University Students' Preferences for Labor Conditions of a Mining Site:
Evidence from Australia

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1. Introduction

The mining industry makes up 10.2% of the gross domestic product (GDP) of Australia. Although the mining industry is one of the largest industries in Australia, securing human resources remains a problem in that field. Specifically, skilled labor shortages are concentrated in remote areas, which is where mining sites are generally located in Australia. A previous study reported that mining companies in mining states such as Western Australia and Queensland are much more likely to have increase in benefits such as pay rates for current staff due to skills shortage than other states in Australia. (59.5% vs 38.0%) and to have offered financial incentives (Bankwest, 2012). Therefore, the aim of this paper is to identify Australian university mining students' preferences for labor conditions at mining sites by means of a discrete choice experiment to promote efficient improvements in labor conditions in the mining industry.

2. Method

Data collection was conducted through a paper-based questionnaire survey based on a method of conjoint analysis on October 26, 2017. The respondents were students majoring in fields relating to mining engineering at Curtin University and The University of Adelaide in Australia. The number of respondents was 95, including males and females aged 19-44 years. The number of valid responses was 93. The attributes and levels used for the analysis are shown in Table 1. A conditional logit model was used for data analysis. First, to estimate the value of each attribute as monetary numbers, marginal willingness to accept (MWTA) was estimated from the results of the model. Second, this study examines how much each individual characteristic affects job selection by logit estimation results. Finally, we demonstrate that the factors include individual characteristics.

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Table 1: Attributes and levels in the conditional logit model

Attributes	Levels
Wage (AUS Dollars)	{70,000, 90,000, 110,000, 130,000, 150,000}
Fatality rate (Per 100,000 employees)	{3/100,000, 5/100,000, 7/100,000}
Working position	{Mine planning, Blasting, Driller, Geotechnical engineer}
Style	{Living near site, Fly in fly out}
Method	{Underground mining, Surface mining}
Company	{BHP, AngloGold Ashanti, Barrick, Rio Tinto, Paddington}

3. Estimation Result

A total of 7 variables were deemed statistically significant: wage, fatality rate, positions (e.g. mine planning, blasting, and drilling), method of employment, and choice of company. The marginal willingness to accept (MWTA) each attribute is shown in Table 2. The estimation results of interactions between individual characteristics and main variables are shown in Table 3.

Table 2: Estimation Result of MWTA

Attributes		Marginal willingness to accept: MWTA (Australian Dollar)
Fatality rate		3719.457
Working postion (Referencing Geotech engineer)	Mine planning	-17149.321
	Blasting	14524.887
	Driller	22986.425
Style (Referencing Fly in Fly out)	Living near site	14932.127
Method (Referencing Surface minin	Underground mining	5746.606
Company (Referencing Paddington)	BHP	-13574.661
	AngloGold Asahnti	-2411.765
	Barrik	-5882.353
	Rio Tinto	-7963.801

Table 3: Estimation Result of Logit Model

Wage × Adelaide	6.510×10^{-6}**	3.29×10^{-6}
Mine planning × Female	0.535*	0.3010
Blasting × Female	0.538*	0.3210
Living near site × Adelaide	-0.654***	0.1770
Underground mining × Adelaide	-0.423**	0.1750
Underground mining × Female	-0.534**	0.2170
BHP × Adelaide	0.663**	0.2760
AngloGold Ashanti × Adelaide	0.504*	0.2800

4.Discussion and Conclusion

The results of this study show that students prefer to work in conditions where fatality rates are lower as, generally expected. Furthermore, the interaction between individual characteristics and the main variables have a significant correlation with job selection, indicating that working conditions or contracts could be improved by adjusting these variables for potential workers who have specific individual characteristics.