax \quad (2),$$

where the element of A is generated by dividing each intermediate input cell by the total output from its associated column, $(a_{ij}) = z_{ij}/x_j$

Leontief's inverse matrix (L) is then can be generated by:

$$L = (I - A)^{-1} \quad (3).$$

The total forward linkages, direct and indirect forward linkages, for each sector is the sum of the row of Leontief's inverse matrix.

$$FL_j = \sum_j^n l_{ij} \quad (4).$$

However, the validity of using Leontief's inverse matrix to calculate forward linkages is questioned by many scholars. The main reason is that Leontief model interprets forward linkages as a measure of the impact of simultaneous unit changes in each and every sector of the final demands. This interpretation was viewed sceptically by *Jones* (*1976*) because of the 'simultaneous unit changes' assumption's insensibility. *Beyers* (*1976*) also objected to this interpretation since he disagreed with the measurement of forward linkages based on the strength of backward linkages *(Cai*

& *Leung, 2004*). The common alternative in measuring forward linkages is using the Ghosh model. The difference with the Leontief model is that while the Leontief inverse matrix explains the relationship between the sectoral gross outputs to the amount of final demand, the Ghosh price model instead suggests the connectivity between the sectoral gross outputs to the primary inputs. Mathematically, the computation using the Ghosh model is made possible by transposing the vertical column view into a horizontal one. Therefore, in generating the inverse matrix, rather than dividing each cell by the output of a sector associated with that column, the Ghosh model divides each cell by the total output associated with its row. *Miller & Blair* (*2009*) uses matrix *B* to represent the intermediate input matrix (the Gosh model), so that it can be differentiated with the Leontief model term. Matrix *B*, can be defined as:

$$B = \hat{x}^{-1}Z \quad (5).$$

This step is the only difference between Ghosh and Leontief models. Using the same method with the Leontief model, the Ghosh inverse matrix (G) or the output inverse matrix can be calculated by:

$$G = (I - B)^{-1} \quad (6),$$

thus, the total forward linkages can be calculated as

$$FL_j = \sum_j^n g_{ij} \quad (7).$$

The element of G (g_{ij}) can be interpreted as "the total value of production that comes about in sector *j* per unit input of sector *i*" (Augustinovics (1970) cited in *Miller & Blair* (*2009*)). Many scholars are still discussing the debate surrounding the measurement of the forward linkages, and no decisive consensus is achieved. Most of the discussion is to find how to formulate the single measurement of forward linkages. This essay uses an approach taken by *Hausmann et al. (2008*), which utilizes both models and uses both results for the analysis procedure.

4.2. Measuring Sectoral Performance

In measuring the contribution of each sector, this study uses the extension of the Leontief model developed by Athukorala and Santosa (*Athukorala & Santosa, 1997*). In measuring the net export earnings, matrix *R* is utilized. Matrix *R*, where

$$r_i = R_i/X_i \quad (8),$$

describes the direct import which is required in a particular sector. Matrix *R* can then be used to create an import inverse matrix (*M*).

$$M = R(I - A)^{-1} \quad (9).$$

The elements of *M*, (m_{ij}) indicate the total import of *i* required by domestic industries to produce one unit of *j*. The total additional import of all sectors when there is an output increase in *j*, represented by m_{Tj}, can be estimated as:

$$m_{Tj} = \sum_i^n m_{ij} \quad (10).$$

Net export earnings from sector *j*, (e_j^{net}) can then be calculated by:

$$e_j^{net} = e_j - m_{Tj}e_j = (1 - m_{Tj})e_j \quad (11),$$

where $e_j$is export from sector *j* and $m_{Tj}e_j$indicates the total value of imports embodied in e_j.

To measure the sectoral contribution to generating value added, a diagonal matrix of value-added coefficient, $V=[v_i]$, $v_i = V_i/X_i$, is utilized. The elements of this matrix show value-added per unit gross output in each sector. Since this research is also interested in measuring additional value added by increasing output of one industry, this research also computes the value-added multiplier. The value-added multiplier can be calculated by:

$$m_{va} = \sum_i^n va_{ij} \quad (12),$$

where va_{ij} is an element of matrix *VA*. This matrix can be shown by (13):

$$va_{ij} = V(I - A)^{-1} \quad (13)$$

Using the extension of the Leontief inverse matrix, total value-added induced by exports can be shown by:

$$VA = V(I - A)^{-1}E \quad (14),$$

where *E* is the matrix of export per sector.

Similar steps are used to measure sectors' employment contribution. A new diagonal matrix *G* is introduced, in which the elements describe the number of workers employed per sector. Therefore, the employment multiplier is:

$$m_l = \sum_i^n g_{ij} \quad (15).$$

And the export-induced employment matrix, *L*, is shown by:

$$L = G(I - A)^{-1}E \quad (16).$$

The method above is also used to compute the sectoral performance using the Ghosh model. The difference is only by replacing the Leontief inverse matrix with the Ghosh inverse matrix. Thus, while generating the import inverse matrix, the computation will be:

$$M = R(I - B)^{-1} \quad (17).$$

5. Results

It is important to notice that this research uses two methods in measuring forward linkages. This study finds that these two methods do not generate contrasting results based on both models' calculations. To simplify, only the results from the Ghosh model are displayed. *Tab.1* shows the fluctuation of the sectors' forward linkages and sectors' contribution of the whole manufacturing industries during the research window. An increase followed a decline in the average of forward linkages in 1995, 2000 and 2005. In contrast with the average value of forward linkages, different patterns were shown by sectors' performances. For instance, net export earnings' value increased slightly from 1995 to 2000, then there was a sharp rise in 2005, reaching approximately $56 million. It is also vital to notice that the manufacturing sectors' contribution declined from 2000 to 2005. This trend implies that even though net export earnings from the manufacturing sectors were rising, the export from other industries such as agriculture and mining were also increasing with higher proportions. In terms of employment generation and value-added creation, the trend is also moving in the opposite direction with forward linkages. As the value of forward linkages increases, the amount of sectoral contribution tends to decreases. This pattern shows that, in general, the value of forward linkages does not clearly represent the sectoral contribution. The same results are also found using the Leontief model. The magnitude of forward linkages may not be the same, but the value of average forward linkages and sectoral performances move in the opposite direction. *Tab.2* displays the coal and metal ore mining sector.

Table 1: Manufacturing Sectors (Overall)*

Indicator	1995	2000	2005
Forward Linkage (average)	1.66	1.55	1.70
Gross exports ($ million)	35,056.68	38,054.47	56,706.23
Net exports ($ million)	26,478.31	26,772.58	40,856.28
Contribution to total net export earnings (%)	52.35	62.75	53.21
Employment multiplier (for $1,000 worth of export)	0.54	1.44	0.80
Export-induced employment ('000)	3,775.10	6,851.40	5,918.59
Export-induced employment (% of total)	2.73	2.20	1.29
VA multiplier (for $1,000 worth of export)	10.37	9.84	10.22
Export-induced VA ($ million)	20,830.83	20,948.64	33,781.36
Export-induced VA (% of total)	7,78	15.33	11.74

*__Source:__ completed by the authors.

Table 2: Coal and Metal Ore Sector*

Indicator	1995	2000	2005
Forward Linkage	1.53	1.80	1.62
Import intensity (average)	0.02	0.05	0.07
Gross exports ($ million)	3,288.99	2,629.80	8,462.56
Net exports ($ million)	3,210.64	2,491.07	7,897.80
Contribution to total net export earnings (%)	6.35	5.84	10.29
Employment multiplier (for $1,000 worth of export)	0.05	0.09	0.05
Export-induced employment ('000)	121.65	138.75	146.27
Value added ($ million)	3,898.55	3,823.89	10,231.93
VA multiplier (for $1,000 worth of export)	1.79	9.22	9.32
Export-induced VA ($ million)	3,100.75	2,818.10	7,702.57
Export-induced VA (% of total)	4.14	4.42	6.95

*__Source:__ completed by the authors.

During the research window, this sector contributed a significant amount of net export earnings. Assuming that the current industry structure is not significantly different, restricting exports from this sector reduced a considerable amount of net export revenue for Indonesia's economy by around 6% in 1995 and 2000, and then reached approximately 10% of total net export earnings in 2005. In addition to this loss, employment from the mining sector was also reduced.

The export-induced employment during the period of the study reached approximately 146,000 workers. These workers will be unemployed if the export restriction policy (based on forward linkage) is implemented. This result is in line with the study by *Azis (1992)*, which found that the employment opportunities will be decreased in the short run after the export restriction is imposed.

Compared to the coal and metal ore mining sector, iron and basic steel manufacturers' contribution during the period under study was below the mining sector contribution (*Tab.3*). Although the iron and basic steel manufacturing sectors' forward linkages are higher than the coal and metal ore mining sectors, the iron and basic steel manufacturing sectors contribute relatively small net export earnings, employment, and value-added. However, it is essential to notice that this sector has a higher employment multiplier. Therefore, the growth of this sector might provide more job opportunities in the long run.

Table 3: Iron and Basic Steel Sector*

Indicator	1995	2000	2005
Forward Linkage	2.17	2.23	2.18
Import intensity (average)	0.19	0.27	0.31
Gross exports ($ million)	325.25	295.74	530.98
Net exports ($ million)	262.08	217.18	365.84
Contribution to total net export earnings (%)	0.52	0.51	0.48
Employment multiplier (for $1,000 worth of export)	0.30	0.77	0.10
Export-induced employment ('000)	6.69	31.26	27.64
Value added ($ million)	2,148.54	539.61	815.29
VA multiplier (for $1,000 worth of export)	1.45	6.42	4.33
Export-induced VA ($ million)	340.73	332.34	493.39
Export-induced VA (% of total)	0.45	0.52	0.45

*__Source:__ completed by the authors.

This essay analyses the sectoral comparison between the iron and basic steel manufacturing sector and other manufacturing industries to make further analysis.

First, this study compares the iron and basic steel manufacturing sectors with the top net export earner during the study, the manufacture of textiles, wearing apparel, and leather (*Tab.4*). During the research window, the later sector had a smaller value of forward linkages than the former industry. Although it had smaller forward linkages, this sector performed outstandingly, marked with high net export earnings contribution, a high number of employees, and high value-added generation.

In all of the sectors' performance criteria, the contribution of the textiles, wearing apparel, and leather manufacturing sector outweighs the iron and basic steel manufacturer.

The result is almost the same if we compare the iron and basic steel manufacturing sector and the second top net export earner, the manufacture of bamboo and rattans products (*Tab.5*).

Table 4: Manufacture of Textiles, Wearing Apparel, And Leather*

Indicator	1995	2000	2005
Forward Linkage	1.31	1.22	1.33
Import intensity (average)	0.39	0.43	0.41
Gross exports ($ million)	7228.81	6410.21	7636.39
Net exports ($ million)	4405.39	3678.50	4481.13
Contribution to total net export earnings (%)	8.71	8.62	5.48
Employment multiplier (for $1,000 worth of export)	0.71	0.85	0.67
Export-induced employment ('000)	970.33	1535.46	1270.44
Value added ($ million)	5552.84	3486.02	6877.71
VA multiplier (for $1,000 worth of export)	3.23	12.87	13.93
Export-induced VA ($ million)	2951.88	2550.13	3617.19
Export-induced VA (% of total)	3.94	4.00	3.26

*__Source:__ completed by the authors.

Table 5: Manufacture of bamboo and rattan products*

Indicator	1995	2000	2005
Forward Linkage	1.51	1.33	1.54
Import intensity (average)	0.09	0.17	0.13
Gross exports ($ million)	5376.89	3716.23	4050.22
Net exports ($ million)	4915.28	3097.81	3533.74
Contribution to total net export earnings (%)	9.72	7.26	4.60
Employment multiplier (for $1,000 worth of export)	0.72	1.21	0.59
Export-induced employment ('000)	1121.94	1860.24	1423.20
Value added ($ million)	3934.86	2025.69	3546.25
VA multiplier (for $1,000 worth of export)	3.65	17.21	14.74
Export-induced VA ($ million)	2100.27	1537.98	2113.11
Export-induced VA (% of total)	2.80	2.41	1.91

*__Source:__ completed by the authors.

The forward linkages of bamboo and rattan manufacturing sectors were again smaller than the iron and basic steel manufacturing sectors had. Nonetheless, although the contribution was smaller than in the textile manufacturing sector, the contribution of bamboo and rattan manufacturing sectors outweighs the iron and basic steel manufacturing sector's contribution. These results show that higher linkages may not be associated with a high contribution to the economy.

The other information that can be concluded is that these sectors are labour-intensive industries. Even though most of their workers are low skilled workers, these sectors are primary sectors that can absorb numerous employments.

Furthermore, this type of industries is consistent with Indonesia's characteristics as a labour abundant country. On the other hand, the iron and basic steel manufacturing industry needs high capital (capital intensive industries). This kind of industry might not yet be suitable with Indonesia's comparative advantage.

Last, we compare the iron and basic steel manufacturing sector with the cigarettes manufacture (*Tab.6*). The iron and basic steel manufacturing sector had a higher net export contribution during the research window. However, in terms of employment generation, employment multiplier, and value-added multiplier, cigarette manufacturing was still slightly better.

Table 6: Manufacture of Cigarettes*

Indicator	1995	2000	2005
Forward Linkage	1.10	1.13	1.11
Import intensity (average)	0.12	0.21	0.13
Gross exports ($ million)	138.54	166.97	260.45
Net exports ($ million)	121.42	132.08	227.65
Contribution to total net export earnings (%)	0.24	0.31	0.30
Employment multiplier (for $1,000 worth of export)	1.96	5.37	3.53
Export-induced employment ('000)	30.32	33.02	17.10
Value added ($ million)	5209.47	2185.91	4478.38
VA multiplier (for $1,000 worth of export)	3.96	17.66	19.24
Export-induced VA ($ million)	135.27	184.29	271.29
Export-induced VA (% of total)	0.18	0.29	0.24

*__Source:__ completed by the authors.

6. Conclusion

The study critically examines links as a criterion in shaping Indonesia's economic policy. Based on the Indonesia's performance in the industries between 1995-2005, the results suggest that the policies based on interconnections, such as policies to provide greater domestic added value, are unwarranted. It is established that a sector with high linkages does not always provide a greater contribution to the economy. During the research window, sectors with lower forward linkages significantly contributed to Indonesian net export earnings, job creation, and value-added. However, this study does not mean that high connections are bad. This study argues that policymakers should also take into account factors other than relationships. This research, nonetheless, does not imply that high linkages are bad. This study simply argues that in formulating any policy, policymakers should also consider other factors besides linkages. The results suggest that other factors that should be considered in policy formulation are its comparative advantage. In Indonesia, its comparative advantage is a considerable number of workers. During the study period, labour-intensive industries contributed significant proportions of net export earnings and employment opportunities to Indonesia's economy. The results also show that implementing the linkages-based policy, such as

restricting the export of unprocessed raw material, can reduce Indonesia's revenue from net export earnings. Moreover, it can cause a decline in mining sector production. Therefore, some workers in these industries can be unemployed. Also, net export earnings and job creation from the manufacture of iron and basic steel industries are not ready to offset the mining sector's loss in the short term. The article would greatly benefit from providing basic macroeconomic indicators for Indonesia, which would allow to assess the relevance and high feasibility of changing or transforming Indonesia's economic policy.

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8. Competing interests

The authors declare that they have no competing interests.

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