

INDUSTRIAL EMPLOYMENT DYNAMICS AND STRUCTURAL DECOUPLING IN CENTRAL JAVA'S SECONDARY SECTOR

Zannia Zain^{1*}, Suharno², Abdul Aziz Ahmad³, Faried Zamachsari⁴

¹⁻³Department of Development Economics, Faculty of Economics and Business, Universitas Jenderal Soedirman, Indonesiaqf

⁴Regional Office of the Directorate General of Treasury, Ministry of Finance of the Republic of Indonesia, Central Java, Indonesia

*Email corresponding author: zannia.zain@mhs.unsoed.ac.id

Article Information: Received --- June 25, 2026, Published --- August 10, 2026

Abstract

Whether industrial expansion continues to generate employment remains a critical question in the structural transformation process of developing economies. Although the growing contribution of the secondary sector is expected to facilitate labor reallocation toward more productive activities, output growth is not always accompanied by proportional employment growth, suggesting a potential decoupling between economic expansion and labor absorption. This study examines the determinants of industrial employment dynamics in Central Java, Indonesia, using balanced panel data from 35 regencies and municipalities during 2019–2024. The analysis employs a Fixed Effects Model with cluster-robust standard errors to estimate the effects of industrial output share, agricultural output share, industrial productivity, agricultural productivity, investment, and a dummy variable capturing the COVID-19 period on industrial employment share. The results indicate that industrial and agricultural output shares exert positive and statistically significant effects on industrial employment share, indicating that the process of structural transformation remains evident at the regional level. In contrast, industrial productivity exhibits a significant negative effect, suggesting that productivity gains are increasingly driven by efficiency improvements rather than labor expansion. Agricultural productivity and investment are not statistically significant, whereas the COVID-19 period is associated with a decline in industrial employment share. The findings contribute to the growing literature on structural transformation by demonstrating that industrial growth and employment expansion do not necessarily progress in parallel, while underscoring the need for industrial policies that balance productivity enhancement with employment creation.

Keywords: structural transformation; structural decoupling; industrial employment; industrial productivity; labor reallocation

INTRODUCTION

Structural transformation has long been recognized as a central process in economic development. Since the seminal contributions of Lewis (1954) and Chenery and Syrquin (1975), economic progress has generally been understood as a gradual reallocation of labor and resources from low-productivity activities, particularly agriculture, toward more productive sectors such as industry and modern services. Within this framework, industrialization plays a pivotal role by expanding productive capacity, increasing labor productivity, and creating employment opportunities that contribute to improvements in living standards. Consequently, the industrial sector has traditionally been regarded as an important engine of both economic growth and employment generation in developing economies.

Despite this theoretical expectation, the relationship between industrial expansion and

employment creation has become increasingly complex. In many developing and emerging economies, industrial output has continued to grow while employment growth has lagged behind. Advances in production technology, increasing automation, and the adoption of more capital-intensive production systems have enabled firms to expand output without a corresponding increase in labor demand. As a result, economic growth and employment expansion no longer appear to move in tandem, raising concerns regarding the capacity of industrialization to sustain its traditional role as a source of employment generation.

These developments have stimulated growing interest in the concept of structural decoupling. Broadly defined, structural decoupling refers to a weakening relationship between changes in sectoral output and changes in employment structure. Under such circumstances, sectors may continue to contribute substantially to economic growth while generating increasingly limited employment opportunities. This phenomenon challenges one of the fundamental assumptions of structural transformation theory, namely that labor reallocation naturally follows shifts in economic activity toward more productive sectors. As productivity improvements become increasingly driven by efficiency gains and technological change, understanding how output growth, productivity, and employment dynamics interact has become a major concern in contemporary development economics.

The issue is particularly relevant in Indonesia. Over the past several decades, the Indonesian economy has undergone substantial structural transformation characterized by a declining contribution of agriculture and a growing role of industry and services in economic activity. Nevertheless, the expansion of industrial output has not always been accompanied by comparable increases in industrial employment. This pattern has generated important questions regarding whether industrial development continues to function as an effective mechanism for employment generation or whether emerging forms of structural decoupling are beginning to reshape the country's development trajectory.

Within Indonesia, Central Java provides an especially relevant case for examining these issues. As one of the country's major industrial regions, the province has experienced significant industrial development while simultaneously retaining a substantial agricultural base. The coexistence of these characteristics creates a distinctive economic structure in which industrial expansion, agricultural transformation, productivity change, and labor allocation interact across regencies and municipalities. Consequently, Central Java offers an appropriate setting for investigating whether changes in sectoral output continue to translate into employment growth within the secondary sector.

Although a substantial body of literature has examined structural transformation, industrialization, and employment dynamics, existing studies have predominantly focused on national-level analyses or cross-country comparisons. Relatively limited attention has been devoted to understanding how sectoral output structure, productivity, and investment jointly shape industrial employment dynamics at the subnational level. Moreover, empirical studies that explicitly examine these relationships through the lens of structural decoupling remain scarce, particularly in the context of regional economies in developing countries. The economic disruptions associated with the COVID-19 pandemic further reinforce the importance of understanding whether temporary shocks alter the relationship between industrial growth and employment outcomes.

This study extends the existing literature by integrating structural transformation and structural decoupling perspectives within a subnational analytical framework. The novelty of this study lies in its integration of structural transformation and structural decoupling perspectives to explain industrial employment dynamics at the subnational level, using evidence from 35 regencies and municipalities in Central Java during 2019–2024. In addition, by incorporating the COVID-19 period as a contextual factor, the study sheds light on how large-scale economic disruptions shape industrial employment outcomes within the process of structural transformation.

Accordingly, this study aims to analyze the determinants of industrial employment dynamics

in Central Java's secondary economic sector. Specifically, it examines the effects of industrial output share, agricultural output share, industrial productivity, agricultural productivity, investment, and the COVID-19 period on industrial employment share. The empirical findings indicate that industrial and agricultural output shares are positively associated with industrial employment, whereas industrial productivity exhibits a negative relationship, suggesting emerging indications of structural decoupling within the province's secondary sector. The study contributes theoretically to the literature on structural transformation, employment dynamics, and structural decoupling by providing evidence from a regional economy in a developing country. From a practical perspective, the findings highlight the importance of industrial development strategies that balance productivity enhancement with employment creation, thereby supporting a more inclusive and sustainable process of structural transformation.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

2.1 Structural Transformation, Structural Decoupling, and Employment Dynamics

The relationship between economic growth and employment creation has occupied a central position in the development economics literature for decades. Structural transformation theory argues that economic development is accompanied by the movement of labor and productive resources from traditional, low-productivity sectors toward more productive sectors, particularly manufacturing and modern services. Such reallocation is expected to improve overall productivity while simultaneously expanding employment opportunities. In this context, industrialization has long been viewed as a key mechanism through which developing economies can accelerate growth and absorb surplus labor from agriculture.

Recent evidence, however, suggests that the relationship between industrial expansion and employment creation has become increasingly complex. While industrial output continues to grow in many developing economies, employment growth often lags behind. Technological upgrading, automation, and increasing capital intensity have enabled firms to raise output without proportionally increasing labor demand. Consequently, productivity gains are increasingly generated through efficiency improvements rather than workforce expansion (Acemoglu & Restrepo, 2020; Adarov & Stehrer, 2021).

This development has attracted growing attention to the notion of structural decoupling, which refers to a weakening relationship between changes in economic structure and changes in employment structure. Adarov and Stehrer (2021) argue that technological progress and capital deepening have reduced the employment responsiveness of economic growth in many countries. Similar concerns are reflected in Rodrik's (2016) discussion of premature deindustrialization, where industrial sectors continue to contribute to output growth while losing their traditional role as large-scale job creators. Under such circumstances, growth in sectoral output may no longer translate into comparable employment expansion.

The growing debate surrounding structural transformation and structural decoupling highlights the importance of examining the determinants of industrial employment dynamics at the regional level. Employment outcomes are likely to be shaped not only by changes in sectoral output but also by productivity conditions, investment patterns, and broader economic shocks. Understanding how these factors interact remains crucial for evaluating whether industrial development continues to function as an effective mechanism of labor absorption.

2.2 Industrial Output Share and Industrial Employment

The expansion of industrial activity remains one of the most visible indicators of structural transformation. A larger industrial output share reflects the increasing importance of industry within the regional economy and generally signals a shift toward higher-productivity production structures. As industrial production expands, firms require additional inputs, including labor, to support production processes, logistics networks, and related economic activities.

Empirical studies generally support the proposition that industrial development contributes to employment generation. McMillan, Rodrik, and Sepúlveda (20) show that industrial expansion remains an important source of productive employment in developing economies. Similarly, Diao et al. (2021) emphasize that structural transformation driven by industrial growth continues to facilitate labor reallocation from lower-productivity sectors. Although recent concerns regarding jobless growth have emerged, industrial expansion in developing regions is still expected to generate additional labor demand.

H1: Industrial output share positively affects industrial employment share.

2.3 Agricultural Output Share and Industrial Employment

Structural transformation is commonly associated with a declining relative contribution of agriculture and an increasing role of industry in economic activity. A high agricultural output share often reflects an economic structure in which productive resources remain concentrated in traditional sectors. Under such conditions, the transition toward industrial-based production structures may proceed more slowly, limiting opportunities for labor reallocation into manufacturing and other secondary activities.

Previous studies suggest that economies with stronger dependence on agriculture tend to exhibit lower levels of industrial employment diversification. Diao et al. (2021) note that the persistence of agriculture-dominated production structures may constrain the pace of labor movement toward more productive sectors. Consequently, a larger agricultural output share may reduce the relative importance of industrial employment within the regional labor market.

H2: Agricultural output share negatively affects industrial employment share.

2.4 Industrial Productivity and Industrial Employment

Productivity growth is widely recognized as a fundamental source of economic development and industrial competitiveness. Higher productivity enables firms to produce more output from a given set of inputs, improving efficiency and strengthening market performance. In the conventional growth framework, productivity improvements support output expansion, which may subsequently stimulate labor demand.

Several empirical studies have documented a positive relationship between productivity growth and employment under conditions where output expansion outweighs labor-saving technological effects. OECD (2021) argues that productivity enhancement can strengthen industrial performance and create opportunities for business expansion. As firms become more competitive, production growth may generate additional employment opportunities despite ongoing technological change.

H3: Industrial productivity positively affects industrial employment share.

2.5 Agricultural Productivity and Industrial Employment

Agricultural productivity plays an important role in facilitating structural transformation. Improvements in agricultural productivity increase output per worker and reduce the labor required to maintain agricultural production. As a result, surplus labor may become available for employment in more productive sectors, particularly industry.

Beyond its labor-release effect, higher agricultural productivity may also increase rural incomes and stimulate demand for manufactured products. Such intersectoral linkages can support industrial expansion and strengthen labor absorption within the secondary sector. Previous studies therefore regard agricultural productivity as an important driver of labor reallocation and economic transformation (FAO, 2022; World Bank, 2020).

H4: Agricultural productivity positively affects industrial employment share.

2.6 Investment and Industrial Employment

Investment is widely regarded as a critical determinant of industrial development. Through capital accumulation, infrastructure development, and business expansion, investment enhances productive capacity and supports economic growth. In the industrial sector, investment facilitates the establishment of new production facilities, the expansion of existing firms, and the development of supporting industries.

Empirical evidence generally indicates that investment contributes to employment creation by increasing production capacity and stimulating economic activity. In developing economies, investment often serves as a catalyst for industrial expansion and job creation, particularly during periods of structural transformation. Consequently, greater investment is expected to strengthen labor absorption within the industrial sector.

H5: Investment positively affects industrial employment share.

2.7 COVID-19 and Industrial Employment

The COVID-19 pandemic generated severe disruptions to production systems, labor markets, and global supply chains. Restrictions on mobility, declining consumer demand, and heightened uncertainty constrained industrial activity across many countries. Manufacturing firms faced operational challenges that reduced production capacity and weakened labor demand.

Studies conducted during and after the pandemic indicate that labor market recovery often lagged behind output recovery. Barrero, Bloom, and Davis (2020) argue that the pandemic accelerated structural adjustments in production processes, while IMF (2021) reports substantial employment losses across various sectors. Consequently, industrial employment opportunities during the pandemic period were generally lower than under normal economic conditions.

H6: The COVID-19 period negatively affects industrial employment share.

RESEARCH METHODS

This study employs a quantitative research design to examine the determinants of industrial employment dynamics in Central Java's secondary economic sector. The unit of analysis consists of 35 regencies and municipalities in Central Java Province, Indonesia. The study covers the period 2019–2024, resulting in a balanced panel dataset comprising 210 observations.

The study relies exclusively on secondary data collected from official publications issued by Statistics Indonesia (Badan Pusat Statistik/BPS) and other relevant government institutions. Data were gathered through documentation techniques and compiled into a balanced panel structure to capture both cross-sectional and time-series variations across regions.

Industrial employment share (PTKI) is specified as the dependent variable. The explanatory variables include industrial output share (PPDRBI), agricultural output share (PPDRBP), industrial productivity (PSI), agricultural productivity (PSP), investment (INV), and a dummy variable representing the COVID-19 period. The COVID-19 dummy takes a value of one for 2020–2021 and zero otherwise.

Drawing upon the structural transformation and structural decoupling literature, the empirical model is specified as follows:

$$PTKI_{it} = \alpha + \beta_1 PPDRBI_{it} + \beta_2 PPDRBP_{it} + \beta_3 PSI_{it} + \beta_4 PSP_{it} + \beta_5 INV_{it} + \beta_6 COVID_{it} + \varepsilon_{it}$$

where (PTKI) denotes industrial employment share; (PPDRBI) represents industrial output share; (PPDRBP) represents agricultural output share; (PSI) and (PSP) denote industrial and agricultural productivity, respectively; (INV) refers to investment; and (COVID) represents the pandemic-period dummy variable.

The empirical analysis employs a Fixed Effects Model (FEM) with cluster-robust standard errors. The Fixed Effects Model is selected to control for unobserved regional heterogeneity across regencies and municipalities, while cluster-robust standard errors are applied to address potential

heteroskedasticity and within-panel serial correlation. All estimations are conducted using panel data analysis techniques to identify the factors influencing industrial employment dynamics in Central Java.

Table 1. Variable Definitions and Measurements

Variable	Definition	Measurement
PTKI	Industrial employment share	Percentage of industrial employment to total employment
PPDRBI	Industrial output share	Percentage contribution of the industrial sector to GRDP
PPDRBP	Agricultural output share	Percentage contribution of the agricultural sector to GRDP
PSI	Industrial productivity	Industrial GRDP per industrial worker
PSP	Agricultural productivity	Agricultural GRDP per agricultural worker
INV	Investment	Total realized investment
COVID	COVID-19 dummy	1 = 2020–2021; 0 = otherwise

Source: Authors' compilation.

RESULTS AND DISCUSSION

Table 2. Fixed Effects Model Estimation Results

Variables	Coefficient	t-statistic	p-value
PPDRBI	0.6853	2.63	0.013
PPDRBP	0.6213	2.52	0.017
PSI	-1.0020	-2.31	0.027
PSP	-0.0195	-0.44	0.660
lnINV	3.3640	1.07	0.294
COVID	-0.9213	-2.84	0.008
Constant	-26.2549	-0.73	0.472

Notes: Fixed Effects Model with cluster-robust standard errors. N = 210 observations.

Source: Processed data (2026)

The estimation results reported in Table 1 indicate that industrial output share, agricultural output share, industrial productivity, and the COVID-19 period significantly affect industrial employment share in Central Java. In contrast, agricultural productivity and investment do not exhibit statistically significant effects. These findings suggest that industrial employment dynamics are primarily influenced by changes in sectoral economic structure and productivity conditions rather than by capital accumulation alone. More importantly, the results provide important insights into the ongoing process of structural transformation and the emerging signs of structural decoupling within Central Java's secondary economic sector.

4.1 Structural Transformation Remains Evident in Central Java

One of the principal objectives of this study is to assess whether structural transformation continues to shape industrial employment dynamics in Central Java. The empirical results indicate that industrial output share exerts a positive and statistically significant effect on industrial employment share. This finding suggests that regions with a larger industrial contribution to regional output tend to exhibit a greater concentration of workers employed in industrial activities. The result is consistent with the classical structural transformation framework, which views industrialization as the primary mechanism through which labor is reallocated from traditional sectors toward more productive economic activities (Lewis, 1954; Chenery & Syrquin, 1975). As industrial activities expand, production networks, supporting industries, and related economic

activities generate additional labor demand, thereby increasing employment opportunities within the secondary sector. Similar evidence has been reported by McMillan et al. (2017) and Diao et al. (2021), who argue that industrial development remains an important source of productive employment creation in developing economies.

An equally interesting finding emerges from the positive effect of agricultural output share on industrial employment share. At first glance, this result appears inconsistent with the conventional view that structural transformation involves a declining role of agriculture and an expanding role of industry. However, the economic structure of Central Java suggests a more nuanced process. Agricultural and industrial activities appear to develop in a complementary rather than substitutive manner. The province hosts a large number of agro-processing industries whose production activities depend heavily on agricultural inputs. Consequently, growth in agricultural output may stimulate downstream industrial activities, generating additional employment opportunities within manufacturing and processing industries.

This finding suggests that structural transformation in Central Java does not occur through a simple transfer of economic activity from agriculture to industry. Instead, the process appears to involve increasingly integrated linkages between agricultural production and industrial development. Such a pattern is consistent with recent studies emphasizing that successful structural transformation often relies on strengthening intersectoral linkages rather than weakening the agricultural sector altogether (Diao et al., 2021; FAO, 2022).

4.2 Evidence of Emerging Structural Decoupling

Although the results confirm that structural transformation remains evident, they also reveal emerging indications of structural decoupling. The most notable evidence comes from the negative and statistically significant coefficient of industrial productivity. Contrary to the conventional expectation that productivity improvements stimulate employment expansion, the results indicate that higher industrial productivity is associated with a lower industrial employment share.

This finding suggests that productivity growth within Central Java's industrial sector is increasingly driven by efficiency improvements rather than workforce expansion. Technological upgrading, automation, improved production management, and greater capital intensity may enable firms to generate higher levels of output without proportionally increasing labor demand. As a consequence, industrial output continues to grow while employment expansion occurs at a considerably slower pace.

The result supports the structural decoupling argument advanced by Adarov and Stehrer (2021), who emphasize that productivity growth and employment growth may become progressively disconnected as economies adopt more advanced production technologies. Similar concerns are reflected in Rodrik's (2016) discussion of premature deindustrialization, where industrial sectors continue to contribute to economic growth while losing part of their traditional function as engines of large-scale employment creation.

A particularly important implication emerges when the positive coefficient of industrial output share is considered alongside the negative coefficient of industrial productivity. On the one hand, industrial expansion continues to generate employment opportunities, indicating that structural transformation remains active. On the other hand, productivity gains appear to weaken the employment responsiveness of industrial growth. Taken together, these findings suggest that Central Java is currently experiencing a transitional stage in which structural transformation and structural decoupling coexist.

In contrast, agricultural productivity does not significantly affect industrial employment share. This result indicates that improvements in agricultural efficiency alone are insufficient to induce substantial labor reallocation toward industry. Although productivity growth in agriculture may increase output and rural incomes, its influence on industrial employment ultimately depends on the capacity of industrial activities to generate attractive employment opportunities. Therefore,

changes in industrial employment appear to be driven more strongly by developments within the industrial sector itself than by productivity improvements occurring in agriculture.

Similarly, investment does not exhibit a statistically significant effect on industrial employment share. This finding suggests that investment expansion does not automatically translate into greater labor absorption. One possible explanation is that a substantial portion of investment is directed toward machinery acquisition, automation, and technological upgrading rather than labor-intensive production activities. Under such conditions, investment contributes to productivity enhancement and production efficiency while generating relatively limited additional labor demand. This interpretation is consistent with UNIDO (2022), which highlights the growing tendency of industrial investment to prioritize competitiveness and technological modernization over employment expansion.

4.3 The Impact of COVID-19 on Industrial Employment Dynamics

The estimation results further indicate that the COVID-19 period exerted a negative and statistically significant effect on industrial employment share. This finding confirms that the pandemic disrupted the capacity of the industrial sector to absorb labor across Central Java.

The negative effect can be attributed to multiple channels. Mobility restrictions, disruptions in supply chains, declining domestic demand, and heightened economic uncertainty constrained industrial production throughout the pandemic period. Under these circumstances, many firms adjusted production activities, postponed business expansion, or reduced labor utilization in response to deteriorating market conditions.

This result is consistent with evidence reported by the International Labour Organization (ILO, 2021) and the International Monetary Fund (IMF, 2021), both of which document substantial employment losses in manufacturing and related sectors during the pandemic. The findings therefore highlight the vulnerability of industrial employment to large-scale external shocks. While industrialization remains an important source of employment creation under normal economic conditions, its employment-generating capacity can be significantly weakened when economic disruptions affect production systems and market activity.

4.4 Revisiting Structural Transformation in Central Java

Taken together, the findings provide a nuanced picture of structural change in Central Java. The positive effects of industrial output share and agricultural output share indicate that structural transformation continues to influence labor allocation across the province. Industrial development remains an important source of employment creation, while agriculture continues to support industrial activities through strong intersectoral linkages.

At the same time, the negative relationship between industrial productivity and industrial employment reveals that the nature of structural transformation is changing. Industrial growth continues to occur, yet employment creation no longer keeps pace with improvements in productivity and output. This pattern suggests that the province is beginning to experience the early stages of structural decoupling, where economic expansion and labor absorption become increasingly disconnected.

The findings therefore extend conventional structural transformation theory by demonstrating that industrial expansion and employment creation can no longer be assumed to move proportionally. In the context of Central Java, structural transformation remains active, but its employment outcomes are increasingly shaped by technological change, efficiency improvements, and evolving production structures. Consequently, the challenge facing policymakers is not merely to sustain industrial growth, but to ensure that industrial development remains sufficiently employment-intensive to translate economic progress into broader labor-market opportunities.

CONCLUSION

This study examines the determinants of industrial employment dynamics in Central Java's secondary economic sector during 2019–2024. The findings indicate that industrial output share and agricultural output share positively influence industrial employment share, confirming that structural transformation remains evident within the province. In contrast, industrial productivity exerts a significant negative effect on industrial employment, suggesting that productivity gains are increasingly driven by efficiency improvements rather than labor expansion. Agricultural productivity and investment do not significantly affect industrial employment dynamics, whereas the COVID-19 period is associated with a decline in industrial employment share. Taken together, these findings suggest that although structural transformation continues to occur, emerging signs of structural decoupling indicate that industrial growth and employment creation are no longer progressing proportionally.

From a practical perspective, the findings highlight the importance of promoting industrial development strategies that balance productivity enhancement with employment creation. Policymakers should not focus exclusively on improving industrial efficiency and competitiveness but should also encourage labor-intensive industrial activities and strengthen production linkages between agriculture and industry. Such efforts are necessary to ensure that industrial growth contributes not only to higher output but also to broader employment opportunities.

Several limitations should be acknowledged. First, the analysis relies on aggregate data at the regency and municipality levels, which may not fully capture variations across industrial subsectors. Second, the relatively short observation period may limit the ability to assess the long-term dynamics of structural transformation. Third, industrial employment dynamics may also be influenced by other factors not included in the model, such as technological adoption, labor skills, infrastructure quality, and institutional conditions.

Future research may extend the analysis by incorporating longer observation periods, broader regional coverage, and more disaggregated industrial data. Further studies may also examine the roles of technological change, digitalization, and industrial upgrading in shaping the relationship between productivity growth and employment creation. Such efforts would contribute to a deeper understanding of how structural transformation can be sustained while ensuring more inclusive employment outcomes.

BIBLIOGRAPHY

- Acemoglu, D., & Restrepo, P. (2020). Robots and jobs: Evidence from US labor markets. *Journal of Political Economy*, 128(6), 2188–2244. <https://doi.org/10.1086/705716>
- Adarov, A., & Stehrer, R. (2021). Economic structural change and labor productivity growth in developing countries. *Structural Change and Economic Dynamics*, 56, 82–96. <https://doi.org/10.1016/j.strueco.2020.10.004>
- Badan Pusat Statistik. (2021). *Pertumbuhan ekonomi Indonesia tahun 2020*. Badan Pusat Statistik. <https://www.bps.go.id>
- Barrero, J. M., Bloom, N., & Davis, S. J. (2020). COVID-19 is also a reallocation shock. National Bureau of Economic Research Working Paper No. 27137. <https://doi.org/10.3386/w27137>
- Chenery, H., & Syrquin, M. (1975). *Patterns of development, 1950–1970*. Oxford University Press.

- Diao, X., McMillan, M., & Rodrik, D. (2021). The recent growth boom in developing economies: A structural change perspective. In D. Rodrik & M. Rosenzweig (Eds.), *Handbook of Development Economics* (Vol. 6, pp. 281–372). Elsevier. <https://doi.org/10.1016/bs.hesde.2021.11.002>
- Food and Agriculture Organization. (2022). The state of food and agriculture 2022: Leveraging automation in agriculture for transforming agrifood systems. FAO. <https://www.fao.org/publications/sofa/2022>
- International Labour Organization. (2021). ILO monitor: COVID-19 and the world of work (7th ed.).
International Labour Organization. <https://www.ilo.org>
- International Monetary Fund. (2021). World economic outlook: Managing divergent recoveries.
International Monetary Fund. <https://www.imf.org/en/Publications/WEO>
- Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School*, 22(2), 139–191. <https://doi.org/10.1111/j.1467-9957.1954.tb00021.x>
- Organisation for Economic Co-operation and Development. (2021). OECD productivity outlook 2021. OECD Publishing. <https://www.oecd.org/economy/productivity-outlook/>
- Rodrik, D. (2016). Premature deindustrialization. *Journal of Economic Growth*, 21(1), 1–33. <https://doi.org/10.1007/s10887-015-9122-3>
- Todaro, M. P., & Smith, S. C. (2020). *Economic development* (13th ed.). Pearson Education.
- United Nations Industrial Development Organization. (2022). Industrial development report 2022: The future of industrialization in a post-pandemic world. UNIDO. <https://www.unido.org>
- World Bank. (2020). World development report 2020: Trading for development in the age of global value chains. World Bank. <https://www.worldbank.org/en/publication/wdr2020>