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HOW HOUSEHOLD TOURISM EXPENDITURE IN INDONESIA? A QUAIDS MODEL ANALYSIS

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Abstract

Tourism is a sector in Indonesia that has experienced rapid development in the last decade. This sector provides new hope for the emergence of new sources of economic growth when the economy is experiencing a slowdown. This study aims to estimate the income elasticity and expenditure pattern household on tourism in Indonesia. This study utilizes data from the Indonesian Family Life Survey (IFLS) publication. To achieve comprehensive estimation results, the research employs the Quadratic Almost Ideal Demand System (QUAIDS) approach, which is currently recognized as the standard method in household demand estimation systems. Four groups of expenditure types were examined: personal goods, household goods, tourism, and transportation. The results showed that the largest household expenditure was transportation followed by personal goods, household goods, and tourism. However, the largest household income elasticity is tourism, followed by household goods, personal goods and transportation. This is because when household income is constant, the household expenditure budget is allocated to transportation, personal goods and household goods more than tourism. Meanwhile, when income increases, households will allocate their budget for tourism, because expenditure on transportation, personal goods, and household goods has reached the point of maximum utility. And then, other finding show that income elasticity is relatively elastic. This suggests that improvements in household income have the potential to increase expenditure on the tourism sector. This has important implications in terms of public policy, as it makes it possible to explore how tourism policy interacts with household expenditure. Thus, the government and related institutions can obtain consideration from income elasticity and expenditure pattern household in making policies in the tourism sector.

Keywords: Household Expenditure, Income Elasticity, Tourism, QUAIDS, Indonesia

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INTRODUCTION

Tourism is one of the sectors in Indonesia that has experienced rapid development in recent years [1].

[1] Fafurida and others, 'Tourism and Economic Development in Indonesia', *International Journal of Scientific and Technology Research*, 9.3 (2020), pp. 6476–79; Diena Mutiara Lemy, Frans Teguh, and Amelda Pramezwary, 'Tourism Development in Indonesia: Establishment of Sustainable Strategies', *Bridging Tourism Theory and Practice*, 11 (2019), pp. 91–108.

Based on records from the Central Bureau of Statistics (BPS), the number of foreign tourists visiting Indonesia increased from 6.32 million people in 2009 to 16.11 million people in 2019. At the productivity level, the tourism sector's contribution to Gross Domestic Product (GDP) experienced an increasing trend of 3.05 percent in 2010 to 4.8 percent in 2019.Along with the significant growth of tourism, tourism expenditure in Indonesia has also increased significantly. In 2009, tourism expenditure was recorded at US$ 6.91 billion to US$ 14.45 billion in 2019.

Nonetheless, one of the most significant challenges currently confronting the tourism sector is addressing the insufficient access to information or insights required to effectively identify consumer preferences and understand their genuine needs [2]. Understanding tourism expenditure will be very useful because tourism is an economic activity driven by expenditure [3]. A thorough comprehension of tourism spending patterns offers substantial advantages in recognizing potential market segments and developing effective market segmentation strategies for the tourism sector [4]. The significance of tourism spending is widely recognized, not only by businesses operating within the tourism industry but also by governmental entities [5]. Therefore, a robust analytical model is essential to track tourist spending patterns. Econometric methods provide valuable analytical tools for examining the relationship between tourism activities and spending patterns [6].

However, there is limited empirical evidence available on the tourist spending patterns, and microeconomic analyses focusing on individual or household-level tourism behavior are even more scarce [7]. Therefore, this research aims to estimate income elasticity and household expenditure patterns for tourism. To address these research questions, this study employs the Quadratic Almost Ideal Demand System (QUAIDS) methodology. A key benefit of this systems-based approach is its ability to simultaneously estimate parameters associated with multiple products [8]. In this research,

[2] Soo Cheong Jang and Sunny Ham, 'A Double-Hurdle Analysis of Travel Expenditure: Baby Boomer Seniors versus Older Seniors', *Tourism Management*, 30.3 (2009), pp. 372–80.

[3] Tanja Mihalic, 'Tourism and Economic Development Issues', *Tourism and Development: Concepts and Issues, 2nd Edition*, 2014, pp. 77–117.

[4] Cristina Bernini and Maria Francesca Cracolici, 'Demographic Change, Tourism Expenditure and Life Cycle Behaviour', *Tourism Management*, 47 (2015), pp. 191–205; Gong Soog Hong, Soo Yeon Kim, and Jieun Lee, 'Travel Expenditure Patterns of Elderly Households in the Us', *Tourism Recreation Research*, 24.1 (1999), pp. 43–52; Juan L. Nicolau and Francisco J. Más, 'Stochastic Modeling. A Three-Stage Tourist Choice Process', *Annals of Tourism Research*, 32.1 (2005), pp. 49–69.

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[6] Juan Gabriel Brida and Raffaele Scuderi, 'Determinants of Tourist Expenditure: A Review of Microeconometric Models', *Tourism Management Perspectives*, 6 (2013), pp. 28–40.

[7] Vera Shanshan Lin, Rui Mao, and Haiyan Song, 'Tourism Expenditure Patterns in China', *Annals of Tourism Research*, 54 (2015), pp. 100–117.

[8] Mohtar Rasyid and Anita Kristina, 'Estimation of Demand System for Household Energy Consumption : Empirical Evidence from Indonesia', *International Journal of Energy Economics and Policy*, 11.6 (2021), pp. 289–95.

parameter estimation will be carried out for three commodities, namely; spending on personal items, household goods, and tourism. As a control variable, this research will also use the household expenditure variable for transportation.

Research on tourism expenditure using household micro data is still not common [9]. To address this gap, the present study focuses on tourism expenditure in the context of a developing country, specifically Indonesia. Unlike prior research, this study utilizes micro-level data derived from Indonesian households, with a particular emphasis on consumption expenditure patterns. This article will be structured with the following details. The introduction section reviews the background and literature review. Next, methods describe the data and models used. The results and discussion contain a description of the research results regarding household expenditure on tourism. This article will close with a conclusion.

RESEARCH METHODS

The Indonesian Family Life Survey (IFLS) is a comprehensive longitudinal study that collects data at the individual, household, and community levels, serving as the primary dataset for this analysis. The initial wave (IFLS1), carried out in 1993, included over 7,000 households across 13 out of 27 provinces, covering approximately 83 percent of the population. Subsequent waves, conducted in 1997, 2000, 2007, and 2014, reinterviewed members of the original IFLS1 households as well as split-off households, achieving recontact rates exceeding 90 percent [10].

This study utilizes micro-level household data from the most recent wave of the IFLS publication, along with other pertinent secondary data sources. The dataset encompasses household consumption patterns for various commodities, price indices for each commodity, and total household expenditures. Additionally, the micro household data incorporated in this research includes variables such as the number of household members, residential status (rural or urban), and other household characteristics [11].

Specifically, in accordance with the research objectives, the main commodities to be studied are commodities that are assumed to be related to tourism. Because the context of this research is to determine shopping patterns and household income elasticity, several commodities will be included in the analysis. These commodities are household expenditure on personal goods, household goods, tourism and transportation.

IFLS data shows the number of households that were successfully interviewed. However, not all households were included in the research observations. This relates to households that cannot answer definitively or do not answer at all regarding the interview questions for the four commodities above.

[9] Sarath Divisekera, 'Empirical Estimation of Tourism Demand Models: A Review', *Handbook of Tourism Economics*, 2013, pp. 67–85.

[10] Elan Satriawan and others, *Does Adolescence Anemia Persist Over A Woman's Life Cycle? Evidence From The Indonesian Family Life Survey*, 2023.

[11] John Strauss, Firman Witoelar, and Bondan Sikoki, *The Fifth Wave of the Indonesia Family Life Survey: Overview and Field Report: Volume 1*, *In Rand Labor and Population*, 2016, I.

Four commodities (household expenditure on personal goods, household goods, tourism, and transportation) will be estimated using a demand system model [12] as follows:

$$w_i = \alpha_i + \sum_{j=k}^{k} \gamma_{ij} \ln p_j + \beta_i \ln \left\{ \frac{m}{a(p)} \right\} \quad (1)$$

In this context, w_i represents the share of consumption expenditure, and p_j denotes the price level of the respective commodity, while m signifies total household expenditure. Equation (1) represents the Almost Ideal Demand System (AIDS). Empirically, the AIDS model can be extended into the Quadratic Almost Ideal Demand System (QUAIDS), which is formulated in a quadratic expression. Therefore, to be able to develop AIDS into QUAIDS, it is necessary to square the AIDS equation [13], then the square of the system of equations (1) above is as follows:

$$w_i = \alpha_i + \sum_{j=k}^{k} \gamma_{ij} \ln p_j + \beta_i \ln \left\{ \frac{m}{a(p)} \right\} + \frac{\lambda_i}{b(p)} \left[\ln \left\{ \frac{m}{a(p)} \right\} \right]^2 \quad (2)$$

In QUAIDS analysis, the coefficient values from the main model estimation results cannot be interpreted directly. From an econometric perspective, the coefficients represent the contribution of each factor to the expenditure share of a specific commodity. Beyond the econometric interpretation, the primary focus of this approach lies in determining the income elasticity coefficient, which is a key analytical outcome. To determine income elasticity, the following equation is as follows:

$$\mu_i = 1 + \frac{1}{w_i} \left[\beta_i + \frac{2\lambda_i}{b(p)} \ln \left\{ \frac{m}{a(p)} \right\} \right] \quad (3)$$

[12] T. Arivelarsan and C. Sekar, 'Food Consumption Pattern of Cauvery Delta Region of Tamil Nadu-An Application of Quadratic Almost Ideal Demand System (QUAIDS)', *Economic Affairs*, 64.2 (2019); Frank Asche and Cathy R Wessells, 'On Price Indices in the Almost Ideal Demand System', *American Journal of Agricultural Economics*, 79.4 (2014), pp. 1182–85; Angus Deaton and John Muellbauer, 'An Almost Ideal Demand System', *The American Economic Review*, 70.3 (1980), pp. 312–26; Muhammad Faishal Farras, Ratya Anindita, and Rosihan Asmara, 'Consumption Pattern and Demand of Animal Protein in Malang City Application of Almost Ideal Demand System (AIDS)', *Jurnal Ekonomi Pertanian Dan Agribisnis*, 5.2 (2021), pp. 286–97; George R. Parsons, 'An Almost Ideal Demand System for Housing Attributes', *Southern Economic Journal*, 53.2 (1986), p. 347; Tey Yeong Sheng and others, 'Complete Demand Systems of Food in Malaysia', *Agricultural Economics*, 54.10 (2008), pp. 467–75.

[13] James Banks, Richard Blundell, and Arthur Lewbel, 'Quadratic Engel Curves and Consumer Demand', *The Review of Economics and Statistics*, 79.4 (1997); Madan Mohan Dey, M. D.Ferdous Alam, and Ferdinand J. Paraguas, 'A Multistage Budgeting Approach to the Analysis of Demand for Fish: An Application to Inland Areas of Bangladesh', *Marine Resource Economics*, 26.1 (2011), pp. 35–58; Michal Gostkowski, 'Elasticity of Consumer Demand: Estimation Using a Quadratic Almost Ideal Demand System', *The Central European Journal of Social Sciences and Humanities*, 22.1 (2018); Kang Ernest Liu, 'A Globally Flexible, Quadratic Almost Ideal Demand System: An Application to Demand for Meats and Fish in Taiwan', *Applied Economics*, 41.17 (2009), pp. 2181–89; Fitria Virgantari and others, 'Analisis Permintaan Ikan Di Indonesia: Pendekatan Model Quadratic Almost Ideal Demand System (Quaids)', *Jurnal Sosial Ekonomi Kelautan Dan Perikanan*, 6.2 (2017), p. 191.

QUAIDS calculations are very complex to perform. Therefore, to facilitate calculations, the STATA application will be used in this research by following the guidelines provided by [14].

RESULT AND DISCUSSION

This research uses system data analysis techniques. Therefore, the relationship between variables is seen simultaneously, comprehensively, and not separately [15]. Apart from that, the type of statistics used is non-parametric statistics so it does not use assumptions and hypotheses [16]. After cleaning the data from IFLS, the number of variables included were four variables, including: expenditure on personal goods, household goods, tourism and transportation. Descriptive statistics of the data used are as follows.

Table 1. Descriptive Statistics

Var	Obs	Mean	Std.Dev	Min	Max
pgood	14820	136029	176685	1000	3000000
hhgood	14820	69299	77523	1000	1500000
recreat	14820	347044	652533	2000	6000000
transp	14820	412861	632834	4000	8500000
totexp	14820	965234	1087520	47000	11600000

Source: Output STATA

Descriptive statistics in Table 1 provide a summary of the data used in this research. After data cleaning was carried out there were 14,820 observations to be estimated using the QUAIDS model. Total household expenditure is only limited to household expenditure on personal goods, household goods, tourism and transportation. The estimation results of the QUAIDS model are shown in Table 2. This table is the result of estimating coefficient values based on the QUAIDS model equation (2). The analysis includes 22 estimated variables, with the majority demonstrating significance at a high confidence level. Only three coefficients fail to achieve significance at the one percent level, while just two coefficients are not significant at the five percent level.

The QUAIDS model can be said to be compatible for estimating household demand if the coefficient values are dominated by coefficient values that are significant at the conventional coefficient level of economic research. Therefore, these estimation results indicate that the QUAIDS model is more relevant to use compared to the AIDS model. There is research that can be used as a basis for affirmation regarding the QUAIDS model which is more relevant than AIDS for almost similar data, namely research by Faharuddin

[14] Brian P. Poi, 'Easy Demand-System Estimation with Quaids', *Stata Journal*, 12.3 (2012), pp. 433–46.

[15] Marta Suárez-Varela, 'Modeling Residential Water Demand: An Approach Based on Household Demand Systems', *Journal of Environmental Management*, 261.June 2019 (2020).

[16] Emanuel Parzen, 'Nonparametric Statistical Data Modeling', *Journal of the American Statistical Association*, 74.365 (1979), pp. 105–21.

et al. and Gostkowski [17]. Both show that the use of the QUAIDS model is more suitable for estimating household demand and expenditure..

Table 2. Estimated QUAIDS Model

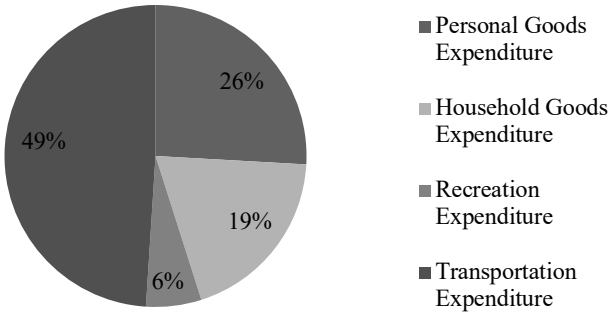
	Coef.	**Std. Err.**	**z**	**P>|z|**	**[95percent Conf.**	**Interval]**
alpha_1	.2533809	.0020232	125.24	0.000	.2494155	.2573463
alpha_2	.2001955	.0015165	132.01	0.000	.1972233	.2031677
alpha_3	.2978813	.0028759	103.58	0.000	.2911447	.3035179
alpha_4	.2485423	.0025296	98.25	0.000	.2435844	.2335002
beta_1	-.0039194	.0031279	-1.25	0.210	-.01005	.0022113
beta_2	-.0278436	.0021941	-12.69	0.000	-.0321439	-.0235432
beta_3	.0108871	.0046418	2.35	0.019	.0017894	.0199848
beta_4	.0208758	.0038439	5.43	0.000	.0133419	.0284098
gamma_1_1	1.32274	.0137886	95.93	0.000	1.295715	1.349765
gamma_2_1	-.1729916	.0092121	-18.78	0.000	-.191047	-.1549361
gamma_3_1	-.4224454	.0099868	-42.30	0.000	-.4420192	-.4028716
gamma_4_1	-.7273028	.011057	-65.78	0.000	-.7489741	-.7056316
gamma_2_2	.8168529	.0113125	72.21	0.000	.7946807	.8390251
gamma_3_2	-.2358088	.0073284	-32.18	0.000	-.2501722	-.2214454
gamma_4_2	-.4080526	.0087373	-46.70	0.000	-.4251773	-.3909279
gamma_3_3	1.69864	.0157634	107.76	0.000	1.667744	1.729536
gamma_4_3	-1.040386	.011788	-88.26	0.000	-1.06349	-1.017282
gamma_4_4	2.175741	.0153808	141.46	0.000	2.145595	2.205887
lambda_1	-.0028763	.001353	-2.13	0.034	-.0055282	-.0002244
lambda_2	.0076269	.0009448	8.07	0.000	.005775	.0094788
lambda_3	.0018736	.0020175	0.93	0.353	-.0020806	.0058278
lambda_4	-.0066241	.0016664	-3.98	0.000	-.0098903	-.003358

Sumber: Output STATA

However, the QUAIDS estimation results in Table 2 cannot provide a more detailed explanation. To get a comprehensive understanding, supporting explanations are needed such as household expenditure patterns and income elasticity. Estimated household expenditure can be seen in Figure 1.

[17] 'Analisis Pola Konsumsi Pangan Di Sumatera Selatan 2013: Pendekatan Quadratic Almost Ideal Demand System', *Jurnal Agro Ekonomi*, 33.2 (2015), p. 121

Figure 1. Estimated Household Expenditures



Based on Figure 1, spending on transportation is the main priority for households, the allocation is 49 percent of the total household expenditure spent. Expenditure on personal goods is in second place at 26 percent, followed by expenditure on household goods at 19 percent and finally expenditure on tourism at six percent.

Furthermore, calculating the elasticity coefficient value using equation (3) manually for each commodity in question will take a long time. The QUAIDS estimation technique introduced by Poi provides an easier solution for researchers for time efficiency. The QUIAIDS command in STATA can display the results of income elasticity estimation in the menu postestimation.

Table 3. Estimated Income Elasticity

	pgood	**hhgood**	**recreat**	**transp**
r1	.76564197	1.6388973	1.8075838	.77576535

Source: Output STATA

The findings in Table 3 show that an increase in household income of one percent will be responded to by household spending on the tourism sector of 1.8 (relatively elastic), by spending on household goods of 1.6 (relatively elastic), by spending on personal goods of 0.7 (relatively elastic). relatively inelastic) and by expenditure on transportation of 0.7 (relatively inelastic).

Several explanations can confirm this finding. First, when income is constant, each household does not allocate its expenditure to tourism because based on Figure 1 household expenditure is dominated by transportation followed by expenditure on personal goods and household goods. Therefore, as income levels rise, household expenditure is allocated to tourism.

In addition, based on empirical evidence, income is one of the most significant determinants for decision making regarding participation in tourism [18]. Nicolau and Mas's [19] research also shows that spending on recreation and tourism is income elastic in the

[18] Juan L. Eugenio-Martin and Juan A. Campos-Soria, 'Income and the Substitution Pattern between Domestic and International Tourism Demand', *Applied Economics*, 43.20 (2011), pp. 2519–31.

[19] 'Heckit Modelling of Tourist Expenditure: Evidence from Spain', *International Journal of Service Industry Management*, 16.3 (2005), pp. 271–93.

UK. Likewise, research by Jang et al. [20] shows that tourists with high incomes spend significantly more than other tourists who are categorized as having relatively low incomes. Crawford et al. [21] show that income not only influences the decision to travel but also determines the mode of tourism expenditure.

CONCLUSION

This research found quite important results. Income elasticity for tourism expenditure is relatively high, followed by household goods, personal goods and transportation. Meanwhile, the largest household expenditure is transportation, followed by personal goods, household goods and tourism. This is because when household income is constant, the household expenditure budget allocated to transportation, personal goods and household goods is greater than tourism. Thus, an increase in household income levels in Indonesia will trigger relatively large spending on tourism. This research still has limitations that need to be refined in the future. For example, the coefficient values for price and total expenditure are formalized in natural logarithm form due to data limitations.

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