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Building back better tourism sector post-COVID-19 pandemic in Indonesia: input-output and simulation analysis

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ABSTRACT

This study, by employing an input-output and simulation analysis, aims to examine policies to build back better the tourism sector's post-COVID-19 pandemic by taking Indonesia as a case study. The result confirms that to build back a better tourism sector in the post-COVID-19 pandemic, the government of Indonesia needs to maintain the supply of domestic inputs used as the primary source of intermediate inputs in the tourism sector and other sectors related to the tourism sector. The simulation analysis indicated that the worst effect of the COVID-19 pandemic on the tourism industry occurred in output reduction compared with the value-added and labor income losses. However, the government needs close collaboration with the private sector and other wide-range tourism stakeholders in determining tourism policies post-COVID-19 pandemic, apart from the importance of evidence-based policy research. This study contributes to international comparative policy research in the tourism field post-COVID-19 pandemic.

Introduction

The COVID-19 pandemic hit the tourism sector hard globally (ADB, 2021; OECD, 2020; UNCTAD, 2021; UNWTO, 2021, 2022a). In Indonesia, the pandemic has made the contribution of the tourism sector to GDP decline from 4.7 percent in 2019–4.1 percent in 2020 (Kompas, 2020; Mc. Kinsey & Company, 2021). The decline in the tourism sector's contribution made the economy fall into recession in 2020 (Kompas, 2021). However, in 2021 the contribution of this sector improved slightly to 4.3 percent. The improvement of growth tourism performance in 2021 was mainly because the number of domestic tourists increased by 12 percent in comparison with the year 2020 but not by the number of foreign tourists. The number of foreign tourists visiting Indonesia declined significantly by 60.9 percent to about 1.6 million visitors (Ministry of Tourism and Creative Economy, 2022).

A large number of studies have shown the negative impact of the COVID-19 pandemic on the tourist sector as well as on the economy in Indonesia (Atmojo & Fridayani,

2021; Dewi Restu Mangeswuri, 2021; Hasudungan et al., 2021; Jan Horas Veyady Purba et al., 2021). Similar studies in other countries also confirm those findings (see, ADB, 2022; Alvaro Bakar & Rosbi, 2020; Breisinger et al., 2020; Dias et al., 2022; Jamal & Budke, 2020; Kumar & Nafi, 2020; Pantaleo & Ngasamiaku, 2021; UNWTO, 2020). To unlock the collapse of the tourist sector from the outbreak of the COVID-19 pandemic, priority policies have been suggested (see, for instance, ADB, 2022; Mc. Kinsey & Company, 2021; OECD, 2020; United Nations, 2020; UNWTO, 2020; World Bank, 2020; WTO, 2020).

The OECD (2020, p. 2), for example, suggested seven key policy priorities, namely, restoring travelers' confidence, supporting tourism businesses to adapt and survive, promoting domestic tourism and supporting the safe return of international tourism, providing clear information to travelers and businesses, and limiting uncertainty (to the extent possible), evolving response measures to maintain capacity in the sector and address gaps in supports, strengthening co-operation within and between countries, and building more resilient, sustainable tourism.

The United Nations (2020), however, suggested five priorities for building back better the tourism industry. These five priorities are to manage the crisis and mitigate the socio-economic impacts on livelihoods, particularly on women's employment and economic security, boost competitiveness and build resilience, advance innovation and the digitalization of the tourism ecosystem, foster sustainability, and inclusive green growth, and coordination and partnerships to transform tourism and achieve Sustainable Development Goals (SDGs). For Indonesia, Mc. Kinsey and Company Indonesia (2021) particularly highlighted the importance to promote domestic tourism and address infrastructure gaps out of ten priority policy suggestions.

As Indonesia is now moving to post-COVID-19 pandemic recovery, there is a need to complement the above policy suggestions. However, no studies employ input-output and simulation analysis in determining what policies need to build back better the tourism sector post-COVID-19 pandemic. The past available studies on this object used single-stage reviews of input-output between tourism and other sectors (see, for instance, Amir & Nazara, 2005; Antara, 2008; Hasudungan et al., 2021; Malba & Taher, 2016; Saputra & Kurniawan, 2012; Singagerda & Septarina, 2016). Hasudungan et al. (2021), for example, in their recent study by applying the above method and econometric analysis of the Error Correction Model (ECM) suggest inter alia that manufacturing output needs to be supported as it contributes a significant and positive effect on the hotel and restaurant industry. They also suggest that the tourism sector needs to be given serious attention as it provides a significant and positive contribution to government retribution and the growth of the economy.

Outside Indonesia, the past studies that used I-O analysis in formulating tourism policy included Atan and Arslanturk (2012), Dogru and Bulut (2018), Jansen et al. (2015), Kim and Kim (2015), Kronenberg et al. (2018), and Shahzad et al. (2017). Jansen et al. (2015) and Kim and Kim (2015), for instance, confirmed that the development of the tourism industry in the Eastern Caribbean needs food and raw materials from the agricultural and manufacturing industries. Kronenberg et al. (2018) found that tourism in Sweden relies on whole trade to intermediate access to raw material inputs from the manufacturer. While Dogru and Bulut (2018) showed that the tourism sector in seven European countries led to economic growth, and investment

in other economic sectors helped increase tourism development. Also, tourism can contribute significantly to the overall economy during economic downturns in the top ten tourist destinations (Shahzad et al., 2017). Further, Atan and Arslanturk (2012) specifically confirmed that tourism had a decent impact on the Turkish economy. As we move into the post-COVID-19 pandemic recovery, policy efforts to build back better the tourism sector in Indonesia as well as in other tourism dependent countries are a must.

This study has uniqueness and novelty in the object and subject compared with past studies. First, the tourism policies derived from this study employ the I-O analysis of the domestic and international linkage between the tourism industry and other sectors post-COVID-19 pandemic. Second, it undertakes the simulation analysis to measure the potential loss of impact of the COVID-19 pandemic in the tourism sector on output, value-added, and labor income in Indonesia. Third, to complement tourism policies in the post-COVID-19 pandemic based on evidence-based policy research (Ruhanen & Reid, 2014). Fourth, this study contributes to international comparative policy research in the tourism field post-COVID-19 pandemic (Kennel, 2020).

The paper consists of four sections. Section 2 detailed the source and methods used to analyze the data to examine research questions. Section 3 addresses the results and discussion of the findings. Finally, section 4 concludes the study.

Methodology

As mentioned at the outset, this study aims at examining policies to build back better the tourism sector post-COVID-19 pandemic. Methods employed were the I-O analysis of the domestic and international linkage between the tourism industry and other sectors and simulation analysis to measure the potential loss of impact of the COVID-19 pandemic in the tourism sector on output, value-added, and labor income. The use of input-output and simulation analysis followed the past studies conducted by Kim and Kim (2015), Koks et al. (2015), Kronenberg et al. (2018), Li et al. (2010); Liu and He (2016), and Miller and Blair (2009) to name just a few. An input-output (I-O) table provides valuable information about the flow of products from a producer to other producers itself and consumers. In short, the row of the I-O table describes how the producer's output is distributed throughout the economy while the column of the I-O describes the composition of intermediate input needed by a particular industry to produce its output as exhibited in Table 1 (Miller & Blair, 2009).

On the basic equation, the level of production in an economy and its inter-relation with other sectors and final demand from the table can be written as follows:

$$x_i = \sum_{j=1}^{n} z_{ij} + f_i \qquad (1)$$

Where Z_{ij} is the intermediate input used, f_i is the final demand, and x_i is the total output. In equation 2, given z_{ij} and x_j, the ratio of intermediate input used (z_{ij}) to the total output of a particular industry (x_j) is called the technical coefficient. This represents the number

Table 1. Input-Output Transaction Table.

		PRODUCERS AS CONSUMERS								FINAL DEMAND			
		Agric.	Mining	Const.	Manuf.	Trade	Transp.	Services	Others	C	I	G	NX
PRODUCERS	Agriculture												
	Mining												
	Construction												
	Manufacturing												
	Trade												
	Transportation												
	Services												
	Other industry												
VALUE ADDED	Employees			Employee compensation						GROSS DOMESTIC PRODUCT			
	Business owners and capital			Profit-type income and capital consumption allowances									
	Government			Indirect business taxes									

Source: Miller and Blair (2009)

of intermediate inputs bought by a sector to produce its output/product.

$$a_{ij} = \frac{z_{ij}}{x_{ij}} \qquad (2)$$

Then, equation (1) can be rewritten in the form of matrix notation as shown in equation (3) below.

$$x = Ax + f \qquad (3)$$

Where A is known as the direct input coefficient of the I-O matrix. Then, to get x, the equation can be rewritten as follows.

$$x = (I - a)^{-1}f = Lf \qquad (4)$$

L is known as the Leontief inverse or total requirement matrix. In this context, x represents the total production that every sector should produce to meet the final demand of the economy.

The data sources of this study were mainly taken from two sources. The first data source was from the Indonesian Central Bureau of Statistics (CBS). This consisted of the Indonesian Statistics 2020 (CBS, 2020), GDP Series 2010 (CBS, 2021a), Statistics of the number of foreign tourists visiting Indonesia (CBS, 2021b), Statistics of the Growth of Room Occupancy Rate of Star Hotels (CBS, 2021c), Statistics of the growth rate of services related to tourism (CBS, 2021d), and the Input-Output Table 2016 published recently by the Central Bureau of Statistics in 2021 (CBS, 2021e). Note that the input-output table released recently by CBS in 2021 was based on the basic price for 185 products. The second data source was the Multiregional Input-Output (MRIO) database 2008 and 2018, published by the Asian Development Bank (ADB) used to compare linkage analysis at domestic and international levels.

Data from the Indonesian Statistics 2020 (CBS, 2020) was used to calculate the percentage distribution of employment in the tertiary sector, and its distribution of employment in accommodation and food services activities by main employment status. The GDP Series 2010 was used to estimate the contribution of tourism-related service activities to the tourism industry (CBS, 2021a). The CBS (2021b) was used to estimate the impact of the COVID-19 pandemic on the number of foreign tourists visiting Indonesia. The CBS (2021c) was used to recalculate the impact of the pandemic on the growth of the Room Occupancy Rate of Star Hotels. The CBS (2021d) was used to estimate the impact of COVID-19 on the Growth Rate of Services related tourism. These data were reviewed in addressing tourism employment and its contribution to the Indonesian economy.

The MRIO database 2008 and 2018 was used to analyze the tourism industry's domestic and international backward and forward linkages, focusing on the hotels and restaurants in 2008 and 2018. The linkage analysis mainly focused on direct interdependence between tourism and other sectors by examining intermediate input used in one industry from different industries. Under this analysis, interdependence between tourism and other sectors can be analyzed directly and indirectly by looking at the intermediate input used in the tourism sector and also tourism industries as an intermediate input for different sectors.

The step of the above input-output analysis is firstly by calculating each sector's output multipliers to measure the sectoral linkages, particularly within tourism-related industries using the MRIO database. After that, it then estimated backward and forward linkage for all sectors, and those two linkages were appropriately indexed across sectors. For the simulation analysis, however, the data used was not the MRIO database 2018. Instead, we used the recent Input-Output Table 2016 published by CBS in 2021. One of the main reasons is that the MRIO database only covers 35 products in contrast to the I-O table 2016 comprises 185 products.

The second reason is that this study identified 29 products related to tourism industries following the tourism classification derived by Sowwam et al. (2018) from the national tourism satellite balance (Table 2). The recent I-O table meets the above criteria because it covers 185 products, while the MRIO database is relatively limited. So the MRIO database was inappropriate for conducting simulation analysis. However, the simulation does not adjust to products related to tourism. In other words, it was assumed that 100 percent of selected products are closely related to tourism activities.

The simulation analysis was employed to estimate the potential loss of impact of COVID-19 in the tourism sector on output, value-added, and labor income. We assumed the government introduced two standard scenarios of public health protocols. The first common scenario of public health protocol is a tight public mobility control policy, limiting the employed capacity in the private sector by 25 percent to break the

Table 2. Sectors related to Tourism Activities.

Codes	Sectors
081	Knitted Items
084	Leather Goods
085	Footwear
089	Other Items of Wood, Cork, Bamboo, and Rattan
093	Printed goods
103	Cosmetics
112	Clay, ceramic, and porcelain articles
139	Musical Instruments
143	Other processing industry products
149	Residential and non-residential buildings
150	Electrical, Gas, Drinking Water, and Communications Buildings & Installations
151	Agricultural Infrastructure
152	Road, Bridge, and Harbor
156	Trade other than Cars and Motorcycles
157	Rail Transport Services
158	Land Transportation Services Other Than Rail Transport
159	Sea Freight Services
160	River Lake and Ferry Transport Services
161	Air Freight Services
162	Transportation Support Services
164	Accommodation Services
165	Food and Drink Services
168	Telecommunication Services
173	Other Financial Institution Services
174	Real Estate Services
175	Professional, Scientific and Technical Services
176	Rental Services and Business Support Services
183	Arts, Entertainment and Recreation Services
185	Other Services

Source: Sowwam et al. (2018)

COVID-19 transmission. The potential loss of the impact of COVID-19 in the tourism sector is assumed by a 75 percent reduction in final demand. This will be categorized as a higher bound of potential losses for tourism industries. The second was by an easy public mobility control policy that is by limiting 75 percent of capacity maximum. The potential loss of the impact of COVID-19 in the tourism sector is assumed by a 25 percent reduction in final demand. This will be called then a lower bound.

Results and discussion

Tourism employment and its contribution to the economy

By recalculating the Indonesian Statistics 2020 (CBS, 2020), it was found that the tourism industry is grouped under the tertiary sector. The number of workers in this sector in 2019 was recorded as about 71,586,949 workers or about 26.6 percent of the total employment in this tertiary sector. This tertiary sector consists of 14 service industries (Table 3). However, employment in the tertiary sector can be divided into formal and informal employment. Based on main employment status, workers are assisted by permanent/paid workers, and workers/employees/employees are considered formal workers, while other employment statuses are considered informal workers. From the Indonesian Statistics 2020, it was calculated the largest proportion of formal employment was in security services industries followed by financial and insurance activities, education and human health, and social work activities. Whilst informal employment was dominated by accommodation and food activities, followed by wholesale and retail trading, and transportation and storage (Table 3). This indicates that the bulk of employment in the tourism industry in Indonesia is in the informal sector (Widiastini & Rahmawati, 2022) as is also the case in many developing countries (see, for instance, Jansen et al., 2015; Kim & Kim, 2015; Monterrubio, 2022).

The tourism industry in Indonesia itself was divided into eight activities. However, the available data published by CBS (2021a) recorded only seven activities (excluding other activities). As shown in Table 4, the growth contribution of these seven activities from the

Table 3. Percentages Distribution of Employment in the Tertiary Sector, 2019.

Main Services Industries	Formal Employment (%)	Informal Employment (%)
Electricity and Gas	89.9	10.1
Water Supply; Sewerage, Waste Management, and Remediation Activities	49.6	50.4
Construction	51.3	48.7
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	34.3	65.7
Transportation and Storage	40.7	59.3
Accommodation and Food Service Activities	32.2	67.8
Information and Communication	70.0	30.0
Financial and Insurance Activities	97.2	2.8
Real Estate Activities	77.9	22.1
Business Activities	78.1	21.9
Public Administration and Defence; Compulsory Social Security	100.0	0.0
Education	96.7	3.3
Human Health and Social Work Activities	91.5	8.5
Other Services Activities	54.8	45.2

Source: Recalculated from CBS (2020).

Table 4. The contribution of Tourism-related Service Activities to the Tourism Industry, 2016–2020 (%).

Items	2016 Q1	2017 Q1	2018 Q1	2019 Q1	2020 Q1
Railways Transport	0.51	0.53	0.56	0.57	0.52
Land Transport	34.52	34.98	35.13	36.35	37.55
Sea Transportation	5.02	4.73	5.02	5.11	5.32
River, Lake, and Ferry Transport	1.72	1.73	1.71	1.69	1.68
Air Transport	10.41	10.88	11.12	9.56	8.15
Accommodation	9.65	9.52	9.31	9.11	8.54
Food and Beverages Service Activities	38.18	37.62	37.15	37.60	38.24

Source: Recalculated from CBS, 2021a.

first quarter of 2016 to the first quarter of 2020 was dominated by food and beverage services activities, followed by land transport activities. The growth contribution of land transport activities from 2016 to 2020, however, showed an increase from 34.5% to 37.6%. While the growth rate contribution of railway transport, river, lake, and ferry transport, air transport, and accommodation service activities indicated a decreasing trend in these periods. By examining this data, tourism-related service activities that significantly need to be improved by the government in the post-COVID-19 pandemic recovery were railways transport and river, lake, and ferry transport activities. This is because the growth contribution of these two particular service activities was still very low at an average of 0.52% and 1.71% respectively during 2016 and 2020.

As calculated that the employment distribution of accommodation and food and beverages services activities of the tourism industry has been dominated by informal employment. The proportion of informal employment in this services-related tourism industry in 2019 was 67.8 percent. The distribution of informal employment of these service activities by main employment status was largely dominated by an own-account worker (30.9%), employer-assisted by temporary/unpaid worker (20.3%), family worker/unpaid worker (15.1%), and casual worker (1.4%). Thus, fiscal and non-fiscal policies as well as a monetary policy issued by the government are necessary to be given to sustain the contribution of informal employment in the tourism industry during the post-pandemic recovery. Detailed percentage distribution of employment in accommodation and food services activities by main employment status was exhibited in Table 5.

Table 5. Distribution of Employment in Accommodation and Food Services Activities by Main Employment Status, 2019.

Main Employment Status	Amount	Percentage
Own account worker	2,614,722	30.92
Employer assisted by temporary/unpaid worker	1,720,104	20.34
Employer assisted by permanent/paid worker	397,920	4.71
Regular Employee	2,325,317	27.50
Casual worker	121,677	1.44
Family worker/Unpaid worker	1,276,656	15.10
Total	8,456,396	100.00
Formal	2,723,237	32.20
Informal	5,733,159	67.80
Total	8,456,396	100.00

Source: Recalculated from CBS (2020).

By using the ADB MRIO database 2008 and 2018, the tourism sector at the global level before the COVID-19 pandemic judging from the shared hotel and restaurant industries showed well-performance both in developed and developing countries. The total value added of the top 20 hotels and restaurant industries at the global level from 2008 to 2018 increased by 53 percent. In 2008 the total value added of the top 20 hotels and restaurants at the global level was US$ 1,315 billion. This total value added increased to US$ 2,007 billion in 2018. By countries, the USA and Japan were the key players in global tourism industries in 2008, contributing 14.9 and 12.6 percent of the total value added at the global value-added. However, in 2018 this composition changed in that the two key players in this sector became the USA and China with a contribution of 26.2 and 10.4 percent, respectively (Table 6).

In the Southeast Asian economies, Thailand and Indonesia were the most contributors to global tourism worldwide in 2008 and 2018 judging from the value-added of hotels and restaurants. Of these two countries, Thailand's tourism industry performance is much more promising than that of Indonesia. As given in Table 6, Thailand's tourism industry in 2008 was still below Indonesia's. While in 2018, Thailand surpassed Indonesia's position. This situation further changed again in 2019 in that Vietnam and Indonesia showed better growth rate performances than Thailand. Vietnam and Indonesia have growth rates of 29 and 22 percent, while the growth rate of Thailand was 8.7 percent (Indonesia.go.id, 2020; World Economic Forum, 2019).

The above record indicated that Indonesia's tourism industry improved significantly from 2008 to 2018. Of the many services sector, the contribution of hotels and restaurants to GDP was in the eighth of the highest rank (Figure 1). Its contribution was below education and post and telecommunication industries but it was above inland transportation. In terms of the total value-added, the total value added of hotels and restaurants showed an increase of 59 percent from US$ 20.4 billion to US$ 32.5 billion

Table 6. The top 20 of the Share of Hotel and Restaurant Industries in 2008 & 2018 (in value-added).

Country	2008		2018	
	Millions of $	% of total	Millions of $	% of total
USA	195,350.02	14.8608	526,280.20	26.2200
China	105,789.28	8.0477	208,755.16	10.4005
Japan	165,390.90	12.5818	167,119.37	8.3261
UK	59,815.17	4.5503	93,257.66	4.6462
Spain	88,453.72	6.7289	92,252.41	4.5961
France	64,372.21	4.8970	78,163.00	3.8942
Italy	70,958.49	5.3980	74,922.59	3.7327
Germany	47,288.91	3.5974	58,492.57	2.9142
Brazil	37,278.08	2.8359	49,363.25	2.4593
Canada	32,829.96	2.4975	47,549.56	2.3690
Australia	29,761.84	2.2641	40,298.23	2.0077
India	19,708.50	1.4993	38,700.53	1.9281
Turkey	14,594.50	1.1102	36,829.77	1.8349
Thailand	11,708.79	0.8907	33,937.45	1.6908
Korea	26,068.02	1.9831	33,581.54	1.6731
Indonesia	20,435.33	1.5546	32,455.51	1.6170
Mexico	24,468.13	1.86	26,628.14	1.33
Austria	16,251.90	1.24	20,628.97	1.03
Netherland	12,007.92	0.91	18,353.59	0.91
Russia	13,503.07	1.03	18,154.85	0.90

Source: recalculated from ADB MRIO Database 2008 & 2018 at constant 2010 prices.
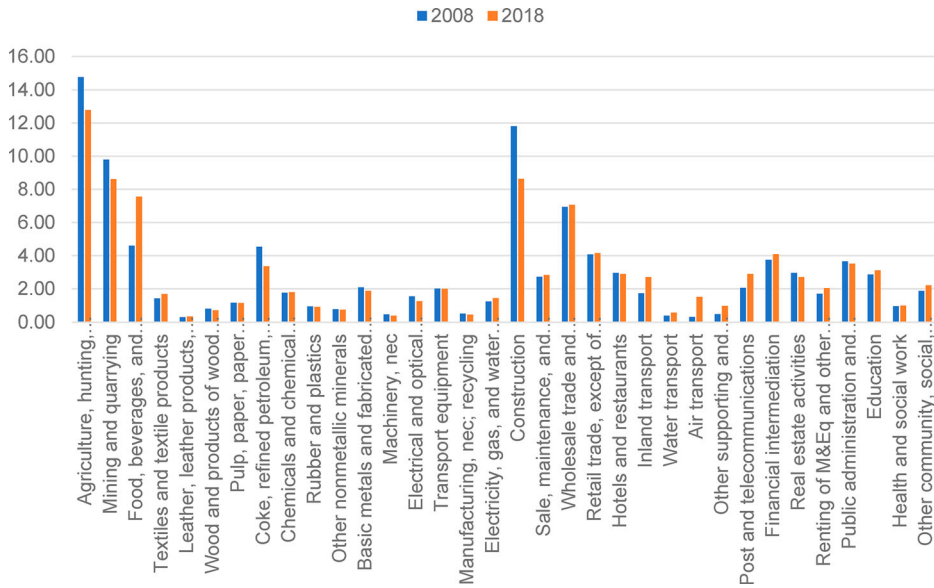
Figure 1. Indonesia's Sectoral Contribution to GDP, value-added (percent). Source: recalculated from ADB MRIO Database 2008 & 2018 at constant 2010 prices.

between 2008 and 2018. However, judging from the contribution of this sector to GDP, it showed a decreasing trend. This industry's share in GDP in 2018 was only 2.89 percent which was lower than in 2008 at about 2.96 percent.

Therefore, there are at least three policy implications that need to be given attention by the government in the post-pandemic recovery judging from the above data calculation. First, the government needs to improve the infrastructure of tourism-related service activities, particularly railways transport and river, lake, and ferry transport activities. Second, policies to support the bulk of informal employment in accommodation and food and beverage services activities of the tourism industry are a must. Finally, there is a need to introduce policies to maintain the growth rate performance of the tourism sector at the global level as in 2019. This, for instance, can be done by promoting domestic tourism and developing infrastructure in tourist destinations.

Inter-sectoral linkages analysis of the tourism industry

As discussed above, hotels (accommodation) and restaurants are the main drivers of the tourism industry in contributing to the GDP. By analyzing the ADB MRIO Database 2018 at constant 2010 prices, it was found that the intermediate inputs used in tourism industries are heavily reliant on domestic supply (Figure 2). Total intermediate inputs used domestically and imported in this sector in 2018 accounted for US$ 31,368 million and US$ 5,439 million, respectively. This suggests that the primary source of intermediate inputs used in accommodation and restaurant services is domestic inputs rather than imported inputs. This finding has also been the case for countries such as the Eastern Caribbean (Jansen et al., 2015; Kim & Kim, 2015), Sweden (Kronenberg et al., 2018), Europe (Dogru & Bulut, 2018), and Turkey (Atan & Arslanturk, 2012).
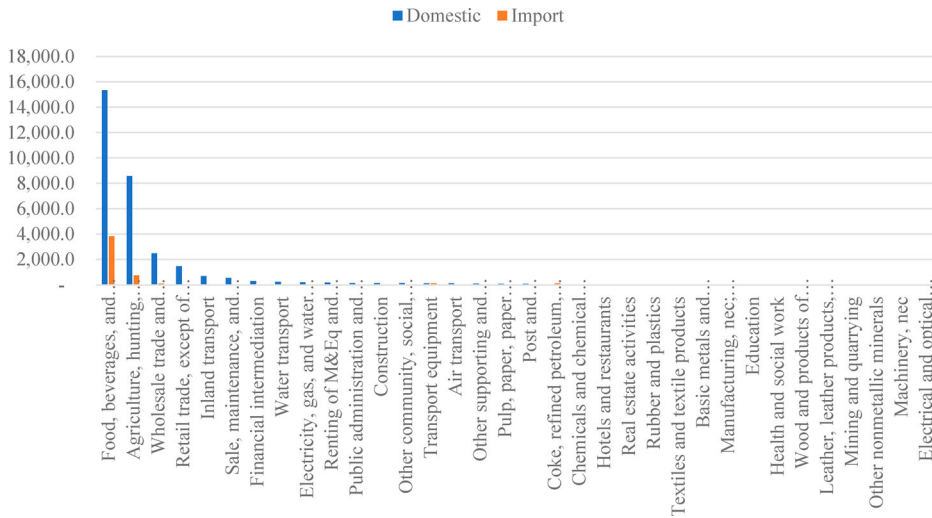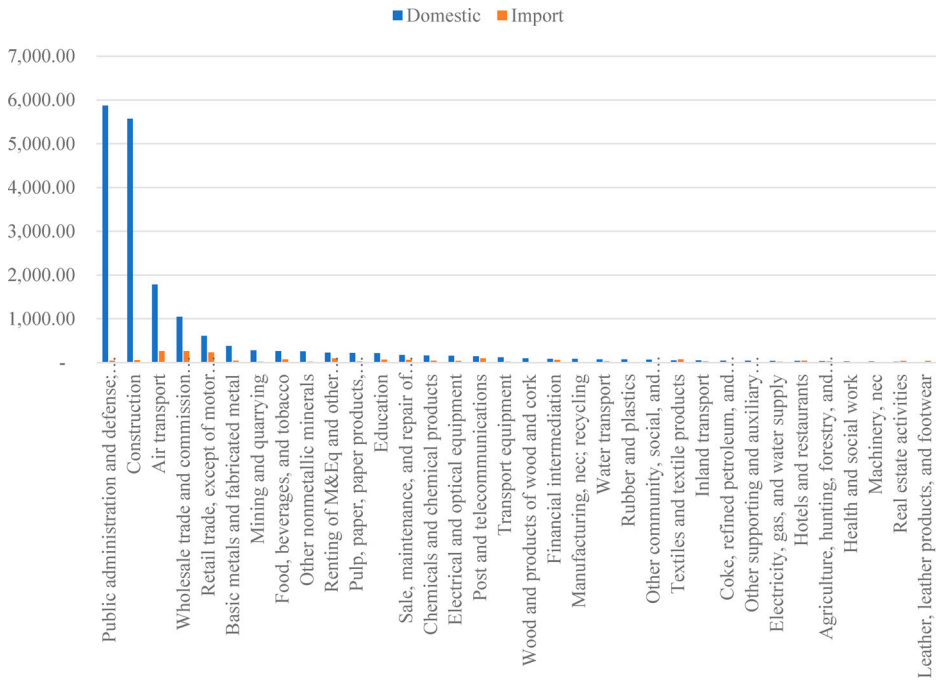
Figure 2. The input used in Hotel and Restaurants services in 2018 (millions of US$). Source: ADB MRIO Database 2018 at constant 2010 prices, recalculated.

Thus, the supply of domestic inputs to the tourism sector needs to be maintained to build back a better tourism sector in the post-COVID-19 pandemic era.

Also, as was shown in Figure 3, intermediate inputs used in this sector typically are mainly from agriculture, food and beverage industries, and wholesale and retail trade sectors excluding motor vehicles and motorcycles. Food and beverage industries contributed about US$ 15,328 million, representing 49 percent of total intermediate input from domestic supply. The second-largest contributor is agriculture contributing about US$ 8,563 million or 27 percent of total domestic intermediate input used in tourism. This shows that about 77 percent of domestic intermediate used in tourism primarily comes from those two sectors. Therefore, the shock in tourism industries will directly worsen the performance of Indonesia's agriculture and food and beverage industries (Atan & Arslanturk, 2012; Dogru & Bulut, 2018; Kronenberg et al., 2018).

In addition, it was found that hotels and restaurants also are affected by other sectors when the two industries act as intermediate inputs used in those sectors. Figure 4 shows that industries closely linked with hotels and restaurants are public administration and defense, construction, air transport, wholesale trade and commission trade (except motor vehicles and motorcycles), retail trade (except motor vehicles and motorcycles), etc. Those industries absorb hotels and restaurants' output as intermediate inputs. The potential contribution of hotels and restaurants as intermediate input used in those sectors accounts for US$ 20,190 million. Of this value, those industries contributed about US$ 15,737 million or represented 77 percent of the total hotels and restaurants used as intermediate input. This suggests that the COVID-19 pandemic that shocks those industries will lead to the potential loss of hotels and restaurants' contribution to such sectors (Dogru & Bulut, 2018; Kronenberg et al., 2018).

Figure 4 further shows that the hotel and restaurant industries are closely related to other service industries, particularly public administration, construction, and air transportation. This information implies that maintaining the performance of these three

Figure 3. Hotel and Restaurant as Intermediate Input in Other Sectors in Indonesia (millions of US$). Source: ADB MRIO Database 2018 at constant 2010 prices, recalculated.

business sectors post-COVID-19 pandemic will strengthen the demand for hotels and restaurants. Although the role of air transportation weakened during the pandemic, the other sectors can fill the position left by air transportation because other sectors relatively have a higher forward linkage index than air transportation, as shown in Figure 4. In this case, demand in the hotels and restaurant industries can be restored
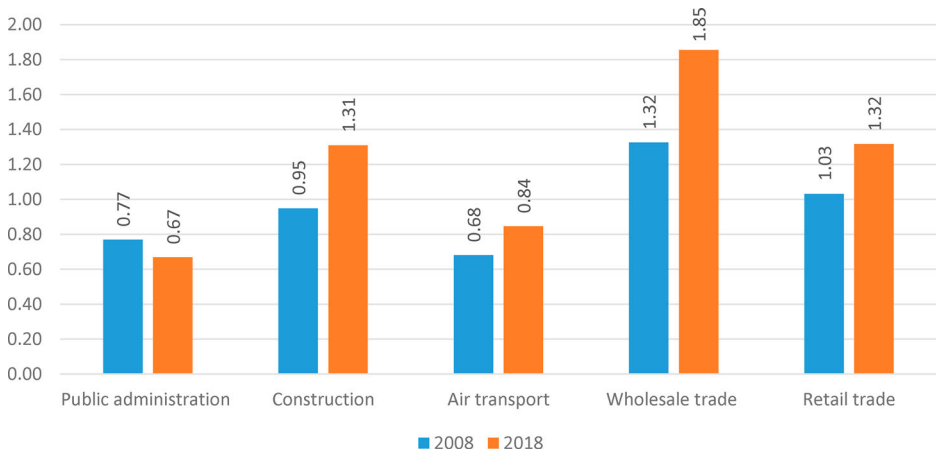
Figure 4. Domestic Forward Linkage Index in Several Sectors in 2008 and 2018. Source: ADB MRIO Database 2018 at constant 2010 prices, recalculated.

partially by maintaining the performance of the public sector spending (i.e. public administration and construction). This means that under tight mobility control, the appropriate government expenditure on public goods and services is essential to maintain and even potentially restore the performance of hotels and restaurants post-COVID-19 pandemic. This finding supports the previous studies (ADB, 2022; Hasudungan et.al., 2021) which endorse direct capital stimulus as a means to recover tourism sectors.

Potential loss of the tourism industry due to COVID-19: a simulation analysis

To estimate the potential loss of impact of COVID-19 in the tourism sector on output, value-added, and labor income, a simulation analysis was conducted by using the domestic transaction of input-output table 2016, published by the Indonesian Statistics. In doing simulation, the table is preferred to the ADB MRIO database because of the reasons mentioned previously in the method section. In other words, the simulation does not adjust in sectors related to tourism or assumes that 100 percent of these sectors are closely related to tourism.

Two standard scenarios of public health protocols introduced by the government are applied to do this analysis. The first standard scenario of public health protocol is a tight public mobility control policy, that is, limiting 25 percent of public mobility to break the COVID-19 transmission. The second was by an easy public mobility control policy, that is, by limiting 75 percent of the capacity maximum of public mobility. These two scenarios imply that the potential loss of the impact of COVID-19 in the tourism sector is a 25 and 75 percent reduction of final demand, respectively.

The estimated results of the simulation analysis are presented in Table 7. It was found that the COVID-19 pandemic affects tourism industries through three different channels: output, value-added, and labor income. The worst effect of the COVID-19 pandemic on the tourism industry occurred in output reduction. By limiting 75 percent of the employed capacity in the private sector to operate, the output potential loss of the tourism industry due to COVID-19 is 4.1 percent of GDP. In comparison, the potential value-added loss of the tourism industry and the labor income potential loss of the tourism sector are 2 percent of GDP and 0.8 percent of GDP, respectively. On the other hand, if the employed maximum capacity in the private sector is limited to 25

Table 7. Potential Loss due to COVID-19 in Tourism Industries (IDR Billion).

Potential Loss	Lower Bound (1st Scenario)	% of GDP	Higher Bound (2nd Scenario)	% of GDP
A. Output				
Tourism Sectors	(519,370.53)	4.11	(1,558,111.60)	12.32
Non-Tourism Sectors	(235,987.50)	1.87	(707,962.50)	5.60
Total Loss	(755,358.04)	5.97	(2,266,074.11)	17.92
B. Value-Added				
Tourism Sectors	(253,473.27)	2.00	(760,419.81)	6.01
Non-Tourism Sectors	(123,943.98)	0.98	(371,831.94)	2.94
Total Loss	(377,417.25)	2.98	(1,132,251.75)	8.95
C. Labor Compensation				
Tourism Sectors	(102,508.08)	0.81	(307,524.23)	2.43
Non-Tourism Sectors	(43,626.60)	0.34	(130,879.81)	1.03
Total Loss	(146,134.68)	1.16	(438,404.04)	3.47

Source: Recalculated from the Domestic Transaction of Input-Output Table 2016 at Basic Prices (CBS, 2021e).

percent, the potential output loss of the tourism industry is 12.3 percent of GDP. At the same time, the potential losses of added value and labor compensation of the tourist industry are 6 percent of GDP and 2.4 percent of GDP correspondingly.

The above finding indicates that public mobility restrictions affect tourism more significantly than non-tourism industries. Due to public mobility restrictions, the transportation sector, particularly the air transport industries, which are closely related to hotel and restaurant activities, could not work properly during the COVID-19 pandemic. Public mobility restriction has forced this industry to reduce the number of passengers on the one side and add extra costs for passengers to meet health protocols on the other side. This suggests that the demand for the industry faces extraordinary challenges compared to non-tourism industries. Therefore, meeting the COVID-19 health protocols and vaccination and other health safety programs is a *conditio sine qua non* to unlock the economic potential of the tourism industry as we move into the post-pandemic. By keeping to meet the health protocols, controlling the present transmission chain of COVID-19, and easing public mobility, the tourism sector will have more opportunities to recover in this post-COVID-19 pandemic condition (ADB, 2022; IMF, 2021; OECD, 2020; UNDP, 2020; United Nations, 2020; UNWTO, 2022b; World Bank, 2020; and WTO, 2020).

Conclusion

There are at least five important conclusions that can be drawn from this study. First, of the eight activities of the tourism sector, railways transport and river, lake, and ferry transport activities have been hit hard by the COVID-19 pandemic. Second, the bulk of employment in the tourism sector in Indonesia is in the informal sector. Most of them are in accommodation and food and beverage services activities. The distribution of informal employment of these service activities by main employment status was largely dominated by an own-account worker, employer-assisted by temporary/unpaid worker, family worker/unpaid worker, and casual worker. Third, the intermediate inputs used in tourism industries are heavily reliant on domestic supply mainly from agriculture, food and beverage industries, and wholesale and retail trade sectors.

Fourth, hotels and restaurants affect other sectors as intermediate inputs are used in these sectors. The sectors that used intermediate inputs of these hotel and restaurant industries include public administration and defense, compulsory social security, construction, air transport, wholesale trade, commission trade (except motor vehicles and motorcycles), and retail trade (except motor vehicles and motorcycles).

Finally, the simulation analysis confirmed that the worst effect of the public mobility restrictions was found in output reduction in comparison with the value-added and labor income losses. These findings may also be the case for other countries that have similar tourism characteristics to Indonesia. However, caveats apply to the simulation analysis as it was assumed that 100 percent of selected products are closely related to tourism activities. Also, it is because the simulation analysis employed two standard scenarios of public health protocols, namely, a tight public mobility control policy and an easy public mobility control policy.

This study recommends strategic policies that need to be introduced to build back better tourism in Indonesia in the post-COVID-19 pandemic as follows. First, fiscal and non-fiscal policies as well as a monetary policy issued by the government are still

necessary to be given to sustain the contribution of informal employment in the tourism industry. Second, policies to maintain the supply of domestic inputs for the tourism sector and support the output of the tourism sector as intermediate inputs for other sectors are a must. Third, policies to restrict public mobility need to be carefully decided based on the intensity of the COVID-19 pandemic as this pandemic is not over yet up to now. However, further studies to detail policies to improve the tourism sector and its related sectors are necessary so that tourism policy post-COVID-19 pandemic justifiable.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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