Panel Seemingly Unrelated Regression on Employment in Tourism Sector: Evidence in Central Java Province

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ABSTRACT: Job opportunities are the main problem faced by Indonesia because the large of population, high population growth rate and large workforce. The tourism sector has a large multiplier effect on employment and become a potential sector as a source of income for a country or region. By combining cross-section and time-series data in 35 districts and cities in Central Java Province from 2016-2020 and the Seemingly Unrelated Regression Panel approach. The results showed that supporting infrastructure for the tourism sector, such as the number of hotel rooms and the number of restaurants, had an effect on employment in the tourism sector, and a positive effect was shown by the variable number of tourist objects and tourist visits. The coefficient value on the wage variable which is quite large indicates that the elasticity of employment related to wages is quite high. The implication of the research is increasing the quality and quantity of sustainable tourist objects can attract an increase in foreign and domestic tourist visits so as to increase the workforce through the tourism sector. The implication of the study to strengthen among government, private sector and local community to develop sustainable tourism sectors.

Keywords: Panel Seemingly Unrelated Regression, Multiplier Effect, Tourism Sector, Employment.

ABSTRAK: *Kesempatan kerja menjadi permasalahan utama yang dihadapi Indonesia karena besarnya jumlah penduduk, laju pertumbuhan penduduk, dan angkatan kerja. Sektor pariwisata memiliki multiplier effect yang besar terhadap penyerapan tenaga kerja menjadi sektor potensial sebagai sumber pendapatan bagi suatu negara atau daerah. Dengan menggabungkan data cross-section dan time-series di 35 kabupaten dan kota di Provinsi Jawa Tengah dari 2016-2020 dan pendekatan Panel Seemingly Unrelated Regression. Hasil penelitian menunjukkan infrastruktur penunjang sektor pariwisata seperti jumlah kamar hotel dan jumlah restoran berpengaruh terhadap penyerapan tenaga kerja sektor pariwisata serta pengaruh positif ditunjukkan oleh variabel jumlah objek wisata dan kunjungan wisatawan. Nilai koefisien pada upah cukup besar menunjukkan elastisitas penyerapan tenaga kerja berkaitan pada upah cukup tinggi. Implikasi dari penelitian bahwa peningkatan kualitas dan kuantitas objek wisata yang berkelanjutan dapat mengatraksi peningkatan kunjungan wisatawan asing dan domestik sehingga dapat meningkatkan tenaga kerja melalui sektor pariwisata. Implikasi dari penelitian adalah penguatan kerjasama pemerintah, swasta, dan komunitas lokal dalam mengembangkan sektor pariwisata yang berkelanjutan.*

Kata Kunci: *Panel Seemingly Unrelated Regression, multiplier effect, sektor pariwisata, tenaga kerja.*

INTRODUCTION

The tourism sector is one of the potential sectors as the main source of income for a country or region. The tourism sector plays a major role in achieving advanced development, both in Indonesia and in the region, especially in terms of the economy. The role of the tourism sector will open up opportunities to create wider employment opportunities (Maulana, 2016). Job opportunities are the main problem faced by Indonesia because of the large population, high population growth rate and large workforce. Absorption of labor has an important role in the growth and development of the national economy in a country. Garsous et al (2017) stated that government intervention in the tourism sector there was a high increase in the tourism sector for labor absorption (multiplier effect). Another result from his study in the SUDENE area of Brazil that government intervention employment in the tourism sector increase around 30 percent compared without government intervention. Akrong (2019) explain that the tourism sector can play important role in socio-economic development.

Panjaitan & Gunnanto (2021) stated that the tourism potential of the province of Central Java is quite large, as can be seen from the districts/cities in Central Java Province which have various tourist objects, restaurants, hotels and other supporting infrastructure as well as more than half Regencies/cities in Central Java have increased productivity. Central Java has tourism potential that is different and unique and has aspects of availability, both in tourism facilities and infrastructure that are expected to be available around tourist areas including public infrastructure, tourist infrastructure. Central Java received appreciation as a large province in the tourism sector, the Indonesia Attractiveness Award (IAA) 2019 Gold for the category of a large province in the tourism sector because it has good tourist attractions and still has a lot of development potential and was awarded the Muslim Travel Index (IMTI) as a leading halal tourist destination. The central java provincial government classifies forms of tourism such as natural, cultural, artificial, special interest tourist attractions and other. The number of natural and artificial tourism made a large tourist attractions than other kind of tourism form.

Figure 1 . Graphic The Total Employment and Employment in Tourism Sector
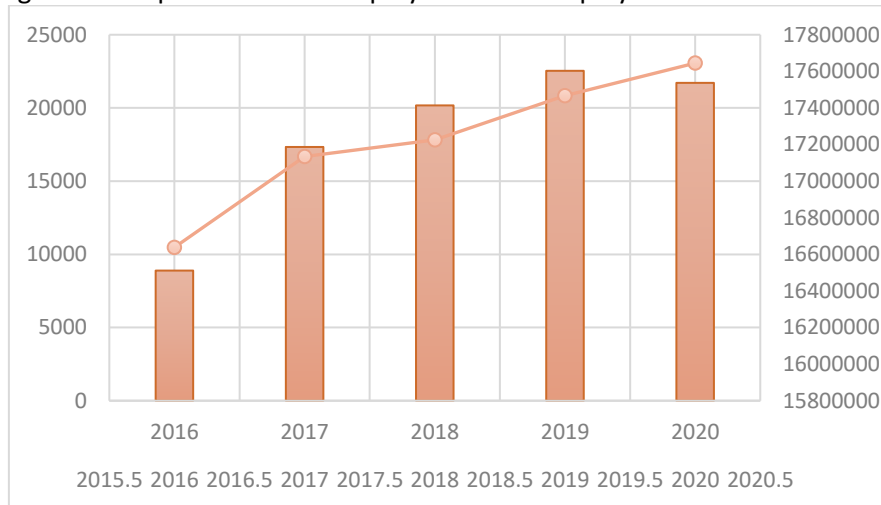
Figure 1 explains that there has been an increase in employment in Central Java Province, but in 2020 the increase in employment in the tourism sector has increased compared to absorption of labor as a whole, this shows that the development of the tourism sector in an area can increase employment opportunities, as well as provide a multiplier effects on business fields related to the tourism sector. The highest growth in the tourism sector for labor absorption in 2019 reached 16.98 percent and fall in 2020 to 8.38 percent due to the COVID-19. Subardini (2018) and Aliansyah & Hermawan (2021) states that the success of the tourism sector will encourage regional income, in which this sector is a major part by observing factors that can influence it which include tourist objects, tourist visits (domestic/foreign tourists), hotel/restaurant tax rates, hotel occupancy rates , per capita income, and the level of tourist attraction fees. Sun et al (2021) stated apart from having a multiplier effect on the labor absorption the tourism sector has particular vulnerabilities to the labor. Kartseva & Kuznetsova

(2020) explains that labor absorption on tourism sector has experiences for the highest vulnerability, caused the tourism sector is an informal sector, low wages, unskilled labor, there is formal contract, individual entrepreneur and include in the form of micro and small business. Based on report from Youth, Sports and Tourism Department that labor absorption in tourism sector decrease from 16.98 percent in 2019 to 8.38 percent in 2020. The number tourist attraction also fell from 20.52 percent in 2019 to 14.51 percent in 2020.

Earlier study from Leiper (1979) explained in term of tourism industry combine from government, private and local community can provide infrastructure that they can serve the desires and needs of tourist. Xiaojuan et al (2012) emphasize that individual who pupose for traveling seek pleasure and not to visit friends or families. Afandi & Alie (2015) state that visitors will determine what they want, such as taking a vacation where there are adequate facilities at their tourist destination. Supporting facilities in the tourism sector will increase the number of tourists which will have an impact on increasing employment. Nindita & Dewi (2018) state that the number of tourist visits will increase the workforce through residential locations, transportation and accommodation to consumption needs. The large multiplier effect from the impact of the tourism sector will attract investors who can make the ecosystem of employment more bigger. Maulana (2016) states that the main characteristics of the tourism sector are service, product and time. These three characteristics are related to the infrastructure of the tourism sector such as hotels, restaurants, transportation, tourist attractions to souvenirs. Herrero et al (2022) stated that ecosystem in the tourism sector is a complex ecosystem, caused relates to accommodation, restaurants, transportation and leisure activities. Become more complex if in area there are several destinations.

Tabel 1. Total Visits of Domestic and International Tourists in Central Java Province

Tahun	Domestic Tourists	Foreign Tourists
2016	36,899,755	578,924
2017	40,188,470	781,107
2018	48,943,607	677,168
2019	57,900,863	691,699
2020	8,776,257	53,399

Source : Youth, Sport and Tourism of Central Java Province

Table 1 explains that overall domestic and foreign tourist visits have increased every year until 2019 and decreased in 2020 due to the pandemic and several tourist destinations were closed to prevent the spread of Covid 19. There are significant differences in visits by domestic and foreign tourists in 2018 where domestic tourist visits increased by 8,825,137 people, while foreign tourist visits decreased by 103,939 people. The importance of supporting facilities for the tourism sector in absorbing labor, such as research developed by Lesmana & Purwanti (2017) that the number of hotel rooms has a positive effect on employment. Sanaubar et al (2017) stated that the tourism sector through the number of hotels, domestic and foreign tourists had a positive effect on employment in the hotel sector in 9 districts/cities of East Java. Infrastructure where tourists live requires large investments such as hotels and apartments and local wisdom such as tourist villages and simple lodgings, both of which have an effect on employment. The tourism sector has positive externalities such as increasing quality of local community, labor absorption, business opportunities, promoting local business and increasing investment in tourism sector and infrastructure (Archer et al., 2012). However, there are negative externalities from the development of the tourism industry such as congestion, parking problems, increasing criminality, vandalism, creating seasonal and low wages labor absorption and being able to relocate local resident for infrastructure in the tourism industry (Archer et al., 2012; Sirima & Backman, 2013).

There is still debate about the effect of wages on employment, this can occur through the demand and supply sides. From the supply side, when wages increase, someone's motivation to look for work is higher and causes the supply of labor to increase. On the demand side, such as research by Sabihi et al (2021), which states that wage rates have a negative effect on employment in Manado,

where an increase in wages will decrease the demand for labor, because an increase in wages can increase production costs so that the demand for labor will decrease. This study aims to examine the effect of wages on employment in the tourism sector and investigate whether it is from the demand or supply side of labor. Sirima & Backman (2013) stated that increase in tourism industry and supporting infrastructure there are negative externalities such as creating seasonal and low wages labor absorption in the tourism sector. Central Java Province where the majority of tourist attractions are natural and artificial tourism is very vulnerable to the creation of seasonal workers, low skills and low wages. Brandt (2018) explains that uncompetitive wages in the tourism sector will hinder sustainable employment.

The use of data on the tourism sector in Central Java province can lead to a correlation in the disturbance term value which results in an inefficient estimator value. To bridge the gap between all previous studies and as a gap of research, the Panel Seemingly Unrelated Regression (SUR) is applied. Thus, the value of the disturbance term for Regency/City i for a certain period can be correlated with the disturbance term for the same Regency/City for different periods, because the data for the tourism sector are interrelated with data for year t and year t-1. Zellner (1962) stated that the SUR panel method can be applied to produce an efficient estimator even though there is a correlation between the disturbance terms in an equation. Research contribution to literature; a) investigate the determinants of employment through the tourism sector and b) apply the SUR method to produce an efficient value estimator so as to produce an unbiased model.

METHODS

The research combines cross-section and time-series data in 35 regencies and cities in Central Java Province and forms a time-series from 2016-2020. The data is sourced from the Central Java Province DISPORAPAR and the Central Bureau of Statistics (BPS). This study analyzes the heterogeneity of employment absorption rates in the tourism sector. So the equation can be written as follows:

$$Labor = f(TA, NH, NR, Wage, TV)$$

Where Labor are the number of workers in the tourism sector, TA is the number of attractions, NH is the total of hotel rooms, NR is the number of restaurants, Wage is the regional minimum wages and TV Total Visits of Domestic and International Tourists in Central Java Province. This study aims to explore labor absorption in tourism sector in government dimensions through TA, Wage and TV variables and ecosystem tourism dimesions through NH and NR variables. Durisin & Puzone (2009) states that success of program in tourism sectors can be through by strengthen the performance of government, private and local community. The equation of panel data as follows:

$$Labor_{it} = \alpha_0 + \beta_1 TA_{it} + \beta_2 NH_{it} + \beta_3 NR_{it} + \beta_4 Wage_{it} + \beta_5 TV_{it} + \varepsilon_{it}$$

where α_0 is the constanta and β_1, β_2, β_3, dan β_4, is the value of coefficient. Notation i express the value of cross-section from the city in central java and t is the time-series. Based from study Zellner (1962) and Al-Marshadi et al (2022) the equation for panel seemingly unrelated regression as follows:

$$\gamma_j = X_j \beta_j + \mu_j$$

where γ_j and μ_j is the n for dimension vectors, β_j is the vector of parameters and X_j express the n x p_j for covariat matrixs. The equation for m use together, the explanation as follows:

$$\begin{bmatrix} \gamma_1 \\ \gamma_2 \\ \vdots \\ \gamma_m \end{bmatrix} = \begin{bmatrix} X_1 & 0 & \cdots & 0 \\ & \vdots & \ddots & \vdots \\ & 0 & \cdots & X_m \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_m \end{bmatrix} + \begin{bmatrix} \mu_1 \\ \mu_2 \\ \vdots \\ \mu_m \end{bmatrix}$$

Assume that disturbance have mean = 0 which exists independently of the various individual and homokedastic components, and μ_j have assumptions, where mean of error terms: $E(\mu_j|X) = 0$; the

variance value of the error term in the equation j is $E(\mu_j\mu'_j|X) = \sigma_{jj}I_N$; The covariance value of the error term in each individual from the equation j and j' is $E(\mu_j\mu'_j|X) = \sigma_{jj}I_N$ where j≠j'; and all matrixs covariance-covariat is $\Omega = E(uu') = \sum \otimes I_N$. In general, study from Zellner (1963) in the linear regression equation or OLS, there is a consistent estimator from β and can be optimalize for:

$$\widehat{\beta_{GLS}} = \{X'(\textstyle\sum^{-1} \otimes I_N)\}^{-1}\{X'\textstyle\sum^{-1} \otimes I_N y\}$$

With $Var\ (\hat{\beta})\ \{X'(\textstyle\sum^{-1} \otimes I_N)X\}^{-1}$, In the estimation there are two procedures, the first is that each equation in the OLS and the residual value form of the m equation can use estimation $\sum$ with $\hat{\mu}_j = \gamma_j - X_j\hat{\beta}_j$ and $\widehat{\sigma_{jj}} = \frac{\hat{\mu}_j\hat{\mu}_j'}{N}$. Second, subtitute $\widehat{\sum}$ with $\sum$ in GLS estimations, the equation as follows:
$$\widehat{\beta_{GLS}} = \{X'(\widehat{\textstyle\sum}^{-1} \otimes I_N)X\}^{-1}\{X'\widehat{\textstyle\sum}^{-1} \otimes I_N)y\}$$
The value of the cross-section can be tested on the value of the coefficient that is combined with the difference from the equation $\beta_j = \beta_{j'} = 0$ or the coefficient value of each respective cross-section like $\beta_j = \beta_{j'}$. Another advantage of the SUR model are comprises a set of regression equations that are independent of one another (Al-Marshadi et al., 2022).

RESULTS AND DISCUSSIONS

All variables used are in logarithmic form except for tourist object variables, because the value of a tourist object is a unit. All the variables used show a mean value that is greater than the standard deviation which indicates that all variables have high variability, this cannot be separated from the use of panel data which will have heterogeneous data values because each cross-section in this case is the district and city in the province. Central Java has its own characteristics. The tourism object variable has a minimum value of 2 and a maximum of 95, meaning that there are changes or additions to at least 2 tourist objects, namely in Sukoharjo Regency and at most 95 tourist objects in Banyumas Regency, overall in Central Java Province every year there is an average increase an average of 22.34 new tourist objects.

Tabel 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Labor	175	5.390	1.199	2.079	8.754
TA	175	22.337	15.889	2	95
NH	175	6.380	0.852	4.205	8.472
NR	175	3.906	1.097	2.079	6.915
Wage	175	14.330	0.150	14.051	14.814
TV	175	13.369	1.181	9.878	16.439

Source: Data processed

The Labor variable has an average value of 5.39, which means that there has been an increase of 5.39 percent in the number of workers in the tourism sector over the last 5 years, this is in line with the increase in the number of tourists where in the last 5 years there has been an increase in the number of domestic and foreign tourists. of 13.37 percent, with a maximum value of 16.44 percent and a minimum of 9.88 percent. Infrastructure supporting the tourism sector as a whole has increased on average in the last five years with the number of hotel rooms by 6.38 percent and the number of restaurants by 3.91 percent. The increase in supporting infrastructure for the tourism sector is in line with the increase in the number of tourists, attractions and workers in the tourism sector.

Tabel 3. Result of Panel Data

Variable	Pooled	RE	FE	GLS	SUR
Constanta	-14.660	-10.234	-10.427	-7.055	-14.660
	(8.329)	(5.000)**	(5.153)**	(4.008)*	(7.640)*
TA	0.026	0.024	0.023	0.033	0.026
	(0.006)***	(0.004)***	(0.004)***	(0.003)***	(0.003)***
NH	0.188	0.031	-0.127	0.127	0.188
	(0.120)	(0.142)	(0.187)	(0.070)*	(0.030)***

Variable	Pooled	RE	FE	GLS	SUR
NR	-0.127	-0.036	-0.040	-0.146	-0.127
	(0.088)	(0.057)	(0.059)	(0.049)***	(0.044)***
Wage	1.014	0.965	1.068	0.635	1.014
	(0.572)*	(0.349)***	(0.369)***	(0.271)***	(0.533)**
TV	0.317	0.091	0.073	0.174	0.317
	(0.070)***	(0.043)**	(0.045)	(0.035)***	(0.060)***
Diagnostic Tools					
F-stat	17.10	107.78	19.77	303.43	1213.74
Chow Test	0.000				
Hausman Test		0.608			
Estimated Covariance				35	630

Source: Data processed

The results of the model specifications between the Chow test and the Hausman test show a random effect model, but there is a time-invariant effect on the regressor Li & Yang (2020) and the use of data in the tourism sector in Central Java province can cause a correlation to the disturbance term value which causes the estimator value to be inefficient, to overcome this, a Seemingly Unrelated Regression (SUR) Panel was implemented. Table 3 on the SUR model shows that the tourist object variable has a positive effect on employment in Central Java Province, this is in line with the research of Punarbawa et al (2016) that tourist attractions have a positive and significant effect. and in this study stated that tourist objects provide opportunities for some people who work in them. Study from Indah et al (2021) states that an increase in tourist attractions will result in an increase in the quantity of labor demanded. If the number of tourist objects increases, it will encourage employment. This encourages job opportunities in the tourism sector. Increasing the number of tourist attractions requires broad support from the government and private sector to create sustainable tourism conditions. (Archer et al., 2012; Durisin & Puzone, 2009).

Other infrastructure supporting the tourism sector, such as the number of rooms in hotels, shows that there is an influence on employment in Central Java Province in the tourism sector. A positive coefficient value means that the number of hotel rooms increases, the employment will increase. The increase in hotel rooms provides a reference for tourists in determining their tourist destinations. The more tourists who stay, the more labor is also needed at each hotel. Rachmania et al (2021) stated that the tourism industry, especially in the hotel sector, is labor-intensive, having a positive influence on creating job opportunities. Current investment developments in the tourism sector such as accommodation facilities such as hotels will require a lot of manpower. Lesmana & Purwanti (2017) state that hotel rooms have a positive and significant influence, so this research supports the research results that the more hotel rooms available, the more jobs are needed. The Indonesian Hotel and Restaurant Association (PHRI) stated that Central Java has recorded an increasingly rapid growth in hotels. The number of hotels in Central Java is due to good infrastructure and the many new destinations in Central Java. Herrero et al (2022) states the tourism sector has ecosystem is a complex sectors. To support the sustainable tourism and infrastructure need more development in accommodation and transportations for tourist (UNWTO, 2020). Baum et al (2016) stated that development of the tourism sector have a close relationship with its ecosystem such as accommodation, transportations and tourist attractions.

The variable number of restaurants has a negative effect on employment in Central Java Province, which means that every increase in the number of restaurants will result in a decrease in the workforce in the tourism sector. Based on BPS data showing that the average restaurant revenue in Central Java Province is experiencing a downward trend and the Covid-19 pandemic has exacerbated the condition of restaurant revenue, in 2018 the average revenue was 4,003 million rupiah and in 2020 it was 2,274 million. In line with the research developed by Rachmania et al (2021) that the number of restaurants has a negative effect on increasing the workforce. The tourist visit variable shows a positive influence on employment in the tourism sector. This is in line with research developed by Nindita &

Dewi (2018) which states that the number of tourist visits will increase the workforce through the location of residence, transportation and accommodation to consumption needs. Maulana (2016) states that foreign tourist visits have a positive influence on employment in the tourism sector in Indonesia.

The minimum wage is a form of reciprocity in the form of payment for services that have been provided in relation to employment. The effect of wages on employment absorption can occur through the demand and supply sides. From the demand side, if the wage rate in the area is higher, the demand for labor will decrease, this is inversely proportional to the supply side, if the wage rate is high, the labor supply will be high. The results of the study (Table 3) show that wages have a positive effect on employment in the tourism sector in Central Java Province. The coefficient value on the wage variable is 1.014, which means that the elasticity of employment related to wages is quite high. The researchers' assumptions show that there is a correlation between wages and labor absorption from the supply side, so that when wages are high, people's willingness to become workers in the tourism sector is high. Based on data from Disparpora, the tourism sector's workforce is showing an increasing trend except in 2020 where it has decreased due to the pandemic. Shu et al (2022) states linkage to industrial theory, the tourism sector is part of economic system where the output of the tourism sector is determined by the cost of production factors and influenced by other sectors. This occurs because the tourism sector is depend on other sectors.

CONCLUSIONS

The panel seemingly unrelated regression is applied to produce an efficient estimator even though there is a correlation between the disturbance terms in an equation. The results showed that supporting infrastructure for the tourism sector, such as the number of hotel rooms, the variable number of tourist attractions and tourist visits, had a positive effect on employment in the tourism sector. While the number of restaurants has a negative effect, this can happen because BPS data shows that the average restaurant income in Central Java Province is experiencing a downward trend and the Covid-19 pandemic has exacerbated the condition of restaurant income. The coefficient value on the wage variable which is quite large indicates that the elasticity of employment related to wages is quite high. The implication of the research is that increasing the quality and quantity of sustainable tourist objects can attract an increase in foreign and domestic tourist visits so as to increase the workforce through the tourism sector.

Implications of the study that labor absorption in tourism sector is vulnerable and to strengthen the ecosystem of tourism sectors with appropriate central java provincial government policies especially in tourism development such as create more investment in tourism sectors. In the last 5 years central java province faced declining of investment. Central java have to encourage sustainable tourism ecosystem and setting competitive wage to encourage improvement in all aspects include the tourism sectors. A limitation of the study does not apply of fiscal policy variables especially for the tourism sectors due lack of data.

REFERENCES

Afandi, R. L., & Alie, M. M. (2015). Kajian pengaruh keberadaan kawasan wisata Sangiran terhadap aspek fisik, aspek ekonomi, dan aspek sosial masyarakat. *Teknik PWK (Perencanaan Wilayah Dan Kota)*, *4*(2), 282–292.

Akrong, K. K. (2019). Pro-poor tourism: Critical perspective and implications for future research. *Journal of Tourism and Hospitality*, *7*(1), 23–35.

Al-Marshadi, A. H., Aslam, M., & Alharbey, A. (2022). Selecting the covariance structure for the seemingly unrelated regression models. *Journal of King Saud University-Science*, *34*, 102027.

Aliansyah, H., & Hermawan, W. (2021). Peran Sektor Pariwisata Pada Pertumbuhan Ekonomi Kabupaten/Kota Di Jawa Barat. *Bina Ekonomi*, *23*(1), 39–55. https://doi.org/10.26593/be.v23i1.4654.39-55

Archer, B., Cooper, C., & Ruhanen, L. (2012). The positive and negative impact of tourism. *Global Tourism*, 79–102.

Baum, T., Cheung, C., Kong, H., Kralj, A., Mooney, S., Thi Thanh, H. N., Ramachandran, S., Ružic, M. D.,

& Siow, M. L. (2016). Sustainability and the tourism and hospitality workforce: A thematic analysis. *Sustainability (Switzerland)*, *8*(8). https://doi.org/10.3390/su8080809

Brandt, D. (2018). Wage determinants in the Swedish tourism sector. *Scandinavian Journal of Hospitality and Tourism*, *18*(1), 18–38. https://doi.org/10.1080/15022250.2016.1206832

Durisin, B., & Puzone, F. (2009). Maturation of corporate governance research 1993-7: An assesment. *Governance: An International Review*, *17*(3), 266–291.

Garsous, G., Corderi, D., Velasco, M., & Colombo, A. (2017). Tax incentives and job creation in the tourism sector of Brazil's SUDENE area. *World Development*, *96*, 87–101.

Herrero, C. C., Laso, J., Cristobal, J., Fullana-i-Palmer, P., Alberti, J., Fullana, M., Herrero, A., Margallo, M., & Aldaco, R. (2022). Tourism under a life cycle thinking approach: A review of perspectives and new challenges for the tourism sector in the last decade. *Science of the Total Environment*, *845*, 157261.

Indah, F. R., Nuraini, I., & Syaifullah, Y. (2021). Pengaruh sektor pariwisata terhadap penyerapan tenaga kerja di Provinsi Jawa Timur. *Jurnal Ilmu Ekonomi*, *5*(2), 339–353.

Kartseva, M. A., & Kuznetsova, P. O. (2020). The economic consequences of the coronavirus pandemic: Which groups will suffer more in terms of loss of employment and income? *Population and Economics*, *4*(2), 26–33.

Leiper, N. (1979). The framework of tourism: Towards a definition of tourism, tourist and the tourist industry. *Annals of Tourism Research*, *6*(4), 390–407.

Lesmana, I. G. P. Y., & Purwanti, P. A. P. (2017). Penyerapan tenaga kerja pada sektor pariwisata di Kabupaten Badung. *E-Jurnal EP Unud*, *9*(4), 843–872.

Li, L., & Yang, Z. (2020). Spatial dynamic panel data models with correlated random effects. *Journal of Econometrics*, *221*(2), 424–454.

Maulana, A. (2016). Pengaruh kunjungan wisatawan mancanegara dan perjalanan wisatawan nusantara terhadap penyerapan tenaga kerja sektor pariwisata di Indonesia. *Jurnal Kepariwisataan Indonesia*, *11*(1), 119–144.

Nindita, N. N., & Dewi, M. H. U. (2018). Pengaruh jumlah kunjungan wisatawan, jumlah hotel dan upah minimum terhadap penyerapan tenaga kerja di sektor pariwisata. *E-Jurnal EP Unud*, *10*(5), 1946–1975.

Panjaitan, Y. G., & Gunnanto, E. Y. A. (2021). Analisis efisiensi sektor pariwisata di Jawa Tengah. *JDEP (Jurnal Dinamika Ekonomi Pembangunan)*, *4*(2), 127–134.

Punarbawa, M. A., Nuridja, I. M., & Suwena, K. R. (2016). Keterserapan tenaga kerja pada industri pariwisata di Kabupaten Buleleng tahun 2011-2015. *Jurnal Jurusan Pendidikan Ekonomi*, *6*(1), 129–141.

Rachmania, S. D., Imaningsih, N., & Wijaya, R. S. (2021). Analisis penyerapan tenaga kerja pada sektor pariwisata (sektor perdagangan, hotel dan restoran) di Kabupaten Badung. *Eksis: Jurnal Ilmiah Ekonomi Dan Bisnis*, *12*(1), 23–30.

Sanaubar, G., Hidayat, W., & Kusuma, H. (2017). Pengaruh potensi pariwisata terhadap penyerapan tenaga kerja sektor perhotelan di 9 Kabupaten/Kota provinsi Jawa Timur tahun 2012-2015. *Jurnal Ilmu Ekonomi JIE*, *1*(3), 324–339.

Shu, H., Yu, Q., Wang, A., & Zha, J. (2022). Understanding wage differences across tourism-characteristic sectors: Insights from an extended input-output analysis. *Journal of Hospitality and Tourism Management*, *51*, 88–104.

Sirima, A., & Backman, K. F. (2013). Communities' displacement from national park and tourism development in the Usangu Plains, Tanzania. *Current Issue in Tourism*, *16*(7–8), 719–735.

Subardini, S. (2018). Analisis Kontribusi Sektor Pariwisata terhadap Produk Domestik Regional Bruto Provinsi Jawa Timur. *Jurnal Ilmiah Administrasi Bisnis Dan Inovasi*, *1*(2), 102–114. https://doi.org/10.25139/jai.v1i2.815

Sun, Y.-Y., Sie, L., Faturay, F., Auwalin, I., & Wang, J. (2021). Who are vulnerable in a tourism crisis? A tourism employment vulnerability analysis for the COVID-19 management. *Journal of Hospitality and Tourism Management*, *49*, 304–308.

UNWTO. (2020). *How are countries supporting tourism recovery?*

Xiaojuan, Y., Namhyun, K., Chih-Chien, C., & Zvi, S. (2012). Are you a tourist? Tourism definition from

the tourist perspective. *Tourism Analysis*, *17*(4), 445–457.

Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests of aggregation bias. *Journal of the American Statistical Association*, *57*, 500–509.

Zellner, A. (1963). Estimators for seemingly unrelated regression equations: Some exact finite sample results. *Journal of the American Statistical Association*, *58*(304), 977–992.