

RETURNS TO TECHNICAL AND VOCATIONAL EDUCATION (TVET) IN MALAYSIA USING THE SALARIES AND WAGES SURVEY (SWS), 2018 – 2023

Zainizam Zakariya^{1*}

Ramdzan Ali Saibon²

Normala Zulkifli³

¹ Department of Economics, Universiti Pendidikan Sultan Idris, Malaysia

Email: zainizam@fpe.upsi.edu.my

² Department of Economics, Universiti Pendidikan Sultan Idris, Malaysia

Email: ramdzan@fpe.upsi.edu.my

³ Department of Economics, Universiti Pendidikan Sultan Idris, Malaysia

Email: normala@fpe.upsi.edu.my

* Corresponding Author

Article history

Received date : 19-6-2026

Revised date : 20-6-2026

Accepted date : 25-7-2026

Published date : 1-8-2026

To cite this document:

Zakariya, Z., Saibon, R. A., & Zulkifli, N. (2026). Returns to technical and vocational education (TVET) in Malaysia using the salaries and wages survey (SWS), 2018–2023. *Journal of Islamic, Social, Economics and Development (JISED)*, 11 (85), 694 – 715.

Abstract: *This research aims to measure the earnings premium for higher-level TVET qualifications and to examine how these returns differ by gender and region after accounting for differences in field of study, occupation, industry, and sector of employment. The analysis employs repeated cross-sectional Salaries and Wages Survey (SWS) data from 2018 to 2023. With a sample of 97,792 certificate and diploma graduates, an ordinary least squares (OLS) regression finds a large diploma premium over certificate holders. However, the premium falls from approximately 25.5 percent in the baseline specification to around 8 percent in the fully specified model, suggesting that occupational and sectoral sorting explain part of the observed premium but a significant credential effect remains. Estimates for gender differences indicate diploma premiums of 6.7 percent for men and 12.3 percent for women. Estimates for regions are positive in all regions, from 5.3 percent in East Malaysia to 10.5 percent in the Southern region. Year dummies reflect a wage squeeze in 2020 and 2021, followed by a rebound in 2022 and 2023. The findings suggest that upgrading from certificate to diploma qualifications can lead to significant wage gains, but to maximize these gains, greater alignment of TVET with the TVET industry, regionally differentiated skills policies aligned with local economic structure, and targeted policies to address disparate wage outcomes in different segments of the labor market are needed.*

Keywords: *Returns to TVET education, diploma, certificates, gender, Malaysia*

Introduction

Technical and vocational education and training is increasingly positioned as a core lever in Malaysia's human capital and productivity strategy, with recent reforms emphasising streamlined intake, stronger coordination across providers, and closer alignment between training supply and labour market demand. In this policy context, a central empirical issue is not only whether TVET improves employability, but whether TVET credentials translate into a wage premium that can justify continued expansion, programme redesign, and more targeted credential pathways.

Although evidence on the returns to TVET in Malaysia has expanded, much of the existing work is based on institution-specific or cohort-based data that may be informative but difficult to generalise to economy-wide wage formation. A frequently cited example is research using ILKBS graduate data, which estimates an average private return to education of about 15.9% for a cohort of 3,517 graduates. While such findings support the proposition that TVET can generate meaningful earnings gains, they are embedded in a particular provider ecosystem and reflect outcomes for defined cohorts rather than the broader allocation of workers across industries, occupations, and local labour markets. As a result, existing estimates may not fully capture how TVET credentials are rewarded across heterogeneous job structures, or how returns shift when labour demand and the wage distribution change.

This study addresses these limitations by estimating the wage returns to TVET using Malaysia's Salaries and Wages Survey (SWS) for 2018 to 2023. The SWS is conducted annually using a household approach and probability sampling that covers all states in Malaysia, and it measures monthly salaries and wages from the principal occupation of paid employees, defined as individuals who work at least six hours a day or at least twenty days a month. For returns analysis, a key strength of the SWS is its systematic reporting of wage statistics by demographic and socioeconomic characteristics, including educational attainment, highest certificate obtained, occupation, and industry. This enables an explicitly labour market-grounded interpretation of TVET wage differentials, since estimated premiums can be examined in relation to the occupational and sectoral structure in which TVET-trained workers are actually employed.

The 2018 to 2023 period is analytically important because it spans substantial variation in Malaysia's wage dynamics, including a pronounced contraction and subsequent rebound. The SWS 2023 report documents year-on-year changes in median and mean wages across 2016 to 2023, showing a sharp decline during 2020 followed by recovery in 2021, 2022, and 2023 (Department of Statistics Malaysia, 2023). Using multiple survey rounds over this period enables the study to assess whether the TVET wage premium is stable across changing macro labour market conditions, or whether it is state-dependent and varies with shocks that alter sectoral demand and occupational composition. The SWS is also explicitly described as a household approach survey covering all states, reinforcing its suitability for nationally representative inference and for comparisons across geographic and labour market segments (Department of Statistics Malaysia, 2023).

In doing so, the study aims to strengthen the empirical basis for TVET policy design and for more targeted strategies that align training supply with the labour market segments that generate the strongest wage payoffs.

Literature Review

Malaysia views technical and vocational education and training (TVET) as a strategic channel for producing skilled workers for a high-income economy. Yet questions persist about whether graduates of technical and vocational institutions obtain wage gains comparable to those with general academic qualifications and whether the government's heavy investment yields adequate social returns. A sizable literature has emerged over the past 15 years examining the rate of return to education and the earnings of TVET graduates.

Before turning to TVET-specific work, it is useful to recall benchmark estimates of returns to education in the Malaysian labour market. Using the 2007 Household Income Survey and Mincerian earnings regressions, Kenayathulla (2013) reported that private returns were highest at the secondary level, ranging between 16.5 % for men and 27.2 % for women, and remained high at the university level (around 15–16 %) (Kenayathulla, 2013). Arshad (2016) replicated the Mincer approach with the 2009 Household Income Survey; he found returns of 6.1 % for lower secondary education, 11.9 % for upper secondary and 11.48 % for university degrees (Arshad, 2016). A related article by Arshad and Mat Ghani (2015) added occupational and regional dummies and confirmed that returns were highest at upper secondary and tertiary levels while male workers earned around 40 % more than female workers (Arshad and Mat Ghani, 2015). These studies provide baseline estimates for general education against which to compare TVET credentials.

Evidence on technical and vocational education is more recent and limited. Saharawati in 2008 conducted one of the earliest cost–benefit analyses of polytechnic diplomas. Surveying 292 graduates and comparing lifetime earnings against tuition and opportunity costs, she calculated a private internal rate of return of about 14 % and a social rate of 13 %, with private-sector diploma holders earning returns around 7 % and public-sector diploma holders around 5 %. Returns were generally higher for female graduates, highlighting gender differentials (Saharawati, 2008).

Chellapan and Kenayathulla (2019 and 2021) published one of the first journal articles estimating returns to TVET using large-scale survey data. Drawing on 3 517 graduates from the Institute Kemahiran Belia dan Sukan (ILKBS) graduate tracer survey, they estimated Mincerian earnings functions using ordinary least squares. Their analysis showed that each additional year of TVET schooling increased wages by 15.9 %, and when experience was grouped, the return rose to 17.2 % (Chellapan and Kenayathulla, 2019, 2021). When disaggregated by gender, the authors found that private returns were 15.1 % for male graduates and 18.8 % for female graduates. Diploma-level qualifications yielded higher returns, roughly 17 % for men and 18% for women, while certificate-level programs produced lower returns. In addition, the studies also reveal that a year of additional work experience raised earnings by 7.1 % for men and 5.8 % for women, whereas Chinese male and female graduates enjoyed income premiums of roughly 9 % compared with other ethnic groups. The study concluded that TVET credentials, particularly diplomas, deliver substantial returns that rival or exceed those of general academic pathways.

In other studies, Chellapan and Mokhzan (2024) used the same ILKBS dataset and estimated that the average private return to education for the whole sample was 15.9 %, rising to 17.2 % when work experience was grouped (Chellapan and Mokhzan, 2024). In particular, private returns were estimated around 15 % for male graduates and nearly 19% for female graduates, confirming significant gender differences. At the diploma level, the returns were slightly higher

for women than for men (18% vs 17%). The authors concluded that the government's investment in human capital through TVET would yield larger future returns and that industry-aligned skills explain the observed wage premium.

Buang et al. (2020) examined earnings and employment among graduates of Malaysian community colleges. Using a graduate employability survey of 367 respondents (drawn from a population of 7 725 graduates) and descriptive statistics, they found that most graduates earned monthly salaries between RM 1 501 and RM 2 000, with smaller proportions earning below RM 1 000 or above RM 2 000 (Buang et al., 2020). Female graduates predominated at the lowest income tier, while male graduates were more represented at higher income levels. Yet, the study did not estimate Mincerian returns but provided earnings distributions and highlighted gender differences.

In another study, Azri Said (2024) explores perceptions of the quality and employability of vocational college graduates. Using interviews with three stakeholders and document analysis, the study identified themes such as adequate skills supply, effectiveness of on-the-job training, integrity and responsibility, competitiveness, and field-specific employability (Azri, 2024). Although the research did not quantify returns or wages, it underscored factors that may influence graduates' labour-market outcomes and emphasised the importance of curriculum recognition and industry collaboration.

Natasha et al. (2017) focused on challenges faced by technical and vocational graduates who become entrepreneurs (Natasha et al., 2017). Through a systematic literature review grounded in Ajzen's Theory of Planned Behaviour, the authors identified generic skills, entrepreneurship training, and strong industry cooperation as critical determinants of high incomes. The paper emphasised that TVET graduates can act as catalysts for economic growth by venturing into self-employment, although it did not present wage estimates.

The evidence suggests that returns to TVET are heterogeneous across programmes, genders and sectors. ILKBS graduates attain private returns between 15% and 17%, while polytechnic diploma holders achieve private and social rates around 14% and 13%. Gender differences persist—women often realise higher returns than men, and returns are greater for diploma-level qualifications than certificates. On-the-job training adds wage premiums of roughly 7.7%, illustrating the value of lifelong learning.

In summary, earlier studies on returns to education and technical and vocational training in Malaysia draw on relatively small or specialised data sets such as national Household Income Surveys, cost-benefit analyses of specific polytechnic programmes, graduate-tracer surveys of ILKBS alumni and qualitative case studies. These sources often involve limited numbers of respondents, and they provide either cross-sectional snapshots or institution-specific insights rather than a comprehensive view of the labour market. By contrast, a study based on the Salaries and Wages Survey (SWS) for 2018 through 2023 would use a nationally representative module of the Labour Force Survey that is conducted annually from January to June to collect monthly wage data. The SWS provides detailed information on salary levels, education, occupation and sector across all employees for every state and from both urban and rural areas. This allows for estimating returns to technical and vocational education across the whole workforce rather than just within single cohorts. Furthermore, using data for 2018-2023 captures wage trends before and after the pandemic, whereas earlier studies rely on older surveys and cannot assess how returns have evolved over time.

Data And Methodology

Salaries and Wages Survey (SWS) Data

In order to examine the returns to vocational and technical education in Malaysia, this study utilizes data obtained from the Salaries and Wages Survey (SWS) conducted by the Department of Statistics Malaysia (DOSM) covering the period 2018 to 2023. This dataset provides comprehensive information on employment characteristics, occupational structure, industrial distribution, and income profiles of Malaysian workers across all states in rural and urban areas. Although the dataset contains rich information on labour market characteristics, yet, a key limitation of the dataset is the absence of a direct variable identifying TVET graduates or the type of institution attended. The SWS provides information on qualification level but not on whether the credential was obtained from a polytechnic, community college, or university. Consequently, this study employs certificate and diploma qualifications as proxies for TVET attainment following the Malaysian Qualifications Framework (MQF) and the National TVET Policy Framework (MTVET, 2024). Under the MQF, both qualification levels (certificate = MQF Level 3–4; diploma = MQF Level 4–5) correspond to applied, skills-based programmes that emphasise technical competence and industry relevance.

Certificate and Diploma programmes offered by polytechnics, community colleges, private colleges, and universities share identical MQF learning-outcome descriptors and are formally recognised within Malaysia's National TVET Policy Framework (MTVET, 2024) and RMK-12 as components of the converged national TVET ecosystem. The inclusion of university-based diplomas reflects the growing integration of academic and technical pathways, where both contribute to producing Malaysia's middle-skilled workforce. This approach, consistent with previous studies (Tan et al., 2019; Lee & Lim, 2020; Ariffin & Noor, 2021), provides a policy-aligned and empirically valid representation of Malaysia's evolving TVET landscape. To ensure accuracy and relevance in estimating the returns to education, non-citizens and individuals working in managerial positions were excluded from the dataset. With a total sample of 97,792 respondents, the data offers a robust foundation for understanding how vocational and technical education contributes to labour market outcomes and wage differentials across demographic, occupational, and regional dimensions in Malaysia.

Descriptive Analysis

Based on the sample distribution comprising a total of 97,792 respondents, several key characteristics emerge from the descriptive statistics as shown in Table 1. The distribution of graduates across the years shows a relatively balanced representation, with each year contributing between 15.8% and 17.4%, indicating consistent sampling over the six-year period (2018–2023). In terms of geographical distribution, Selangor recorded the highest proportion of respondents (11.6%), followed by Johor (9.5%), Sarawak (8.5%), and Kedah (7.8%), reflecting higher concentration in more populous or economically active states. Smaller shares are observed in Perlis (2.5%), Labuan (1.8%), and Putrajaya (3.7%), corresponding to their smaller population sizes.

From a demographic perspective, urban respondents dominate the sample with nearly 78% compared to rural respondents with roughly 22%, aligning with Malaysia's urbanisation pattern. Gender distribution is fairly balanced, with males representing 53.3% and females 46.7%. The mean age of respondents is 34.6 years (SD = 9.3), suggesting that most participants are in their early to mid-career stage. Ethnically, Bumiputera form the majority (82.3%), followed by Chinese (12.4%), Indians (4.6%), and others (0.7%), mirroring the national

population composition. In terms of marital status, 63.3% are married, 34% are never married, while the widowed (1.1%) and divorced/separated (1.7%) categories form a small minority.

Table 1: Characteristics of Main Variables Used (Mean and Standard Deviation)

Variable	%	Std. Dev.
Year		
2018	15.8	
2019	16.8	
2020	17.2	
2021	16.6	
2022	16.1	
2023	17.4	
State		
Johor	9.5	
Kedah	7.8	
Kelantan	5.5	
Melaka	5.4	
N. Sembilan	6.0	
Pahang	6.6	
P. Pinang	5.7	
Perak	6.7	
Perlis	2.5	
Selangor	11.6	
Terengganu	6.2	
Sabah	7.7	
Sarawak	8.5	
WP Kuala Lumpur	4.8	
WP Labuan	1.8	
WP Putrajaya	3.7	
Strata		
Urban	79.2	
Rural	20.8	
Gender		
Male	53.3	
Female	46.7	
Age	34.55	9.3
Ethnic		
Bumiputera	82.3	
Chinese	12.4	
Indian	4.6	
Others	0.7	
Marital status (marst)		
Never Married	34.0	
Married	63.3	
Widowed	1.1	
Divorced/Separated	1.7	
Highest certificate obtained (<i>highcert</i>)		
Certificate	36.3	

Diploma	63.7	
Field of study	0.0	
Humanities and Arts	4.0	
Social sciences, Business and Law	27.6	
Science, Mathematics and Computing	8.9	
Engineering, Manufacturing and Construction	36.0	
Agriculture and Veterinary	1.9	
Health and Welfare	16.0	
Services	5.7	
Higher education institution (HEI)		
IPTA/ IPA	54.3	
IPTS/ IPS	25.1	
Oversea	20.6	
Occupation		
Professional	17.9	
Technician and Associate Prof	29.8	
Clerical Support Workers	18.5	
Service and Sales Workers	15.2	
Skilled Agricultural, Forestry, Livestock	0.7	
Craft and Related Trades Workers	5.8	
Plant and Machine Operators and Assemblers	8.1	
Elementary Occupations	4.0	
Industry		
Agriculture, Forestry and Fishing	1.6	
Mining and Quarrying	1.4	
Manufacturing	16.7	
Electricity, Gas, Steam and Air Conditioning	1.3	
Water Supply; Sewerage, Waste Management	0.8	
Construction	5.7	
Wholesale and Retail Trade; Repair of M	12.7	
Transportation and Storage	4.2	
Accommodation and Food Service Activities	5.3	
Information and Communication	2.1	
Financial and Insurance/Takaful Activities	4.1	
Real Estate Activities	0.7	
Professional, Scientific and Technical	3.5	
Administrative and Support Service Activities	3.6	
Public Administration and Defence; Comp	15.4	
Education	6.7	
Human Health and Social Work Activities	12.4	
Arts, Entertainment and Recreation	0.5	
Other Service Activities	1.4	
Employment sector		
Government	29.6	
Private	70.4	
Monthly income (RM)	3102.1	2003.5

Source: Authors' own calculation

Regarding education, almost 64% of graduates hold diplomas and 36% possess certificates, and the most common fields of study are Engineering, Manufacturing and Construction (36%), Social Sciences, Business and Law (27.6%), and Health and Welfare (16%), highlighting the technical and professional orientation of the sample. Most respondents graduated from public higher education institutions (IPTA/IPAs) with 54.3%, followed by private institutions (25.1%), and overseas institutions (20.6%).

With respect to job characteristics, the largest groups come from Technicians and Associate Professionals with almost 30%, Clerical Support Workers (18.5%), and Professionals (17.9%). These distributions may suggest that the majority of respondents, with nearly 50%, occupy semi-skilled to professional jobs. Smaller proportions of graduates are engaged in Service and Sales (15.2%), Plant and Machine Operations (8.1%), and Elementary Occupations (4.0%). By sector, respondents are most concentrated in Manufacturing (16.7%), Public Administration and Defence (15.4%), Human Health and Social Work (12.4%), and Wholesale and Retail Trade (12.7%), reflecting Malaysia's diversified labour market. Interestingly, most graduates are employed in the private sector, with over 70%, with the remaining nearly 30% working in the government sector. In terms of income, the average monthly income is RM3,102.10 with a standard deviation of RM2,003.50, indicating considerable income variation across graduates. Overall, the sample reflects a well-distributed and representative workforce profile across states, sectors, and demographic categories, predominantly composed of mid-career, diploma-qualified individuals in the private sector, with a strong presence in technical and service-oriented occupations.

Empirical Model

This study estimates the wage returns to TVET using an augmented Mincer earnings function. The baseline specification models the natural logarithm of wages as a function of TVET attainment, labour market experience, and a set of individual and job characteristics:

$$\ln w_{it} = \alpha + \rho TVET_{it} + 1Exp_{it} + 2Exp_{it}^2 + X_{it}'\gamma + t + d + it \quad (1)$$

where $\ln w_{it}$ is the log of wage for individual i in year t , $TVET_{it}$ is an indicator (certificates vs diploma) capturing TVET qualification, Exp_{it} denotes potential labour market experience, and Exp_{it}^2 allows for concavity in the experience–earnings profile. X_{it}' is a vector of controls including socio-demographic and job characteristics (e.g., sex, marital status, ethnicity where available, urban–rural strata, industry, occupation and sector). t captures year fixed effects to account for common macroeconomic wage shifts, and d denotes district fixed effects to control for time-invariant local labour market conditions. The error term it captures unobserved determinants of wages. The parameter of interest is, which measures the conditional TVET wage premium. For interpretability, the implied percentage wage differential is computed as $100(e-1)$.

To examine whether TVET wage returns differ across population subgroups and labour market contexts, the regression is estimated in stages. First, the model is estimated on the pooled sample to obtain an overall average association between TVET and wages. The pooled Mincer earnings regression provides a useful average estimate of the wage premium associated with TVET credentials, but a single pooled wage structure implicitly assumes that the returns to credentials and other covariates are identical across workers and places, which is often inconsistent with how labour markets actually operate.

Next, the same specification is estimated separately by gender. This subgroup strategy allows it to vary flexibly across groups, providing evidence on distributional and structural heterogeneity in wage returns to TVET. Estimating the model separately by gender is also because the literature shows persistent gender wage gaps driven not only by differences in characteristics (education, experience, occupation) but also by differences in the “prices” of those characteristics reflecting occupational segregation, career interruptions, firm practices, and discrimination. Thus, the wage equation can plausibly differ in slopes between men and women (Blau & Kahn, 2017).

All models are estimated using OLS on log wages with heteroskedasticity-robust standard errors (and clustered at an appropriate geographic level where relevant). Because TVET attainment may be correlated with unobserved traits such as ability or motivation, the estimated coefficients should be interpreted as conditional associations, particularly in the absence of valid instrumental variables in the dataset.

Empirical Findings

The results on the returns to vocational and technical education are presented in Table 2, which is derived using the OLS regression method, which estimates the relationship between the logarithm of monthly income and a range of explanatory variables. This approach allows the study to quantify the contribution of diploma qualifications to income differences compared to certificate qualifications after taking educational field, geographic location, demographic profile, and job attributes into account. The analysis applies six regression models, from Model 1 to Model 6, which progressively introduce additional control variables to observe how the estimated income premium for diploma holders evolves when accounting for various economic and personal characteristics such as field of study, institution type, state, strata, gender, ethnicity, marital status, occupation, industry, employment sector, and year of observation. Overall, the explanatory power of the models improves progressively across the six specifications. The R-squared value increases from 0.2726 in Model 1 to 0.5655 in Model 6, while the adjusted R-squared rises from 0.2726 to 0.5651. This improvement indicates that as more control variables are added, the models become more comprehensive in explaining variations in monthly income among employed TVET graduates. By the final model, more than 56% of income variation is explained by the included factors, showing that demographic, occupational, and regional characteristics play an important role in shaping wage outcomes for vocational and technical graduates in Malaysia.

Table 2: Returns to TVET Education Across Model 1 to Model 6 (Pooled Sample)

Log monthly income	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Diploma (0 = No, 1 = Yes)	0.2272 *** (0.0033)	0.1800 *** (0.0043)	0.1597 *** (0.0042)	0.1751 *** (0.0041)	0.0812 *** (0.0036)	0.0757 *** (0.0037)
Age	0.0947 *** (0.0012)	0.0922 *** (0.0014)	0.0866 *** (0.0014)	0.0717 *** (0.0016)	0.0399 *** (0.0013)	0.0390 *** (0.0013)
Agesqr	-0.0009 *** (0.0000)	-0.0008 *** (0.0000)	-0.0008 *** (0.0000)	-0.0006 *** (0.0000)	-0.0003 *** (0.0000)	-0.0003 *** (0.0000)
Field of study (Ref group - Humanities and Arts)						
Social sciences, Business and Law		0.0610 *** (0.0095)	0.0357 *** (0.0092)	0.0541 *** (0.0091)	0.0791 *** (0.0081)	0.0819 *** (0.0080)
Science, Math and Computing		0.0789 *** (0.0107)	0.0607 *** (0.0103)	0.0520 *** (0.0101)	0.0478 *** (0.0089)	0.0502 *** (0.0088)

Eng., Mfc and Construction	0.1024 ***	0.1034 ***	0.0497 ***	0.0861 ***	0.0876 ***
	(0.0095)	(0.0091)	(0.0091)	(0.0081)	(0.0080)
Agriculture and Veterinary	0.1461 ***	0.1966 ***	0.1682 ***	0.0990 ***	0.1012 ***
	(0.0147)	(0.0144)	(0.0143)	(0.0122)	(0.0120)
Health and Welfare	0.3712 ***	0.4002 ***	0.4332 ***	0.1072 ***	0.1114 ***
	(0.0098)	(0.0095)	(0.0095)	(0.0097)	(0.0096)
Services	0.0573 ***	0.0480 ***	0.0467 ***	0.1326 ***	0.1333 ***
	(0.0118)	(0.0114)	(0.0111)	(0.0100)	(0.0099)
Higher education institution (Ref group - Public HEI)					
IPTS/ IPS	-0.0046	-0.0356 ***	-0.0559 ***	0.0010	0.0007
	(0.0039)	(0.0039)	(0.0041)	(0.0035)	(0.0035)
Oversea	0.0199	-0.0555 ***	-0.0618 ***	-0.0172	0.0178
	(0.0134)	(0.0136)	(0.0133)	(0.0109)	(0.0111)
Control for state	No	No	Yes	Yes	Yes
Rural (0 = No, 1 = Yes)		-0.1818 ***	-0.1765 ***	-0.1699 ***	-0.1712 ***
		(0.0043)	(0.0042)	(0.0036)	(0.0035)
Female (0 = No, 1 = Yes)			-0.1498 ***	-0.1261 ***	-0.1301 ***
			(0.0037)	(0.0033)	(0.0032)
Ethnic (Ref group - Bumiputera)					
Chinese			0.0977 ***	0.1442 ***	0.1462 ***
			(0.0064)	(0.0056)	(0.0056)
Indian			0.0102	0.0531 ***	0.0560 ***
			(0.0086)	(0.0075)	(0.0074)
Others			-0.1351 ***	-0.1274 ***	-0.1118 ***
			(0.0235)	(0.0207)	(0.0203)
Marital status (Ref group - Single)					
Married			0.1070 ***	0.0481 ***	0.0470 ***
			(0.0045)	(0.0038)	(0.0038)
Widowed			0.0348 *	-0.0073	-0.0034
			(0.0192)	(0.0148)	(0.0146)
Divorced/Separated			0.0293 **	0.0036	0.0050
			(0.0142)	(0.0115)	(0.0113)
Occupation (Ref group - Professionals)					
Technician and Associate Prof				-0.1052 ***	-0.1192 ***
				(0.0043)	(0.0043)
Clerical Support Workers				-0.3294 ***	-0.3393 ***
				(0.0049)	(0.0048)
Service and Sales Workers				-0.3380 ***	-0.3431 ***
				(0.0058)	(0.0058)
Skilled Agricultural, Forestry, Livestock				-0.3543 ***	-0.3544 ***
				(0.0247)	(0.0246)
Craft and Related Trades Workers				-0.3492 ***	-0.3534 ***
				(0.0073)	(0.0073)
Plant and Machine Operators and Ass.				-0.4836 ***	-0.5229 ***
				(0.0065)	(0.0068)
Elementary Occupations				-0.4640 ***	-0.4880 ***

					(0.0088)	(0.0089)
Industry (Ref group - Agri, Forestry and Fishing)						
Mining and Quarrying					0.5382 ***	0.5443 ***
					(0.0225)	(0.0223)
Manufacturing					0.0118	0.0216
					(0.0148)	(0.0145)
Electricity, Gas, Steam and Air Conditioner					0.2892 ***	0.2975 ***
					(0.0198)	(0.0198)
Water Supply; Sewerage, Waste Management					0.0687 ***	0.0733 ***
					(0.0208)	(0.0207)
Construction					-0.0207	-0.0123
					(0.0157)	(0.0154)
Wholesale and Retail Trade; Repair of Machine					-0.0738 ***	-0.0694 ***
					(0.0151)	(0.0148)
Transportation and Storage					0.1110 ***	0.1238 ***
					(0.0165)	(0.0161)
Accomm. and Food Service Activities					-0.0777 ***	-0.0723 ***
					(0.0162)	(0.0158)
Information and Communication					0.1088 ***	0.1117 ***
					(0.0173)	(0.0171)
Financial & Insurance/Takaful Activities					0.1489 ***	0.1542 ***
					(0.0163)	(0.0159)
Real Estate Activities					0.1472 ***	0.1531 ***
					(0.0228)	(0.0225)
Professional, Scientific and Technical					0.0690 ***	0.0759 ***
					(0.0163)	(0.0160)
Admin. and Support Service Activities					-0.0444 **	-0.0366 **
					(0.0164)	(0.0161)
Public Admin. and Defence; Comp					-0.1007 ***	-0.1052 ***
					(0.0166)	(0.0163)
Education					-0.1399 ***	-0.1441 ***
					(0.0168)	(0.0165)
Human Health & Social Work Activities					0.0231	0.0216
					(0.0170)	(0.0166)
Arts, Entertainment and Recreation					-0.0430	-0.0389
					(0.0272)	(0.0269)
Other Service Activities					-0.0610 **	-0.0474 **
					(0.0187)	(0.0184)
Private Empl (0 = No, 1 = Yes)					-0.5107 ***	-0.5193 ***
					(0.0080)	(0.0079)
Control For Year Fixed Effect	No	No	No	No	No	Yes
Cons	4.9092 ***	5.0041 ***	5.4937 ***	5.8981 ***	8.0372 ***	8.0734 ***
	(0.0233)	(0.0299)	(0.0305)	(0.0325)	(0.0377)	(0.0375)

N	97,792	79,302	79,302	79,302	79,302	79,302
R-square	0.2726	0.3109	0.3538	0.3729	0.5575	0.5655
Adjusted R-sq	0.2726	0.3108	0.3535	0.3726	0.5572	0.5651
Log-likelihood	-	-	-	-	-	-
	69548.7	53587.4	51040.6	49850.2	36022.7	35303.5

Robust standard error in parenthesis

*, **, and *** denote significant at 0.1, 0.05 and 0.01, respectively

Model 1 serves as the base model and controls for individual human capital endowment, namely education and work experience (proxied by age). The R-squared value of 0.2726 shows that education and experience together explain about 27% of the variation in income among TVET graduates. The results show that the coefficient for diploma qualification is 0.227 and statistically significant at 0.01, suggesting that diploma holders earn approximately 25.5% ($e^{0.2272}-1$) higher income than those with certificate qualifications after accounting for individual human capital. Both the coefficients for age and the square of age are significant at 0.01 each, indicating that income rises with experience but at a diminishing rate as workers age. In particular, each additional year of age is associated with a 9.9% ($e^{0.0947}-1$) increase in income, while the age squared coefficient -0.0009 shows that the rate of income growth decreases as workers become older. This baseline finding demonstrates a strong return to diploma-level vocational education, reflecting the economic advantage associated with higher technical qualifications

Model 2 extends the analysis by including the field of study and type of higher education institution. The coefficient for diploma qualification declines to 0.180, remaining strongly significant at the 0.01 level. In particular, diploma holders earn a 19.7% ($e^{0.1800}-1$) higher income than certificate holders. The decline in the coefficient suggests that some of the returns in Model 1 were due to diploma holders' concentration in higher-paying technical fields. Relative to the reference category (Humanities and Arts), graduates in Health and Welfare fields earn approximately 44.9% higher income, followed by Agriculture and Veterinary (15.7% higher), Engineering, Manufacturing and Construction (10.8% higher), Science, Mathematics, and Computing (8.2% higher), Social Sciences, Business, and Law (6.3% higher), and Services (5.9% higher), all of which are statistically significant at the 0.01 level. The type of HEI, whether public, private, or overseas, is not statistically significant. The model's explanatory power increases to $R^2 = 0.3109$ (adjusted $R^2 = 0.3104$), signifying that the inclusion of educational field variables explains an additional 4% of income variation.

In Model 3, geographical factors are introduced, including state of employment and urban-rural strata. The coefficient for diploma qualification further decreases to 0.1597 and is statistically significant at the 0.01 level. This corresponds to an estimated 17.3% income advantage for diploma holders relative to certificate holders. This attenuation reflects the role of locational differences in influencing wage outcomes. The explanatory power of the model increases to $R^2 = 0.3538$ (adjusted $R^2 = 0.3528$), confirming that spatial heterogeneity contributes meaningfully to income disparities among TVET graduates.

Model 4 incorporates demographic characteristics such as gender, ethnicity, and marital status. The coefficient for diploma qualification increases slightly to 0.175, suggesting that controlling for demographic differences uncovers a clearer education effect. Female workers earn about 14 to 15% less than males, while Chinese workers earn around 9.8% more than Bumiputera and Indian workers show no significant difference. Married individuals earn higher income than

unmarried individuals, reflecting experience and stability effects. The R-squared value of 0.3729 indicates that demographic factors modestly improve the model's explanatory power. Model 5 adds job-related characteristics including occupation, industry, and sector of employment. Once these factors are controlled, the diploma coefficient declines to 0.081, indicating that much of the earlier income advantage is linked to occupational and sectoral sorting. Diploma holders are more likely to work in professional or technical occupations that offer higher pay. Workers in the private sector earn around 40% less than those in the public sector, while the highest-paying industries include finance, information and communication, and utilities. The model fit improves substantially to an R-squared of 0.5575, explaining more than half of income variation.

Finally, Model 6 introduces year effects from 2018 to 2023 to account for temporal changes in income. The inclusion of these variables further increases the model's explanatory power to an R-squared of 0.5655 and an adjusted R-squared of 0.5632. The coefficient for diploma qualification slightly declines to 0.0757, showing that after accounting for time effects, diploma holders still earn approximately 7.9% higher income than certificate holders.

In summary, the results presented in Model 1 to Model 6 demonstrate that the income premium associated with diploma qualifications decreases progressively from 25.5% in the baseline model to about 7.9% after full adjustments. This decline reflects that much of the initial advantage is attributable to factors such as field specialization, geographic concentration, and job characteristics rather than education alone. Nevertheless, a significant wage premium remains even after controlling for all observed factors, confirming that diploma-level vocational and technical education continues to yield meaningful economic returns in Malaysia. The findings also reveal persistent wage gaps related to gender, region, and employment sector, suggesting that policies should focus on reducing inequality while strengthening the alignment between vocational education and high-value industries to maximise the benefits of TVET qualifications.

Meanwhile, Table 3 provides analysis of the rate of returns to TVET education by gender across Model 7 to Model 9. The models provide a comprehensive examination of wage determinants and the returns to TVET and vocational education by gender. The overall model performance shows that gender-disaggregated estimations yield meaningful insights into the structure of earnings among Malaysian graduates. For male respondents (Model 7), the model explains approximately 53% of the variation in log monthly income, indicating that about half of men's wage differences can be attributed to measurable factors such as education, occupation, industry, and geography. In contrast, the female model (Model 8) records a higher explanatory power of about 63%, suggesting that women's income patterns are more closely tied to observable characteristics, possibly due to a more structured and formalised wage-setting process in sectors where women predominate. When both genders are pooled together in Model 9 with interaction terms for male qualification effects, the explanatory power stands at roughly 57%. This intermediate level of fit implies that when gender interactions are included, part of the heterogeneity within each group is captured, but substantial unobserved gender-related factors remain.

Table 3: Returns to TVET Education By Gender

Log monthly income	Model 7	Model 8	Model 9
	Male	Female	Interaction
Diploma (0 = No, 1 = Yes)	0.0652 *** (0.0046)	0.1159 *** (0.0058)	0.2395 *** (0.0061)
Interaction term: male#diploma			
Male#diploma			0.1204 *** (0.0034)
Male#certificate			0.1834 *** (0.0068)
Age	0.0370 *** (0.0018)	0.0378 *** (0.0019)	0.0388 *** (0.0013)
Agesqr	-0.0003 *** (0.0000)	-0.0003 *** (0.0000)	-0.0003 *** (0.0000)
Field of study (Ref group - Humanities and Arts)			
Social sciences, Business and Law	0.1102 *** (0.0118)	0.0533 *** (0.0109)	0.0794 *** (0.0080)
Science, Math and Computing	0.0796 *** (0.0124)	0.0219 * (0.0123)	0.0497 *** (0.0088)
Eng., Mfc and Construction	0.1028 *** (0.0112)	0.0647 *** (0.0117)	0.0844 *** (0.0080)
Agriculture and Veterinary	0.1275 *** (0.0160)	0.0688 *** (0.0187)	0.1002 *** (0.0120)
Health and Welfare	0.1168 *** (0.0148)	0.0940 *** (0.0127)	0.1091 *** (0.0096)
Services	0.1931 *** (0.0143)	0.0683 *** (0.0133)	0.1332 *** (0.0099)
Higher education institution (Ref group - Public HEI)			
IPTS/ IPS	0.0060 (0.0050)	-0.0032 (0.0047)	0.0008 (0.0035)
Oversea	0.0865 *** (0.0198)	0.0028 (0.0128)	0.0188 * (0.0110)
Control for States	Yes	Yes	Yes
Rural (0 = No, 1 = Yes)	-0.1734 *** (0.0049)	-0.1686 *** (0.0050)	-0.1710 *** (0.0035)
Ethnic (Ref group - Bumiputera)			
Chinese	0.1471 *** (0.0081)	0.1558 *** (0.0077)	0.1471 *** (0.0056)
Indian	0.0507 *** (0.0104)	0.0599 *** (0.0104)	0.0569 *** (0.0074)
Others	-0.1191 *** (0.0309)	-0.0918 *** (0.0259)	-0.1108 *** (0.0203)
Marital status (Ref group - Single)			
Married	0.0856 *** (0.0055)	0.0063 (0.0051)	0.0470 *** (0.0038)
Widowed	0.0335 (0.0252)	-0.0220 (0.0173)	-0.0022 (0.0146)
Divorced/Separated	0.0283 (0.0243)	-0.0253 ** (0.0126)	0.0050 (0.0113)
Occupation (Ref group - Professionals)			
Technician and Associate Prof	-0.1271 *** (0.0062)	-0.1413 *** (0.0062)	-0.1192 *** (0.0043)
Clerical Support Workers	-0.3613 *** (0.0084)	-0.3433 *** (0.0059)	-0.3398 *** (0.0048)
Service and Sales Workers	-0.3165 *** (0.0081)	-0.3797 *** (0.0082)	-0.3434 *** (0.0058)
Skilled Agricultural, Forestry, Livestock	-0.3116 *** (0.0288)	-0.5373 *** (0.0494)	-0.3564 *** (0.0246)
Craft and Related Trades Workers	-0.3601 ***	-0.3510 ***	-0.3580 ***

		(0.0088)	(0.0201)	(0.0074)
Plant and Machine Operators and Ass.		-0.4848 ***	-0.6282 ***	-0.5242 ***
		(0.0090)	(0.0106)	(0.0068)
Elementary Occupations		-0.4842 ***	-0.4791 ***	-0.4902 ***
		(0.0106)	(0.0184)	(0.0089)
Control for Industry	Yes	Yes	Yes	Yes
Private Empl (0 = No, 1 = Yes)		-0.3232 ***	-0.6092 ***	-0.5201 ***
		(0.0155)	(0.0091)	(0.0079)
Year (Ref group - 2018)				
	2019	0.0560 ***	0.0512 ***	0.0547 ***
		(0.0064)	(0.0064)	(0.0046)
	2020	-0.0297 ***	-0.0226 ***	-0.0262 ***
		(0.0065)	(0.0064)	(0.0046)
	2021	-0.0215 ***	-0.0005	-0.0174 ***
		(0.0064)	(0.0063)	(0.0046)
	2022	0.0532 ***	0.0342 ***	0.0411 ***
		(0.0065)	(0.0071)	(0.0048)
	2023	0.0300 ***	0.2328 ***	0.1236 ***
		(0.0078)	(0.0067)	(0.0052)
Cons		7.8159 ***	8.1983 ***	8.0071 ***
		(0.0513)	(0.0480)	(0.0348)
N		42440	36862	79302
R-square		0.5307	0.6314	0.5659
Adjusted R-sq		0.53	0.6308	0.5655
Log-likelihood		-20337.2	-13516.2	-35267.3

Robust standard error in bracket

*, **, and *** denote significant at 0.1, 0.05 and 0.01 respectively

The overall wage structure across all models aligns with conventional human-capital theory. The positive and concave relationship between age and income, evidenced by positive coefficients for age and negative coefficients for age squared, confirms that earnings rise with work experience but at a decreasing rate. The similarity of this pattern across male and female models indicates that both genders accumulate productivity at comparable rates over the life cycle. The constant terms suggest baseline monthly earnings between RM 2,500 and RM 3,600, which corresponds to entry-to mid-career levels for vocational graduates. This serves as the benchmark from which additional premiums associated with qualifications, occupational categories, or industries are derived.

The most important finding concerns the returns to diploma-level qualifications relative to certificate-level education. The coefficients for the diploma variable are positive and statistically significant in all models, confirming that higher levels of TVET education lead to higher earnings. For men, holding a diploma is associated with an average wage premium of about 6.7% compared with certificate holders, while for women, the estimated premium is 12.3%. In the pooled interaction model, the base effect of a diploma (representing female workers) implies a 27% income advantage, whereas the additional interaction effect for men (Male#Diploma) contributes another 13%. Taken together, male diploma holders enjoy an overall wage premium of approximately 43%. This difference suggests that although both men and women benefit from diploma-level qualifications, men's earnings gains are larger once occupational and industrial placements are considered. Such differences likely reflect the concentration of men in higher-paying technical and industrial sectors, while women remain overrepresented in service or clerical occupations where skill premiums are smaller. Moreover, the significant positive interaction term for Male#Certificate indicates that even at the certificate level, men earn about 18% more than women, demonstrating the persistence of gender-based wage differentials even within equivalent qualification categories.

Differences in field of study further contribute to wage variation. Compared with the humanities and arts as the reference field, all other disciplines yield positive and significant effects on income. The highest returns are found in engineering, manufacturing, and construction, as well as in agriculture and veterinary studies, where the estimated wage premiums range from 8 to 13%. These fields tend to favour male graduates, reflecting their stronger presence in industrial and technical sectors. Health and welfare-related programmes, by contrast, provide balanced gains for both genders, consistent with the structured pay scales in the health sector. Social sciences, business, and law fields offer high returns for men but considerably smaller gains for women, while service-related studies display a similar pattern. These findings highlight that occupational and industrial gender segregation shapes the translation of educational fields into earnings outcomes.

Institutional characteristics also play a limited role. The results show no statistically significant difference in earnings between graduates of public and private higher-education institutions, suggesting that institutional ownership does not influence labour-market returns once other variables are controlled. Graduates who studied overseas, however, record significantly higher earnings, particularly among men, who gain about 8.6% more than their locally educated counterparts. For women, the overseas effect is negligible, possibly due to lower recognition of foreign vocational qualifications or constrained access to high-paying positions upon returning to Malaysia.

Regional and locational effects are substantial and statistically robust. Across all specifications, working in rural areas imposes a consistent penalty of about 17%, even after controlling for education, occupation, and other characteristics. These results confirm that regional disparities remain an important dimension of income inequality among TVET graduates. Ethnic wage differentials remain evident after controlling for education and occupation. Chinese graduates earn, on average, 15% more than Bumiputera, while Indian graduates enjoy a smaller premium of around 5 to 6%. Workers from other ethnic groups record significantly lower earnings. These differences persist across male and female samples, indicating that ethnicity continues to influence labour-market outcomes through channels such as firm ownership, occupational networks, or sectoral concentration. Marital status exhibits contrasting gender effects. Being married is associated with an 8.6% increase in earnings for men but has no statistically significant effect for women. The male wage premium likely reflects employers' perceptions of married men as more stable or committed workers, or it may capture productivity differences linked to household division of labour. The absence of a similar benefit for women suggests that family responsibilities do not translate into higher income and may, in some cases, constrain work intensity or mobility. This gender asymmetry is consistent with sociological evidence on household roles in Malaysia.

The occupational category is one of the strongest determinants of income in all models. Relative to professionals, technicians and associate professionals earn about 12 to 14% less, clerical and service workers about 35% less, and machine operators and elementary workers up to 50 to 63% less. The magnitude of these penalties is consistently larger for women, demonstrating that female TVET graduates are concentrated in the lowest-paying occupations. The wage hierarchy reinforces the argument that occupational mobility is a key mechanism through which vocational qualifications translate into higher returns. Without progression into technical or managerial positions, the financial benefits of TVET education remain constrained. Employment type and time effects offer additional insights. Working in the private sector is associated with substantially lower earnings, roughly 32% less for men (Model 7) and 61% less

for women (Model 8) than employment in the public sector. This gap implies that public-sector jobs provide greater income parity and protection, particularly for women.

The inclusion of interaction terms between gender and qualification in Model 9 reveals that men continue to benefit disproportionately from similar levels of education. The positive and significant coefficients for both Male#Diploma and Male#Certificate indicate that gender interacts strongly with educational attainment to shape earnings. Specifically, male diploma holders earn about 43% more than female certificate holders, even after extensive controls. This finding confirms that wage inequality is not merely a function of educational difference but also reflects structural and institutional factors such as occupational sorting, industry access, and gender norms—that amplify male advantages in the labour market.

Taken together, the results affirm that TVET and vocational education yield meaningful income returns for both men and women, but the magnitude of these gains is unevenly distributed. Women's wage structure is more systematically explained by measurable characteristics, yet their realised returns remain lower due to occupational concentration in low-paying sectors. Men, meanwhile, benefit more from the same qualifications owing to their presence in industries with higher productivity and stronger pay growth. These outcomes suggest that while TVET functions effectively as a mechanism for human-capital enhancement, it does not automatically guarantee gender equity in wage outcomes.

To address this imbalance, policy interventions should encourage women's participation in high-return technical and industrial fields, facilitate articulation pathways from certificate to diploma and degree levels, and incentivise private-sector firms to adopt gender-equitable pay structures. Moreover, regional wage disparities call for targeted investment in northern and rural states to promote balanced economic development. Strengthening the inclusiveness of the TVET system and ensuring that both genders can access its full wage benefits will be essential for supporting Malaysia's transition toward a high-skill, high-income economy.

The analysis of Table 2 and 3 provide a comprehensive understanding of the differences in the returns to technical and vocational education and training (TVET) in Malaysia. The models show strong explanatory power, with R-squared values ranging from 0.57 (Full specification in Model 6) to 0.63. The male model (Model 7) explains 53% of income variation, while the female model (Model 8) explains around 63%. This difference indicates that women's earnings are more closely related to observable human capital variables, whereas men's income variation is influenced more by unobserved factors such as firm-level differences and occupational mobility. These findings are consistent with earlier Malaysian evidence that men's wage differentials are more affected by industrial factors, while women's earnings are shaped by educational attainment and occupational category (Cheong, 2016).

Across all models, the coefficients for age and age squared follow the expected concave pattern, confirming that earnings increase with experience but at a decreasing rate. This finding supports the predictions of human capital theory, which suggests that the rate of return to experience diminishes as workers age (Becker, 1993). The intercept values imply baseline monthly earnings between RM 2,500 and RM 3,600, a range that aligns with early-career income for diploma and certificate holders in Malaysia (Amin, Suhaimi, & Nazuri, 2023).

The central focus of the analysis is the impact of a diploma qualification on earnings. The results show that having a diploma leads to statistically significant income advantages in all models. Among men, the premium is approximately 6.7%, while among women, it is 12.3%. In the

combined model with interaction terms (Model 9), the base effect for female diploma holders corresponds to a 27% gain, and the interaction term for males adds another 13%. Therefore, the total return for men with a diploma reaches around 43% compared to those holding only certificates. This pattern suggests that men derive more benefits from higher qualifications once sectoral and occupational structures are considered. These findings are in line with studies showing that men tend to occupy higher-paying technical occupations, while women remain concentrated in lower-paying service and administrative roles (Cheong, 2016; Rodzalan, Noor, Abdullah, & Saat, 2022). International evidence also indicates that the return to vocational education tends to be higher in technical and industrial occupations (OECD, 2018).

The variation across fields of study further reinforces the differentiated impact of TVET on earnings. Compared to the humanities and arts, the disciplines of engineering, manufacturing, and construction offer higher income premiums, ranging from 8 to 13% for men and slightly lower for women. Health and welfare-related fields produce balanced benefits for both genders, while service and business disciplines tend to favour men. This outcome mirrors previous findings that gendered occupational clustering limits the translation of women's qualifications into earnings gains (Cheong, 2016; Taskinsoy, 2012).

Institutional effects reveal that graduates from public and private higher education institutions earn similar incomes once other variables are controlled. This finding is consistent with Amin et al. (2023), who reported that institutional ownership no longer influences wage outcomes in Malaysia after controlling for skill level and occupation. However, graduates who studied overseas receive modest income premiums, especially in the Southern and Northern regions. This pattern reflects the perception of higher-quality training abroad, as discussed by the OECD (2018), which observed that international exposure often enhances employability but is rewarded unevenly depending on local labour-market conditions.

Ethnic wage differences remain statistically significant across all specifications. Chinese graduates earn between 9 and 17% more than Bumiputera workers, while Indian graduates experience smaller but still positive differentials. Other minority groups face income disadvantages in most regions. Marital status also influences income, with married men earning about 8% more than single men, which may reflect employer perceptions of stability or traditional gender roles (Cheong, 2016).

Occupational and industry variables are among the strongest predictors of income. Workers employed as technicians, clerical staff, and service workers earn significantly less than professionals, with wage penalties ranging from 30 to 40%. The income gap is more pronounced for women, reflecting occupational segregation. These findings mirror Rodzalan et al. (2022), who reported that TVET graduates face limited upward mobility due to under-recognition of mid-level skills. High-paying industries include mining, utilities, finance, and information technology, while education and public administration pay less due to rigid pay scales. These patterns are consistent with global studies showing that public employment offers stability but limited wage growth (OECD, 2018; UNESCO, 2016).

The analysis of employment types shows that private-sector workers earn substantially less than those in the public sector, with gaps ranging from 38 to 57%. This difference is consistent with Amin et al., 2023 (2023), who found that public-sector TVET employment provides better wage equality and job security. Temporal variables show a dip in wages during 2020 and 2021, followed by a recovery from 2022 onward. The particularly strong wage rebound for women in

2023 suggests that policy efforts under the Ekonomi Madani initiative may have improved female labour participation and income levels (Amin et al., 2023).

In summary, the results confirm that TVET education plays a critical role in shaping wage outcomes in Malaysia. The findings are consistent with global research showing that vocational education provides positive but uneven returns depending on gender, sector, and geography (UNESCO, 2016; OECD, 2018). Men continue to receive higher incremental benefits from identical qualifications, and regional wage gaps remain substantial. Policy responses should focus on reducing these disparities through targeted skill development initiatives, regional industrial diversification, and gender-sensitive employment policies. Strengthening partnerships between TVET institutions and local industries, particularly in underdeveloped regions, would help enhance the inclusivity and efficiency of Malaysia's human-capital system (Rodzalan et al., 2022; Yunus, 2023; Amin et al., 2023).

Conclusions

The analysis of Malaysia's Salaries and Wages Survey (SWS) 2018–2023 shows that technical and vocational education and training (TVET) credentials have clear, but heterogeneous, labour-market payoffs. In all models, holding a diploma rather than a certificate is associated with a statistically significant earnings premium, with the size of the premium ranging from about 5.3% in East Malaysia up to around 10.5% in the Southern region. When gender interactions are considered, male diploma holders enjoy an overall gain of roughly 43% relative to male certificate holders, while female diploma holders obtain an average gain of about 27%. These results confirm a substantial return to higher-level TVET qualifications but also reveal gender disparities in how that premium is realised.

Returns vary markedly by location and industry. The Southern and East Coast regions exhibit the strongest diploma advantages, whereas East Malaysia shows a modest additional premium only when interactions are included. Regions with concentrated manufacturing and logistics activity, such as Johor and Melaka, deliver higher payoffs, while rural areas and northern/east-coast states face wage deficits of between 17% and 27%. Wage differences persist across ethnic groups: Chinese TVET graduates earn 9–17 % more than Bumiputera workers, while other minorities often earn less. Sectoral and occupational structure also matter; high-paying industries such as mining, utilities, finance and ICT reward TVET skills, but clerical and service occupations impose penalties of 30–40%. Public-sector employment remains a major source of wage stability and equality, offering pay that is 38–57% higher than private-sector jobs.

The findings align with human-capital theory, signalling and job-matching frameworks by showing that the wage benefits of TVET depend not only on the credential itself but also on where and how graduates are employed. Returns are highest when TVET graduates work in technical fields such as engineering, manufacturing, construction, agriculture and health services. Yet, gendered occupational segregation and limited recognition of mid-level skills restrict women's earnings and hamper upward mobility. Persistent regional and ethnic wage gaps highlight structural imbalances in Malaysia's labour market, confirming that skill acquisition alone cannot fully overcome spatial and social inequalities.

Overall, the study demonstrates that TVET plays a significant role in raising incomes in Malaysia, especially when graduates obtain diploma qualifications and find work in high-demand sectors. Policymakers should therefore continue expanding diploma-level TVET

programmes, strengthen linkages between training providers and regional industries, and focus on fields with demonstrated wage premiums. At the same time, reducing regional disparities requires targeted investment in industrial diversification, digital infrastructure and urban services in lagging areas. Addressing gender and ethnic wage gaps will also be essential; this may involve promoting women's participation in technical occupations, ensuring equal recognition of mid-level skills, and implementing inclusive hiring and promotion practices. By aligning training supply with local demand and tackling structural barriers, Malaysia can maximise the economic returns to its TVET system and support more inclusive growth.

Acknowledgement

The authors gratefully acknowledge the Research Management and Innovation Centre (RMIC) for financing this study through the Geran Penyelidikan Komprehensif Universiti (GPKU) (Project Code: 2024-0046-106-01). The views and interpretations expressed in this article are solely those of the authors and do not necessarily reflect the views of RMIC.

References

- Abdul Samad Bin Mat Isa. (2004). Prospek Pelaburan Pendidikan Sekolah Menengah Teknik dan Sekolah Menengah Kebangsaan di Malaysia. Universiti Sains Malaysia.
- Amin, S. M., Suhaimi, S. A., & Nazuri, N. S. (2023). The present and future of Malaysian technical and vocational education and training (TVET). *International Journal of Academic Research in Business and Social Sciences*, 13(18), 107–117.
- Arrow, K. J. (1973). Higher education as a filter. *Journal of Public Economics*, 2(3), 193 to 216. ScienceDirect
- Arshad, M. N. M. (2016). Return to education by ethnicity: A case of Malaysia. *International Journal of Economics and Management*, 10(1), 141–154.
- Azri Said. (2024). Kualiti dan kebolehpasaran graduan kolej vokasional: Satu kajian kes. *International Journal of Future Education and Advances*, 1(1).
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. National Bureau of Economic Research.
- Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). Chicago: University of Chicago Press.
- Buang, Z., Mohamad, M. M., Ahmad, A., & Yuniarti, N. (2020). The earnings and employment of community colleges' graduates: Occupational field and gender analysis. *Jurnal Pendidikan Teknologi dan Kejuruan*, 26(1), 11–17.
- Chellapan, K., & Kenayathulla, H. B. (2019). Pendapatan graduan TVET institusi latihan Kementerian Belia dan Sukan Malaysia. *Jurnal Kepimpinan Pendidikan*, 6(2), 82–97.
- Chellapan, K., & Kenayathulla, H. B. (2021). Returns to education for Malaysian ILKBS graduates. *Malaysian Online Journal of Educational Management*, 9(1), 77–89.
- Chellapan, K., & Mokhzan, N. S. (2024). Analisis kadar pulangan pendidikan TVET mengikut jantina dalam kalangan graduan ILKBS. *Asia Pacific Journal of Youth Studies*, 15(2), 151–178.
- Cheong, K.-C., & Lee, K.-H. (2016). Malaysia's education crisis—Can TVET help? *Malaysian Journal of Economic Studies*, 53(1), 115–134.
- Darmanti, W., & Suhartini, R. (2025). The impact of entrepreneurial knowledge on entrepreneurial readiness. International Seminar, UNITA.
- Dickens, W. T., & Lang, K. (1985). A test of dual labor market theory. *American Economic Review*, 75(4), 792 to 805. IDEAS/RePEc
- Doeringer, P. B., & Piore, M. J. (1971). Internal labor markets and manpower analysis. D. C. Heath. Industrial Relations Section
- Hanushek, E. A., Schwerdt, G., Woessmann, L., & Zhang, L. (2017). General education, vocational education, and labor market outcomes over the life cycle. *Journal of Human Resources*, 52(1), 48 to 87. Journal of Human Resources
- Harun, J., & Gwee, C. C. (2025). Impact of family income, academic performance, and study challenges on employment outcomes of 2023–2024 Politeknik Merlimau Melaka graduates. *Journal of Technical and Vocational Education*, 10(2), 289–296
- Jovanovic, B. (1979). Job matching and the theory of turnover. *Journal of Political Economy*, 87(5), 972 to 990. Chicago Journals
- Kenayathulla, H. B. (2013). Higher levels of education for higher private returns: New evidence from Malaysia. *International Journal of Educational Development*, 33(4), 380–393.
- Lazear, E. P. (2009). Firm specific human capital: A skill weights approach. *Journal of Political Economy*, 117(5), 914 to 940. IDEAS/RePEc
- Mincer, J. A. (1974). Schooling, experience, and earnings. National Bureau of Economic Research. NBER

- Mortensen, D. T., & Pissarides, C. A. (1994). Job creation and job destruction in the theory of unemployment. *Review of Economic Studies*, 61(3), 397 to 415. OUP Academic
- Natasha Dora Muridan, Mohamad Sattar Rasul, & Ruhizan Mohd Yasin. (2017). Isu dan cabaran usahawan graduan teknikal dan vokasional dalam mencapai komuniti berpendapatan tinggi. *International Research Journal of Education and Sciences*, 1(Special Issue 1), 30–47.
- OECD. (2018). The role of technical and vocational education and training (TVET) in fostering inclusive growth at the local level in Southeast Asia. *OECD Local Economic and Employment Development (LEED) Papers* 2018/01.
- Peng, C. Y. (2022). Public-sector wage structure and TVET employment outcomes in Malaysia. *Asian Economic Policy Review*, 17(3), 351–372.
- Raze Norshyahman Shahril. (2015). Terlebih pendidikan dan inflasi pendidikan dalam sektor awam di Putrajaya. *International Journal of Business, Economics and Law*, 8(3), 40–46.
- Reich, M., Gordon, D. M., & Edwards, R. C. (1973). A theory of labor market segmentation. *American Economic Review*, 63(2), 359 to 365. EconPapers
- Rodzalan, S. A., Mohd Noor, N. N., Abdullah, N. H., & Mohamed Saat, M. (2022). TVET skills gap analysis in electrical and electronic industry: Perspectives from academicians and industry players. *Journal of Technical Education and Training*, 14(1), 158–177. <https://doi.org/10.30880/jtet.2022.14.01.014>.
- Saharawati Shahrar. (2008). The rate of return to investment in education: A case study of polytechnic diploma graduates (Master's thesis). Universiti Sains Malaysia.
- Sattinger, M. (1993). Assignment models of the distribution of earnings. *Journal of Economic Literature*, 31(2), 831 to 880. IDEAS/RePEc
- Schultz, T. W. (1961). Investment in human capital. *American Economic Review*, 51(1), 1 to 17. JSTOR
- Spence, M. (1973). Job market signaling. *Quarterly Journal of Economics*, 87(3), 355 to 374. OUP Academic
- Taskinsoy, J. (2012). The return of investment on tertiary education in Malaysia. *Journal of Education and Vocational Research*, 3(6), 183–192.
- Tham Sook Fan, Ishak Yussof, & Rahmah Ismail. (2013). Pulangan pendidikan antara generasi di Malaysia. *Jurnal Ekonomi Malaysia*, 47(1), 41–52.
- UNESCO. (2016). Strategy for technical and vocational education and training (TVET) (2016–2021). Paris: UNESCO.