Food And Beverage Industry Sector Linkages In Indonesia

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Abstract: *The food and beverage industry in Indonesia is growing rapidly at the moment. Indeed, Indonesia is currently undergoing an economic transformation towards industrialization and services. Therefore, one of the factors that can support the acceleration of industrialization in Indonesia is to look at the linkages between the food and beverage industry sector, which makes the largest contribution to the manufacturing sector, and other industrial sectors. This study examines the linkages between the food and beverage industry and other manufacturing sectors, as well as the resulting income multipliers. The data used in this study is Indonesia's 2021 input-output data obtained from BPS. The analysis techniques used are descriptive analysis, linkage analysis, and multiplier analysis. The results showed that the food and beverage industry sector contributed 23.15% of the gross value added of the manufacturing industry. The IFL value of 1.1703 and the IBL value of 1.2092 indicate that the food and beverage industry has strong linkages with the downstream and upstream sectors. When multipliers, specifically income, are considered, each demand for the food and beverage industry of 1 rupiah, results in a total increase in income in the sector of Rp 345,911,027.*

Keywords: Food and Beverage Industry, Input-Output, Forward Linkage, Backward Linkage, Income Multiplier

JEL: A1, L6, O4

1. INTRODUCTION

The goal to bring Indonesia as a developed country makes the industrial sector and the service sector a special concern for all stakeholders involved. Currently, the industrial sector is starting to experience continuous improvement, this can be seen from the improving growth trend of the industrial sector. The development of the economic structure can certainly be seen through the increase in Gross Domestic Product (GDP) generated by a country. To help increase economic development as a direction of change to become a developed country, GDP growth is an urgency that must be increased. Increasing GDP can be through good cooperation between economic sectors that have forward linkages and backward linkages with other sectors. (Maria Parinusa, 2023)

Countries that industrialize are characterized by a transformation from an agrarian economy to a capital-intensive economy (Eliza Noviriani, 2023). One of the reasons for supporting the industrial sector is that it is the most important sector to achieve greater growth in real income per capita, especially for developing countries because it is able to affect output multipliers and also higher labor multipliers compared to developing countries (Koylal , 2024). Currently the manufacturing sector makes a high contribution to GDP, indicating that the government is jointly encouraging economic growth and development through its improvement in the industrial sector. The following is a graph of the development of the manufacturing sector in Indonesia.
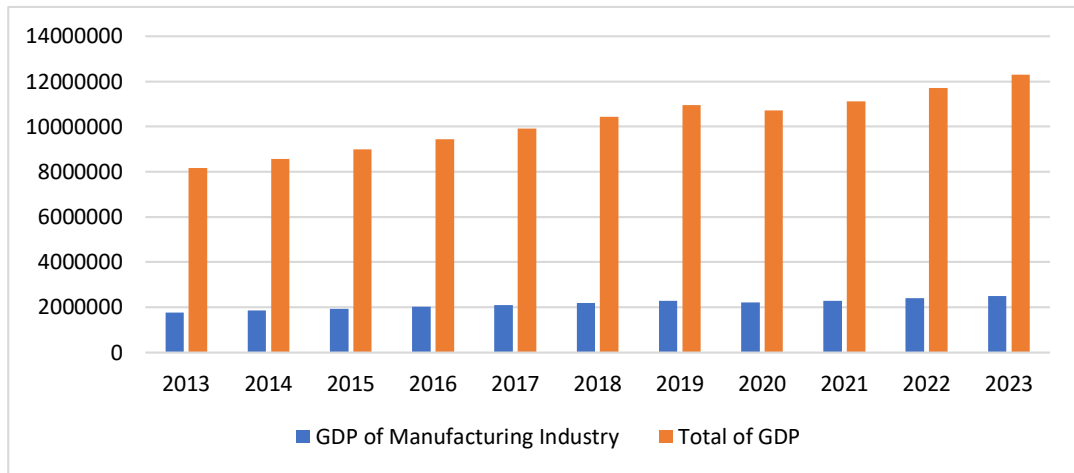
Figure 1: Comparison of GDP of manufacturing sector with total GDP
Source**:** Badan Pusat Statistik (BPS) Indonesia, diolah

The graph shows that the growth trend of the manufacturing sector matches the growth trend of total GDP, indicating that the manufacturing sector has a significant impact on Indonesia's GDP. If the manufacturing sector contributes more, the total GDP will increase. Despite a slight decline in 2020, the manufacturing sector bounced back in 2021 and increased its contribution value even more, ensuring the continuation of the growing trend of the manufacturing sector and Indonesia's GDP.

Global economic uncertainty can be an obstacle in the industrialization process that will be carried out by developing countries, especially in Indonesia. To overcome the global economic threat, the government needs to formulate appropriate policies so that the development of the industrial sector is right on target and can become a leading sector in the economy. It is important for the government to see the following problems, because if it is wrong in determining policies, the risk of economic decline will be even greater. Where, if the government is not successful in determining its development priorities, it will have an impact on the decline in the welfare of its people. Economic transformation is a form that can support structural changes in the economy in Indonesia, one of which is through industrialization (Eki Indriyanti , 2023). Therefore, the industrial sector needs to be reviewed for its interrelated aspects in order to be able to produce maximum contribution to GDP. By determining the right policies, there will be a harmony of economic growth that can encourage the creation of good employment and maximum output from the processing industry.

Reported through BPS grouping, there are 16 industrial subsectors that are part of the processing industry sector. Of course, each subsector of the processing industry has a different contribution because it is based on the availability of inputs that will produce certain outputs. Industrial subsectors that are able to produce products with high added value and create many jobs will certainly benefit economic growth in the region. Therefore, it is important to know what subsectors of the manufacturing industry are capable of becoming leading sectors with many linkages between other sectors. This is important, because given that the available resources are limited, it is necessary to prioritize development in a directed manner. (Koylal, 2024). The leading processing industry subsector in Indonesia is the food and beverage industry. The food and beverage industry is also supported by a large increase in MSMEs because it is able to stimulate the economy in every region in Indonesia. The contribution of the food and beverage industry sector is presented in the following table.
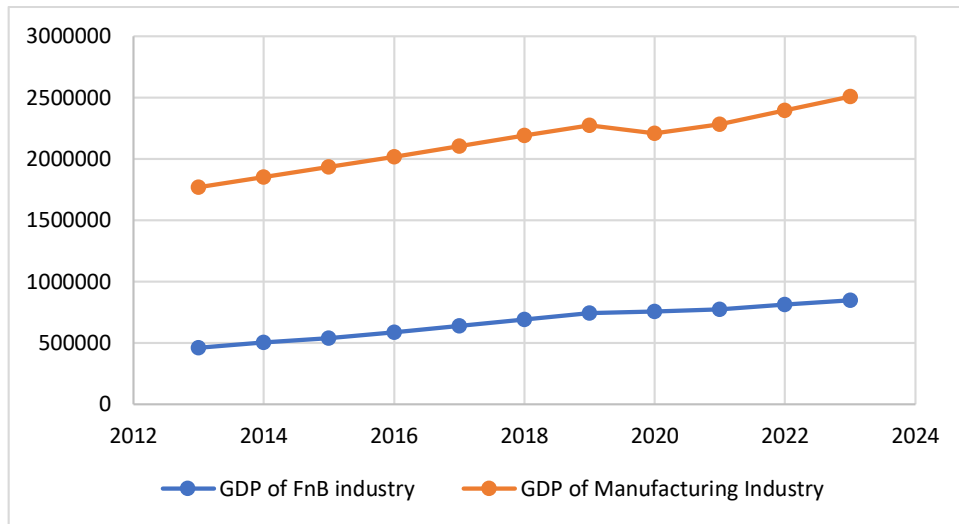
Figure 2. Growth of Food and Beverage Industry Sector against Processing Industry
Source: Badan Pusat Statistik (BPS) Indonesia, diolah

From the graph, it can be seen that the food and beverage industry subsector has an ever-increasing contribution and a good growth trend. The growth of the food and beverage industry sector is also in line with the GDP of the manufacturing sector. Thus, it can be seen that the food and beverage industry sector has a positive influence on the GDP of the manufacturing sector. Most of the food and beverage industry is part of the small and medium industry. This is certainly important, because developing small and medium industries is one of the good priorities because it provides a form of life as an Indonesian people who pass through the economic crisis and can maintain their business continuity in the midst of intense competition. (Zainob, 2022).

The size of the contribution of the food and beverage industry sector reflected in GDP alone does not necessarily guarantee that the food and beverage industry sector deserves to be the driving force of the economy in Indonesia. Therefore, we need to know whether the food and beverage industry sector is a leading sector. A leading sector is a sector that has relatively higher profits when compared to other sectors. In this case, in addition to having a significant contribution, the industry must also have significant sectoral and spatial connectivity. In addition, the sector is able to provide long-term and short-term benefits. Therefore, if the food and beverage industry meets these criteria, it can be classified as a key sector in Indonesia's economic development that can be prioritized by the government so that development in the sector with available resources is perfectly allocated.

Thus, based on the information that has been presented above, the urgency of this research is obtained, namely in helping to determine priority economic development so that the Indonesian state can carry out economic transformation to the maximum through key sectors. By looking at the key sectors that play a major role with large linkages between other sectors, it will certainly help in the formulation of policies made by the stakeholders involved so that economic development can be maximally realized with the realization of appropriate investment so as to be able to bring economic progress to the country through economic transformation.

2. LITERATURE REVIEW

2.1 Economic Growth

Economic growth is an important indicator to help analyze economic development in a country. According to Kuznets, economic growth is the increase in the long-term capacity of the country concerned to provide various economic goods to the population in the country. (Azwina et al., 2023). According to Untoro (2010:39), Economic growth is the development of activities in the economy that causes the goods and services produced in society to increase and the prosperity of

society to increase in the long term.

2.2 Input-Output Model

An I-O table is a matrix table that contains information about transactions of goods, services, and relationships between economic activities (industries) in a region over a period of time. To meet intermediate and final demand, an economic sector is allocated to other sectors in the row and column sections. On the other hand, intermediate and primary inputs of an industry are used in the production process. This table provides a complete picture of the quantitative method. No matter how much a region's economic sectors contribute to the formation of Gross Domestic Product, regional development shows the economic potential of a region..

2.3 Leading Sector Analysis

If the Forward Linkage Index (IBL) and Forward Linkage Index (IFL) of an industry are high (IBL & IFL > 1), the industry is considered a leading industry and is placed in the corner of quadrant I on the balance chart. Conversely, if the IBL & IFL are low (IBL & IFL < 1), the industry is placed in quadrant III. If written as a mathematical formula, the result is as follows:

$$IBL_j = \frac{\sum_{i=1}^{n} b_{ij}}{\frac{1}{n} \sum_{i=1}^{n} \sum_{j=1}^{n} b_{ij}}$$

$$IFL_i = \frac{\sum_{j=1}^{n} b_{ij}}{\frac{1}{n} \sum_{i=1}^{n} \sum_{j=1}^{n} b_{ij}}$$

IBL$_j$ = Indeks *Backward Linkage* for sector j
IFL$_i$ = Indeks *Forward Linkage* for sector i
b$_{ij}$ = Inverse matriks elemen
n = total of sector

2.4 Input Coefficients and Multipliers

The Input-Output tool can be used to provide a statistical description in the form of a matrix that presents information about goods and services transactions and the relationship between one economic sector and another (BPS, 2008). Suppose that the amount of output of sector i used as input to sector j is called xij, the total output of sector i is called xi, and the total final demand of sector i is called yi. Then, the total output of sector i can be written as follows (BPS, 2008):

$$x_i \sum_{j=1}^{n} x_{ij} + y_i$$

2.5 Keterkaitan Antar Sektor Industri dan Sektor Kunci

To assess the role of a sector of the economy, it can be seen from the dependency relationship as well as the linkages to other sectors of the economy. Significantly, these effects result in two types of sectoral linkages: backward linkages and forward linkages. The backward linkage of a sector can be determined using the Leontief model by looking at the demand-driven component, while the forward linkage can be determined using the supply-driven component. According to BPS, the range of backward and forward linkages is as follows:

$$BL_j \sum_{ji=1}^{n} b_{ij}$$

2.6 Previous Research

Research on the relationship between the industrial sector and its impact on the economy of a region/country has been studied by many previous researchers. So as to support the relevance of the

research to be carried out, there are several references to previous research as follows.

Research conducted by Ronalia (2021) entitled Downstream Potential of Industry in Riau Province (Interregional Input Output Table Perspective). This study found that the downstream industry in Riau is very appropriate because the Processing Industry which is a leading industry will also be able to attract and encourage the growth of other sectors. Research by Solikin (2021) entitled The Role of the Alcoholic Beverage Industry in the Indonesian Economy: Input-Output Analysis. The analysis shows that the output multiplier is low, the labor multiplier is high and the income multiplier is high. In addition, the forward linkage and backward linkage effects are less than one. With these results, it can be concluded that the alcoholic beverages industry is not a leading sector in Indonesia and its role is relatively limited.

Sofia Yanti (2017)in her research entitled Classification of Bandung City Industrial Sector Based on Input Output Model Comparability Method successfully analyzed the success of the industrial sector in Bandung city. Based on the analysis of 40 economic sectors in Bandung City, 16 sectors are able to compete with other regions, and the rest are only able to compete in the Bandung City area. Fathimatuz Zahroo et al. (2022) in his research entitled Linkage Analysis of the Manufacturing Industry Sector to the Economy in East Java Province (Input Output Approach). The results show that the manufacturing sector; service sector; agriculture, forestry and fisheries have forward linkages to the manufacturing sector.

Kim et al. (2021) in their research entitled Industrial linkage and spillover effects of the logistics service industry: an input-output analysis successfully analyzed the linkages of the shipping service industry sector. The results show details of the industrial linkage effects of the logistics service industry, which shows that several logistics sectors (transportation, storage, and handling) are not only interdependent but also form a service ecosystem.

3. METODE

3.1 Scope

The scope of this study is limited in order to focus on specific variables and parameters. Of course, this is very useful to direct the researcher so as not to cover too many variables and remain relevant to the research objectives. This research focuses on the relationship between the food and beverage industry sector in Indonesia and other industrial sectors in terms of contributing to a relatively high GDP and driving economic transformation.

3.2 Data Type and Sources

This research requires data analysis derived from the 2021 input-output (IO) table from the Central Bureau of Statistics. The data classification used is a total of 52 industries in Indonesia. The transactions used are domestic transactions that have been separated from the components of export-import between provinces and export-import internationally with other countries.

3.3 Analysis Technique

3.3.1 Descriptive Analysis

3.3.1.1 Demand Supply Structure

This analysis shows how domestic production and imports affect a region's economy. It is also used to determine the role of intermediate and final consumption of a region's economic output. This demand and supply structure can certainly help reflect on the major producers and see the supply of exports and imports in a particular sector of the economy (Prihawantoro, 2020).

3.3.1.2 Output Structure

By analyzing the output structure, it can help to see the economic sectors that act

as leading sectors in the economy of a region (Rahmawan & Angraini, 2021). Furthermore, it can see the sector that produces the largest output and the smallest output based on the contribution given by each sector.

3.3.1.3 Gross Value Added Structure

This structure is obtained from the value of output (production value) and from the value of intermediate inputs in the production process (Hadi Sutrisno, 2021). As we know, high output from a sector may not necessarily produce high gross value added. This gross value added can help as an indicator of whether people working in the sector have high or low productivity through the components of wages/wages, business surplus, depreciation, indirect taxes, and subsidies from each sector.

3.3.1.4 Final Consumption Structure

This analysis looks at the final consumption of output produced by each industrial sector in a region. This analysis reviews the components of final consumption composition such as household consumption, non-profit institutions, government consumption, gross fixed capital formation, as well as stock changes and exports (Fitriyanti, 2022).

3.3.2 Linkage Analysis

In determining the key industrial sector, it can be seen from the forward linkage and backward linkage. Where the leading industrial sector can be seen from the sustainability of raw materials, investment, market share and also socio-economic conditions in carrying out policies, especially in the downstream industry. (Junari, 2020). By looking at industrial sector linkages, we can see that key industrial sectors and other industrial sectors encourage each other to form economic growth in a region. (Fathimatuz Zahroo, 2022). This is important to help determine which industries should maximize their development.

3.3.3 Spread Analysis

This analysis looks at direct and indirect relationships. There are two types of analysis: coefficient dispersion and sensitivity dispersion. Spread sensitivity analysis is the ability of a sector to increase the growth of its upstream industries, which is useful to know the distribution of benefits from the development of a sector to the development of other sectors through the mechanism of input market transactions. On the other hand, the coefficient of dispersion shows how much influence the linkages have on the calculation of backward linkages. (Rahma & Widodo, 2019).

3.3.4 Multiplier Analysis

Multiplier analysis can be used to measure the response or impact of economic stimulus by looking at several effects, such as income, gross value added, output multipliers, and employment. The output multiplier is the total value of output or production produced by the economy, while the revenue multiplier is the total value of household income from one unit of additional final demand in a particular sector. In addition, labor compensation, business surplus, and taxes less subsidies are part of gross value added. (Suseno et al., 2019).

4. RESULTS AND DISCUSSIONS

4.1. Overview of the Indonesian Economy

The good economy of a region or province in supporting current industrialization can be seen from the supply and use of goods or services produced in the region. Table 1 presents the goods and services in Indonesia. The table shows the flow of goods and services in inputs and outputs in Indonesia. In terms of use, most of the inputs are used for the production process, amounting to 42.50% in the form of intermediate demand. Furthermore, the inputs are also used for household consumption by 27.36%. 0.56% was used for consumption of household non-profit

institutions. For government consumption, the amount of input used was 4.21%.

Table 1. Balance of Goods and Services of the Indonesian Economy (Million Rupiah)

Usage			Provision		
Details	**Value**	**Share (%)**	**Details**	**Value**	**Share (%)**
Intermediate Demand	1105897051	42,50	Domestic Output	23704788355	91.10
Household Consumption	71199090	27,36	Impor	2314213412	8.89
LNPRT Consumption	144944697.7	0.56			
Government Consumption	1094181418	4,21			
PMTB	4139130417	15,91			
Inventory Change	82588959	0.32			
Ekspor	2379276757	9,14			
TOTAL	**26019001767**	**100%**		**26019001767**	**100%**

Sources**:** Input-Output Table (BPS; diolah).

In terms of gross fixed capital formation, 15.91% was used. In terms of export activities, Indonesia used 9.14% of inputs. Furthermore, for the provision of 91.10% of goods and services in Indonesia are produced domestically. Meanwhile, products and services obtained from imports amounted to 8.89%. A total of 6.76% is the percentage of fulfillment of imported goods and services from abroad. The total output that has been used in Indonesia in 2021 is 26,019,001,767 billion rupiah.
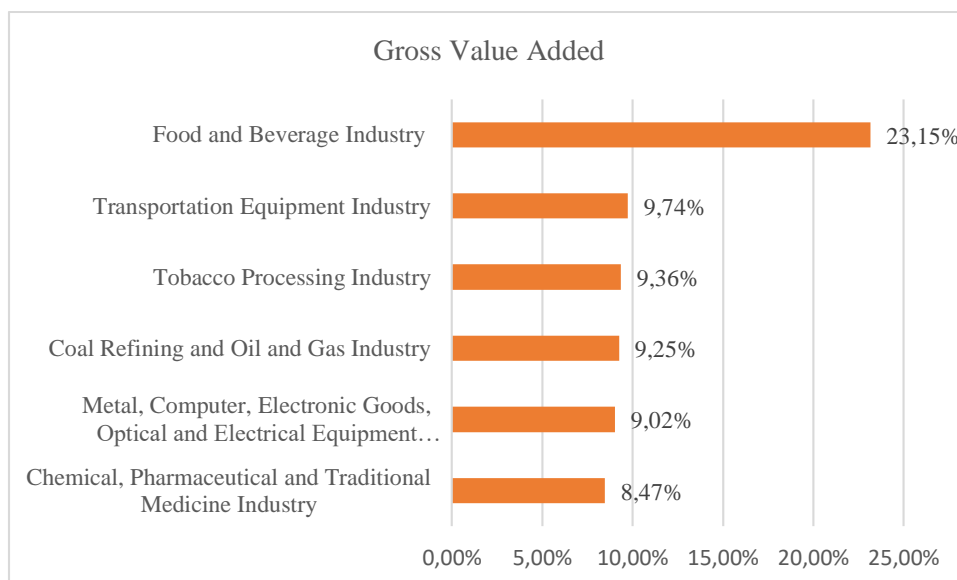

Figure 3. Gross Value Added 5 Manufacturing Sectors by highest contribution
Sources**:** Badan Pusat Statistik (BPS) Indonesia, diolah

Gross value added also plays an important role in looking at economic growth in Indonesia. In general, sectors that produce large outputs may not necessarily produce large NTBs. The food and beverage industry has a gross value added contribution of 23.15%, which indicates that every 100% output produced from this construction industry can create 687,390,747.7 primary income in the form of wages and salaries, business surplus, depreciation, direct taxes or indirect taxes, and related subsidies. The second industry with a large NTB is the transportation equipment industry, which amounted to 9.74%. The tobacco processing industry has a gross value added contribution of 9.36% to the tobacco processing industry. The coal and oil and gas refining industry has an NTB contribution of 9.25%. Meanwhile, the metal goods industry contributed 9.02% to the NTB of the

processing industry in Indonesia.

The food and beverage industry sector indicates a large NTB which indicates that the productivity of the food and beverage industry sector is quite good. With the high NTB value, it can indicate that the welfare of people in Indonesia who work in this sector is quite high. The distribution of gross value added from the food industry sector consists of 66.05% of business surplus, then for labor compensation of 27.59%. For taxes on other production as much as 6.36%.
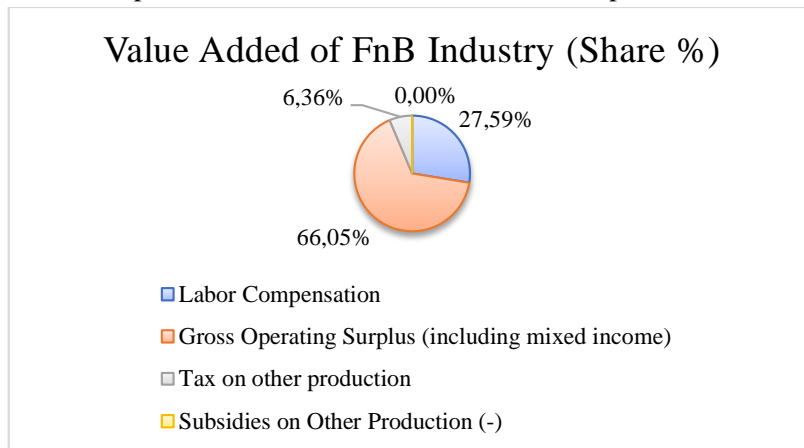
Figure 4. Distribution of Gross Value Added of Food and Beverage Industry
Source**:** Badan Pusat Statistik (BPS) Indonesia, diolah

4.2. Food and Beverage Industry Sector Linkage

Linkages between each industrial sector are important to analyze in order to create good efficiency, because the high GDP contribution of an industrial sector may not necessarily stimulate other industrial sectors. For this reason, it can be seen through the forward linkages and backward linkages of the related industrial sectors whether they are able to encourage upstream or downstream industrial sectors. (Junari et al., 2020b). Table 2 shows the forward and backward linkage indices of each manufacturing industry in Indonesia. It can be seen from the following table that the average manufacturing subsector has a forward and backward linkage index with a value above 1.

Table 2. Industry Sector Linkage Index

SECTOR OF INDUSTRY	IFL	IBL
Coal and Oil and Gas Refining Industry	1.6531	0.9268
Food and Beverage Industry	1.2092	1.1703
Tobacco Processing Industry	0.8253	0.8282
Textile and Apparel Industry	0.8710	1.0626
Leather, Leather Goods and Footwear Industry	0.7892	1.0900
Wood, Wood and Cork Products and Wickerwork of Bamboo, Rattan and the Like Industry	0.9674	1.1112
Paper and Paper Goods, Printing and Recording Media Reproduction Industry	1.3944	1.1559
Chemical, Pharmaceutical and Traditional Medicine Industry	1.3323	1.0583
Rubber, Rubber and Plastic Goods Industry	0.8980	1.1959
Non-Metallic Excavated Goods Industry	0.8153	1.1663
Basic Metal Industry	0.9461	1.1354

Manufacture of Metal Goods, Computers, Electronic Goods, Optical and Electrical Equipment	0.9251	1.0107
Machinery and Equipment Industry YTDL	0.9063	1.0116
Transportation Equipment Industry	0.8367	0.9937
Furniture Industry	0.6929	1.1048
Other Manufacturing Industries, Machinery and Equipment Repair and Installation Services	1.4833	0.9619

Source**:** Input-Output BPS 2021 (diolah)

If seen in the food and beverage industry sector, it has IBL> 1, which means that every additional output of the food and beverage industry sector can encourage other industry sectors to increase their production inputs. The IBL value shows the impact of the final demand of an industry on the value of output required from other industries as suppliers of its inputs. The higher the IBL of an industry, the greater the impact of its final demand on its upstream industries (input suppliers) in the country. This is important for developing supply chains and industry linkages in the economy. The IBL value of the food and beverage industry sector of 1.1703 indicates that if the output of the food and beverage industry increases by 1,000,000 units, it will increase its upstream industry sector by 1,170,300 units.

When viewed from the IFL value of 1.2092, the food and beverage industry sector has an IFL value > 1, which means that any increase in output in the food and beverage industry sector will increase output in its downstream industry sectors. The higher the forward linkage index of an industry, the greater the impact of its increased output on its downstream industries (output users) in the country. This is important for developing industrial linkages and value chains in the economy. The food industry sector has extensive forward linkages with various downstream industries related to distribution, packaging, food services, further processing, and other logistical support. Thus, if the food and beverage industry sector increases by 1,000,000 units, the demand in the downstream industry sector will increase by 1,209,200 units.

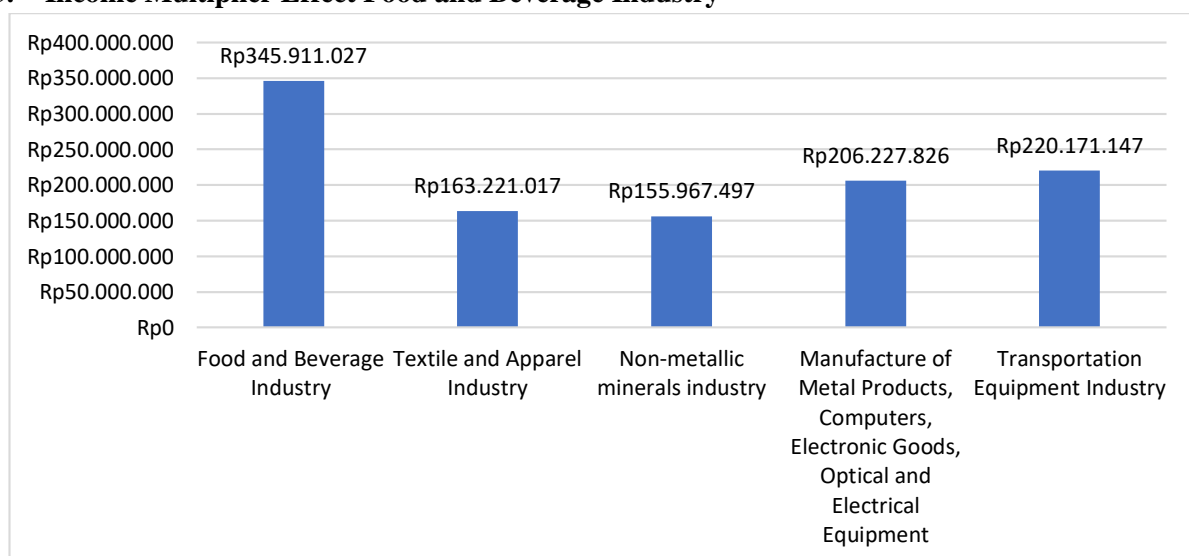### 4.3. Income Multiplier Effect Food and Beverage Industry

Figure 5. Income Multipliers of 5 Manufacturing Sectors by highest contribution
Source**:** Badan Pusat Statistik (BPS) Indonesia

When viewed from the income multiplier, it is found that the food and beverage industry sector

has the highest contribution of the total processing industry. This income multiplier figure shows that for every 1 rupiah of demand for the food and beverage industry, the total increase in income in the sector is Rp 345,911,027. The greater the income multiplier value of a sector, the greater the impact of an increase in the sector's final demand in increasing overall household income. This happens because an increase in final demand will increase production, which in turn increases the demand for production factors such as labor. The high number of income multipliers in the food and beverage industry indicates that the food and beverage industry is capital intensive by using a lot of innovation and technology according to the times (Raharjo & Kusnadi, 2023). An increase in labor demand will increase household wages/income. Sectors with a high income multiplier value are considered to have a large ability to create household income when final demand increases. Thus, the food and beverage industry is considered to be able to increase household income in Indonesia. This is in line with research that was conducted by Bado (2024) where in his research successfully showed that the development of the food and beverage industry is able to provide more and more labor absorption, thereby increasing the income of individuals working in the food and beverage industry sector.

The food and beverage industry is very easy to develop by various groups and is a fairly labor-intensive industry, so that if the number of food and beverage industries increases, it will certainly absorb a lot of labor and reduce the unemployment rate in the area (Alifa et al., 2021). The income multiplier effect of the food and beverage industry sector in Indonesia can lead to increased production and sales through other related industry sectors. The food and beverage industry is a provider of primary needs for people in Indonesia, of course, it is not surprising that rapid growth in the food and beverage industry will be the leading sector that generates other sectors (Nasution, 2023). Higher income from the food and beverage industry sector for its workforce will increase public consumption which can stimulate the Indonesian economy to advance. The rapid growth of the food and beverage industry can certainly increase the demand for raw materials from the agricultural sector, for example, or other industrial sectors.

5. CONCLUSION AND SUGGESTION
CONCLUSION

The conclusion obtained from this research is that the food and beverage industry sector can be categorized as a leading industrial subsector in the manufacturing industry sector. This is reflected through the gross value added in the manufacturing industry sector contributed by the food industry as much as 23.15%. The linkage of the food and beverage industry with other manufacturing sectors is also high with the results of the Backward Linkage Index of the food and beverage industry sector of 1.1703, indicating that if the output of the food and beverage industry increases by 1,000,000 units, it will increase the upstream industry sector by 1,170,300 units. Furthermore, the Forward Linkage Index of the food and beverage industry sector is 1.2092 if the food and beverage industry sector increases by 1,000,000 units, the demand in the downstream industry sector will increase by 1,209,200 units.

When viewed from the multiplier number, especially income, it shows that for every 1 rupiah of demand for the food and beverage industry, the total increase in income in the sector is Rp 345,911,027. The greater the income multiplier value of a sector, the greater the impact of an increase in the sector's final demand in increasing overall household income. Therefore, the food and beverage industry sector has a high interrelationship between industrial sectors and a maximum increase is needed to support overall economic transformation in all economic sectors.

SUGGESTION

The suggestion that can be conveyed is that increasing the development of the food and beverage sector industry is the right step to take because it has a high sectoral linkage to other industrial sectors. So, by focusing on increasing the contribution of the food and beverage industry sector, of course, it can also increase other processing industry sectors. The government can issue stimulus policies to increase the contribution of food and beverage sector output such as increasing investment so that economic transformation can be realized.

ACKNOWLEDGMENTS

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