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ECONOMIC RETURN TO INVESTMENT IN EDUCATION AND TVET MICRO AND MACRO PERSPECTIVES



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ACRONYMS AND ABBREVIATIONS

AGR	Agriculture, except cassava, livestock, forestry, and fish
CAP	Capital
CAS	Cassava
CGE	Computable General Equilibrium
COMTY	Other Community Service Activities
CON	Construction Sector
CPC	Central Product Classification
CSES	Cambodian Social-Economic Survey
ELEC	Electricity, Gas, and Water Supply
FEL	Fairly Educated Labour
FIN	Financial intermediation industry
FIRM	Firm
FISH	Fishing, Aquaculture, and Service Activities Incidental to Fishing
FOOD	Food products, beverages and tobacco
FOREST	Forestry
GHE	General higher education
GVT	Government
HEALTH	Health and Social Work
HEL	Highly Educated Labour
HHPP	Household Phnom Penh
HHRR	Household Other Rural
HHUB	Household Other Urban
HOTEL	Hotels and Restaurants
ILO	International Labour Organization
INV	Savings
IO Table	Input-Output Table
ISIC	International Standard Industrial Classification
Kedu	Education Capital
LAND	Land
LEL	Low Educated Labour
LSTOK	Livestock and poultry
MANU	Manufacturing

METAL	Metal products, machinery and equipment
MQ	Mining and Quarrying
NGO	Non-Governmental Organization
NIS	National Institute of Statistics
NTVET	Non-Technical and Vocational Education and Training
OSERV	Other Services, n.e.c.
PUB	Public Administration and Defence
PUB	Public Administration and Compulsory Social Security Services
RESTAT	Real estate, renting and business activities
RGC	Royal Government of Cambodia
ROW	Rest of the World
SAM	Social Accounting Matrix
SUT	Supply-Use Table
TD	Direct tax
TEXTILE	Textiles, apparel and leather products
TGOODS	Other transportable goods, except metal products, machinery and equipment
TI	Indirect Tax
TM	Import duty
TRAD	Distributive trade services; accommodation, food and beverage serving services; transport services; and electricity, gas and water services; and electricity, gas and water distribution services
TRANS	Transport, Storage and Communications
TVET	Technical and Vocational Education and Training
TVETPOST	TVET Post-Secondary School Labour
TVETPRE	TVET Presecondary School Labour
VSTK	Change in stocks
WSAL	Wholesale and Retail Trade; and Repair of Motor Vehicles



EXECUTIVE SUMMARY

This study is a part of the UN Joint Programme through which the UNDP seeks to examine the relationship between the economic/monetary returns of investments in education and technical vocational education and training (TVET) at individual, household and national levels. The overall objectives of the study are (1) to estimate the rate of return at the individual, household and national level, of investment in education and trainings, and in empowering programmes for urban and rural youth in Cambodia, and (2) to identify areas for programmes and policy interventions to improve, and to upgrade and expand relevant skills trainings and empowerment programmes/schemes for young men and women in urban and rural Cambodia. The research findings and policy options are expected to benefit young men and women in urban and rural areas, particularly youth who seek meaningful and decent employment in sustainable enterprises. The target audience of the research are the key government policymakers including MoEYS, MoLVT, MoIH, and other relevant ministries and stakeholders including employers, trainers, and youth.

To address the study's objectives, a mix-method design was used, incorporating both micro and macro approaches. To assess the micro perspective, an econometric analysis was employed to estimate the returns of individual investment in TVET, supported by a qualitative analysis. For the macro perspective, a computable general equilibrium (CGE) model was used to identify the net returns to investment in education and/or training for the economy as a whole.

Using a microeconomic approach, we observed the following:

- ❖ Summary statistics shows that TVET graduates earn on average US\$323 per month—US\$221 for

Certificate Level 1 (C1), US\$240 for Certificate Level 2 (C2), US\$296 for an Associate Degree (AD), and US\$402 for a Bachelor Degree. Those with general higher education earn an average of US\$395 per month—US\$300 for an Associate Degree and US\$426 for a Bachelor Degree. Graduates with a bachelor in civil engineering command the highest monthly wages (US\$467 for TVET; US\$573 for GHE)—followed by electricity (US\$429 for TVET; US\$509 for GHE) and information technology (US\$376 for TVET; US\$434 for GHE).

- ❖ The regression analysis shows no statistically significant wage differences between TVET and GHE graduates—implying that GHE graduates command little wage premium. The wage differential is observed only among graduates with a bachelor in civil engineering, having TVET graduates earning wages 23.6 percent less than that of those with general higher education. TVET graduates, nonetheless, seem to perform better in their school-to-work transition in terms of high propensities of obtaining a job immediately after graduation.
- ❖ TVET graduates with an associate degree perform relatively better in almost all measured labour market outcomes compared to those of GHE with the same degree. The former earns 16.5 percent more in wage earnings and are 37.0 percent more likely to get a job immediately after graduation.
- ❖ A graduate's major is crucial in determining the economic benefits of TVET in comparison to those of GHE. This is highlighted through the lack of statistically significant differences in wage earnings between TVET and GHE graduates

specializing in accounting and finance or banking and finance. Thus, vocational education and training could be beneficial only for particular specializations, indicating that wholesale reform or applying of one-size-fits-all policies does not address neither the skills shortage nor the mismatch.

- ❖ Within TVET, graduates of Certificate Levels 1 and 2 (C1 and C2) perform relatively poorly in all measured labour market outcomes in comparison to graduates with associate or bachelor degrees. In absolute terms, they earn low monthly wages/salaries—roughly US\$230 per month. The earned amount is comparable to that of an average garment and footwear worker (with no or little education) earning a minimum wage of US\$182 per month plus other benefits—amounting to a minimum of US\$199-210 per month. The National Employment Agency (2018) reported a maximum monthly salary of US\$267 in 2018 for an average garment, footwear or textile worker.
- ❖ English language ability and competence remains an issue for TVET students, further constraining them in academic and career advancement and, more importantly, in career flexibility.
- ❖ Self-employment is low and independent to degree type, implying that TVET and GHE graduation does not necessarily lead to a high probability of one starting a business. There is however, indicative but inconclusive, evidence that TVET graduates have a higher probability of being self-employed than GHE graduates.
- ❖ A higher probability of students who are good at mathematics choose university education rather than technical and vocational education.
- ❖ Rural-urban earning gaps exist between students attending university/institution based in Phnom Penh.
- ❖ Girls are less likely to go into STEM majors (electricity, civil engineering and information technology) implying that gender wage gaps might persist or even widen in the future with the likelihood of STEM courses and jobs being increasingly encouraged and in demand.

A qualitative analysis provides the following findings:

- ❖ Position of TVET graduates in the labour market and their skills: The position of TVET graduates in the labour market is generally promising. In addition, their skills are perceived to be in high demand over the next five years. Their market entrance is relatively less competitive and complicated than that of university graduates. As a result, they have a better chance of securing the jobs that are most suited to their graduate skills. The private sector has played a key role in facilitating the transitioning of TVET graduates into the labour market, through internship opportunities and additional skills advancement activities in the workplace. Although their entrance into the job market is relatively easy, their career advancement is somewhat challenging due to their lack of necessary skills.

Incentives and motivations of TVET and university graduates to skills valuation: Although still struggling with common negative stereotypes, technical skills are evidently valued, to some extent, among job seekers due to the growing demands for the skills and perceived entrepreneurial opportunities. Graduates have been motivated to value these skills by a number of factors such as the economic return of obtained technical skills, passions, childhood interests and future plans. The experiences of graduates also offers a glimpse into how and where to speak to the heart of the potential young students and parents.

- ❖ Effectiveness of TVET initiatives to promote youth employability: Initiatives have been put in place to improve TVET graduates' employability, based on interviews with TVETs. There is some debate over the effectiveness of these initiatives, however, due to key constraints such as the implementation of the reported initiatives seeming to progress slowly, especially at the provincial level. The practical industrial experience of the trainers and their classroom facilitating skills have been slightly improved. In general, capacity-building opportunities for TVET trainers have increased over the years. However, the frequency, duration, rotation and nature of the training provided have yet to meet the TVET

trainers' expectations. There are also cases where new workshop equipment has not been fully utilized due to the lack of trainers' operating knowledge. Resource constraints with late disbursement, and low participation from the private sector have been generally cited by the interviewed participants as the main challenges in TVET development. Despite this, there seems to be little evidence suggesting any efforts in maximizing the outcomes given the resource constraint situation. Having more TVETs located near each and other offering the same courses may not be efficient given the costly operation of the TVET system and limited number of enrolled students. TVETs, especially at the provincial level, continue to face human resource challenges regarding qualifications and numbers.

Macroeconomic approach shows the following results:

- ❖ Using a standard static CGE model based on the PEP-1-1 (Version 2.1) model with some modifications, we simulated two scenarios (1) government injects US\$10 million to the TVET sector through increased government spending on TVET such as providing of scholarships or subsidizing TVET school fees, to be financed mainly through ROW financing schemes (ODA), or (2) government injects US\$10 million to the non-TVET education sector, financed by the same source (ODA).
- ❖ The results from the two simulation scenarios in the CGE model revealed a positive impact to the economy by increasing real GDP, wage rate of labour, and household income. Injection of funds into the economy through public spending on the TVET sector produced almost the same amount of real GDP as spending on the non-TVET education sector.
- ❖ However, increased government spending on non-TVET education induces higher wage rates to the five types of labour, as well as higher household income, which leads to an increase in all sectoral price levels and higher inflation in general. The highly educated labour force benefits the most from the two simulation scenarios by obtaining the highest actual income.

Yet, the percentage change of wage rates of TVET presecondary labour and TVET postsecondary labour are the highest among the five types of labour. Households in Phnom Penh and in other urban area benefit the most from this spending through a higher percentage change in their income.

Policy conclusion and recommendations

Given the above findings and explanations, we recommend the following for policy consideration.

Degree and major segregation. 80 percent of TVET graduates who completed Certificate Level 1 or 2 return to pursue associate or bachelor degrees, indicating that the ability and skill competency gained from C1 or C2 might not be sufficient for job requirements and career advancement. Thus, the Ministry of Labour and Vocational Training might reconsider whether or not to provide C1 or C2 courses. Also, the Ministry of Education, Youth and Sport might reconsider whether or not to provide associate degrees as its GHE graduates perform relatively poorly compared to TVET graduates with the equivalent degree. The focus should therefore be on medium- and long-term TVET courses.

Quality rather than quantity. Relevant ministries may want to focus on providing a few good skills that are in demand by the market rather than trying to provide all kinds of skills. Electricity, information technology and accounting and finance are suggestions. Other estimates point to the demand for construction and hospitality skills over the next five to eight years. Given the expensive TVET operation costs in a context of resource scarcity, specializing in major skills based on their market niche may help reduce the resource allocation problem. Moreover, specialization also facilitates effective resource channelling. Maybe during this early stage of the new TVET branding, each TVET should distinctively specialize in some skills rather than offering similar skills to one another. Therefore, starting with the 39 TVETs under the Ministry of Labour and Vocational Training, all the TVETs, with close stakeholder consultations, should identify and agree on their potential specific focus for skills development.

Improving the quality of all aspects of TVETs. The administrative, managerial and technical development should be equality prioritized in every TVET development

efforts. The findings of this study support the idea of a public-private partnership (PPP) in TVET quality improvement. However, in order for such partnership models to be successful, support is needed from development partners, ministries, and the private sector such as: Ministry of Finance, Ministry of Industry and Handicraft, Ministry of Labour and Vocational Training, local and international Chambers of Commerce and/or Business Associations. There is a need to ensure that the curriculum of all TVET programmes are up-to-date and of high quality. One way to achieve this is to conduct regular private-sector consultation to understand current and future private sector demands for skills. Given that TVET institutions at provincial level perform relatively poorly in comparison to those in Phnom Penh, there is a need to focus such activity at this level.

Expediting of income diversification activities. All relevant ministries and TVETs themselves should speed up their efforts in diversifying sources of incomes for TVETs. This includes preparing TVETs to offer private, weekend and/or evening classes. On the one hand, the extra income may help ease the burden of limited and late budget disbursement, to some extent. On the other hand, it may help motivate and attract more qualified trainers to remain with the TVETs. The income diversification may require the TVET management and personnel to obtain a set of skills necessary for effectively coping with and managing this new operational setup. Given their different development stages and situations, the skill sets given to each TVET should be individually tailored to fit its specific needs. Nevertheless, all skill sets should include entrepreneurship courses.

Upgrading workshop equipment rather than campuses. In any given limited budget situation, all infrastructure development efforts should prioritize upgrading workshop equipment rather than classroom and/or campus improvement. Although some may argue that a physically appealing TVET campus would improve the image of TVETs and help attract more potential students. At the end of the day, however, quality of education being received is more important to potential students than what the campus looks like.

Basic subjects. The results show a lack of competency in mathematics and science subjects at high school level. The majority of the surveyed students do not particularly

enjoy these subjects, preferring literature and other non-STEM ones instead. They, however, acknowledge the importance of STEM subjects in achieving academic and career success. Thus, improving and strengthening teaching and learning of STEM subjects at lower and upper secondary education levels is highly recommended. In fact, this suggestion is not new and the government, particularly the Ministry of Education, Youth and Sport, has already stepped up these efforts. Findings of this study support this.

English language competency. Continue to strengthen English language competency of TVET graduates. This would call for all TVET programmes to include English language competency components.

Girls in STEM. Our results show that female graduates earn, on average, less than male graduates—TVET or GHE. Wage differential is in the range of 20.7 to 28.8 percent, according to OLS estimates. The difference is more significant by major, particularly in electricity, civil engineering and information technology. In addition to reducing workplace discrimination and cultural biases against women—which could lead to a decrease in gender wage gaps—increasing enrolment and retention of women in STEM courses is in the best interest of all relevant stakeholders and highly relevant given the rapid increase in skill-biased technologies. Understanding why girls are underrepresented in STEM subjects is also an objective of further research.

Despite the findings, a more relevant thinking for policymakers and practitioners is to provide education that allows students to adopt and adapt to the changing environment of the working world. This would demand a mixture of skill-specific subjects that equip students with the right skills needed by employers, and general ones that allow students to acquire new skills once the existing ones are obsolete. The latter is even more relevant due to the current speed of technological changes—those that affect the wages and employability of fresh graduates, as well as of the employed.

The remainder of the report is organized as follows: Section 1 is introduction. Section 2 provides labour market information in the context of Cambodia. Section 3 methodology. Section 4 Findings and discussion. Section 5 provides policy conclusion and recommendations.



1. INTRODUCTION

In Cambodia, technical and vocational education and training (TVET) seems to have become a shared interest and vision of both the government and development partners for the last couple of years. Millions of dollars from both government and development partners have been allocated to fund VET-related programs and initiatives aiming to raise awareness among pre- and post-high-school students about the importance and relevance of TVET education to the current industrial and job market needs and, to some extent, to lure students away from enrolling into college and university. This is because of the view that the skills students receive through general higher education is of little relevance to the current changing labour market and does little to address the skill mismatch. TVET (pre- and post-secondary) is and will continue to be an integral part of Cambodia's education system. Without it, as some argue, Cambodia could not achieve its vision of becoming an upper middle-income country by 2030, and high-income country by 2050. Without it, Cambodia cannot achieve what is set out in the Industrial Development Plan to fit the growing need for industrial plants for skilled labour.

In 2015, the government launched a National Policy on Technical and Vocational Education and Training (2015-2030) with four pillars—two of which focus on addressing the need to increase skilled labour and to tackle persistent skills mismatch. The government has also designated June of the year as the National TVET's Day to celebrate its importance and relevance to the national education strategy. Development partners are also supportive in providing technical and financial assistance in an effort to beef up skills development.

“Vocational education plays a crucial role in developing human resources through knowledge, skills, good work attitudes and morality, and is essential to enhancing the country's competitiveness, attracting more foreign investment, and creating new jobs. We [the government] continue to invest a significant portion of the national budget towards the development of technical vocational education and training”

said Samdech Prime Minister Hun Sen in a statement to celebrate National TVET Day (June 2018)

Technical and vocational education is even more relevant in achieving the targets set out in the Industrial Development Plan (2015-2025). Specifically, the government aims to increase the share of the industrial sector to 30 percent by 2025 from 24.1 percent in 2013, with the manufacturing sector growing from 15.5 percent in 2013 to 20 percent in 2025. This expansion would definitely require a stable supply of medium and high skilled labour. Other targets include (1) increasing exports of non-textile goods to 15 percent of total exports by 2025 while still promoting exports of processed agricultural products to reach 12 percent of total exports by the same year (2) encouraging the formal registration of 80 percent of small enterprises and 95 percent of medium enterprises and to ensure that 50 percent of small enterprises and 70 percent of medium enterprises have proper accounts and balance sheets (Royal Government of Cambodia 2015, ii).

Provision of technical and vocational education is done through a multi-stakeholder approach, with various line ministries, development partners and non-governmental organizations involved either directly or indirectly. The Ministry of Labour and Vocational Training, the responsible line ministry in the coordination and implementation of TVET policies and initiatives, and the Ministry of Education, Youth and Sports (MoEYS) are committed and forward-looking in ensuring the supply of skilled labour through technical and vocational education. Under the supervision of the Ministry of Labour and Vocational Training (MoLVT), 32, students enrolled in TVET at institutions and provincial/vocational training centres (PTC/VTC) in the 2014-2015 academic year. The number reached 39,207 in the 2016-2017 academic year, growing at an average rate of 6.2 percent per annum.

There are other technical and vocational skill providers. The Ministry of Women's Affairs (MoWA) has 12 WID centres which provide services to women in extreme poverty, most of whom are school dropouts or illiterate. NGOs operate on a very small and localized scale with few exceptions. NGOs move in and out of skills training, depending on availability of donor funds and/or donor interest. At present, there are 12 national NGOs that run institution-based skills training courses, while on-the-job training programs are provided by small, medium and large enterprises.

Despite the emphasis and enthusiasm placed on them, little is known about short- and long-term private and social benefits to technical and vocational education (absolute or relative), and that quality of TVET courses and skills have not been sufficient to meet market demands. Student enrolment has remained low relative to that of general higher education, because of the fact that high school graduates regard TVET as being second-class or second-rank education, commanding lower wages than that of general higher education. There remains a perception that TVET education is for blue-collar workers with low propensity to move up occupational ladders (Asian Development Bank 2016).

The economic returns of TVET, however, are not clear. Without credible data showing the economic return of education at both the individual and wider economy level, there is a tendency for an undervaluation of TVET. Hence, 'hard evidence' of monetary rates of return at the

individual, household, and at economy-wide levels is needed.

1.1. LITERATURE

There are two strands to the argument on the benefits of TVET school enrolment relative to those of GHE: optimism and pessimism. Krueger and Kumar (2004a, 2004b) explain the differential growth between the US and the EU in their policies that focus on enhancing general and vocational education, respectively. They find that economic growth in the EU is slower than that in the US due to the focus of EU policy on vocational education and training. They also find that vocational policies might have been beneficial for Europe in the 1960s and 1970s when technological changes were slow and not common. The policies are thus less beneficial in an era of fast-changing technological progress.

In Indonesia's case, Chen (2009) finds no statistically significant differences on labour market outcomes of TVET students compared to GHE ones. The author moreover demonstrates that attendance levels in TVET schools resulted in lower academic achievement as measured by national test scores. Using a panel dataset of 10,000 TVET students majoring in computer science in two Chinese provinces, Loyalka et al. (2016) find that: (1) students in vocational high schools and training programs perform poorer in mathematics as well as computing skills compared to those in general (academic-focused) high schools; and (2) students in vocational high schools have a higher probability of dropping out, particularly among disadvantaged students from low income backgrounds and/or with low ability. The authors conclude that the rapid expansion of TVETs at the expense of general high schools might have negative impacts on human capital development in developing countries such as China.

Oosterbeek and Webbink (2007) evaluate the economic benefits of an extra year in vocational education in the Netherlands and find that graduates who go through the extra year gain little in terms of wage increases compared to those who do not. The authors argue that an extra year in vocational education is equal to an extra year of work experience. Hanushek et al. (2017) examine the trade-off policymakers face when advocating for vocational education as opposed to general education

as a solution to a quick school-to-work transition by using data from 11 countries obtained through the International Adult Literacy Survey (IALS). The authors find that TVET graduates are more likely to be employed earlier in life, but less so at later stages, implying that they are less likely to be adaptable and flexible when it comes to their skills and employment, compared to GHE graduates. The analysis provides another set of evidence for seeking to push for TVET prematurely.

Kahyarara and Teal (2008) investigate returns to TVET education in comparison to general education in Tanzania and find that returns to TVET depend on one's level of education, implying that TVET provides relatively more returns than general education in cases of lower levels of education. Stenberg and Westerlund (2015) assess and compare the impacts of vocational and general education among the Swedish unemployed using administrative data from 1990 to 2010. They find that graduates trained in specific skills learn more in the short-run, but that the difference converges 5 to 7 years after completion of the program. Verhaest et al. (2018) confirm the trade-off between short- and long-run benefits of vocational versus general education, arguing that vocationally educated students are more likely to perform relatively better in terms of employability and with less problems of skills mismatch. Nonetheless, the authors argue that the benefits seem to fade in terms of employment flexibility and resilience in the long-term. Other studies find little, and sometimes negative, effects of TVET include Teal (2016); Hall (2016); Chabé-Ferret (2015); Cho et al. (2013); Card et al. (2011); Malamud and Pop-Eleches (2010); Fersterer, Pischke, and Winter-ebmer (2008); Meer (2007); Bertocchi and Spagat (2004); Ryan (2001).

In the Thai case, Moenjak and Worswick (2003) find that vocational education provided relatively high economic returns compared to general education and that students from 'well-to-do' families tend to enrol in TVET schools. The authors suggest improving access to TVET education given its positive benefits.

Using firm-level data from sub-Saharan Africa, Rosholm, Nielsen, and Dabalén (2007) investigate the benefits of on-the-job training on wages using matching estimators and finding statistically positive impacts of such interventions. The authors stress a relatively bigger impact from long training durations and large firms.

Evaluating a government program in Uganda to help the poor and unemployed become self-employed artisans, Blattman, Fiala, and Martinez (2014) randomly assigned young adults into treatment and control groups and provided unsupervised grants of US\$382 per member of the treatment group. The authors found that participants in the treatment group increased their business assets by 57 percent, their work hours by 17 percent and their earnings by 38 percent, compared to those in the control group.

Attanasio et al. (2011) assess the impacts of a training program for disadvantaged youth in Columbia in 2015. The authors find that the intervention positively impacts women's earnings and employment, with women in treatment groups able to earn 19.6 percent more than women with similar backgrounds who were not offered the training. The former were also found to have a higher probability (0.068) of paid employment. Vu, Hammes, and Im (2012) also find statistically significant impacts of vocational training on economic growth than of university education, arguing that vocational education provides specific skills demanded by the market, thus pushing productivity further. In Nepal, Chakravarty et al. (2019) find that vocational training participation helps to increase non-farm self-employment activities, particularly among the female population. The large and statistically significant positive effects of vocational training programs found by the authors are in contrast with findings in middle- and high-income countries.

There have also been studies employing meta-analyses to systematically synthesize empirical findings of impact evaluations on active labour market policies—from assessing the impact of in-classroom training, of on-the-job training and of a combination of both. Tripney and Hombrados (2013), for instance, conduct a meta-analysis of studies examining the impacts of TVET interventions for youth in low- and middle-income countries (LMICs). The authors find statistically significantly positive impacts of TVET, but the effect was small. The authors also argue that studies with low quality methods tend to overstate the effect size compared to those with medium quality—indicating that methods play a significant role in estimations. Card, Kluve, and Weber (2010) review 97 impact evaluation studies conducted between 1995 and 2007 and find that: (1) among active labour market policies, job search programs appeared to have 'relatively favourable' effects on labour market outcomes and (2)

training programs are beneficial in the medium-term, but less so in the short-term. Greenberg, Michalopoulos, and Robins (2003) synthesize 31 evaluations of 15 voluntary government-funded training programs in the United States between 1964 and 1998. The authors find statistically significant effects of such training on the labour market outcomes of women and men, but not of youth. The authors also point out that there is no statistical evidence that more expensive training is more effective than less expensive training. Other systematic reviews include those by Kluve et al. (2019); Card, Kluve, and Weber (2018); Grimm and Paffhausen (2015); Cho and Honorati (2014); Ibararán and Rosas Shady (2009); Card, Kluve, and Weber (2010), among others.

Empirical studies on returns to TVET in Cambodia is scarce, but Ouch (2019) and Cheng et al. (2019) provide two recent studies on the benefits of vocational training and on determinants of gender wage gaps, respectively. Ouch (2019) finds statistically positively insignificant impacts of attending hospitality training on observed labour market outcomes of disadvantaged adults. The author argues that the insignificant effects might be attributable mainly to a small sample size (120) and the short duration of training and exposure. Cheng et al. (2019) explore gender wage differentials using an extended Blinder-Oaxaca decomposition to determine observed and unobserved factors affecting the difference. Assessing the 2014 Cambodia Socio-Economic Survey, the authors find that men earn more (15 percent) on average than women, and that unobserved factors such as labour discrimination and institutional effects contribute more to gender wage gaps. Also, among the observables, education is one of the main determinants of the observed wage gaps—accounting for approximately 17 percent of the difference. While advocating for more attention of and focus on TVET, the Ministry of Education, Youth and Sport has not conducted or commissioned research studies to show social or economic benefits of TVET. Nonetheless, a report by the Ministry of Labour and Vocational Training shows that TVET graduates earn more than non-TVET ones, specifically in engineering and science-related skills. They, however, earn relatively lower than non-TVET graduates in social science skills—two common of which are accounting and finance. It should be noted that analyses of these studies are descriptive (mean difference), risking under- or over-

estimation due to potential endogeneity and self-selection of either TVET or GHE.

Taking this into account, the focus or re-focus of TVET might be dependent on a country's context and the problems each country is facing. However, three gaps can be identified from the literature. First, the empirical results are inconclusive, demanding more empirically sound studies in various contexts to draw a majority, if not consensus, and agreed-upon conclusion about the benefits of TVET relative to those of GHE. 90 percent of the reviewed literature findings indicate statistically insignificant impacts of TVET on the long-term labour market outcomes of graduates. The insignificant effects are more frequently observed in middle- and high-income countries.

Second, the observed differences in labour market outcomes between TVET and GHE graduates may be attributable to selection on observed and/or unobserved socio-economic characteristics of students, parents and geography (e.g., Oyer and Schaefer 2019; Caliendo, Mahlstedt, and Mitnik 2017)—implying that, if this is true, TVET enrolment does not have a significant impact on the knowledge and skills acquisition of its students, and does not command higher wage premiums than GHE.

Third, econometric methods used are crucial for the estimated results—two of the internally strong and valid methods are RCTs and panel-related ones such as difference-in-differences (DID) and regression discontinuity design (RDD). As Ryan (2001, 73) states: “merits of vocational curricula and work-based preparation are particularly difficult to evaluate statistically, given the potential importance of selection around unobservable, the near-absence of experimental evidence, and the paucity of prior labour market experience to use in econometric modelling”. Our study contributes, in whole or partially, to filling the knowledge gaps on these three fronts.

1.2. OBJECTIVE

This study is a part of the UN Joint Programme through which UNDP seeks to examine the relationship between the economic/monetary returns at individual, household and national levels of investments in education and

technical vocational education and training (TVET). The overall objectives of the study are:

1. to estimate the rate of return at individual, household and national level, of investment in education and training, and in empowering programmes for urban and rural youth in Cambodia; and
2. to identify areas for programmes and policy interventions aiming to improve, upgrade and expand relevant skill trainings and empowerment programmes/schemes for young men and women in urban and rural Cambodia.

The research findings and policy options are expected to benefit young men and women in urban and rural areas, particularly those who seek meaningful and decent

employment and sustainable enterprises. The target audience of the research are the key government policymakers including MoEYS, MoLVT, MoIH, other relevant ministries and stakeholders including employers, trainers, and youth.

To address the study's objectives, a mix-method design was used, incorporating both microeconomic and macroeconomic approaches. To side the microeconomic perspectives, an econometric analysis was employed to estimate the returns of individual investment in TVET, supported by a qualitative analysis. For the macroeconomic perspective, a computable general equilibrium (CGE) model was used to identify the net returns to investment in education and/or training for the economy as a whole.

2.

LABOUR MARKET INFORMATION IN THE CONTEXT OF CAMBODIA



2.1. EDUCATION AND TVET SYSTEM IN CAMBODIA

The Cambodian education system has three streams: general education, TVET and higher education (ADB, 2016). The first stream is general education, consisting of pre-school education, primary school (grades 1-6), lower-secondary school (grades 7-9) and upper secondary school (grades 10-12) (Andreas et al., 2018; World Bank, 2015). After upper-secondary school, students can continue to higher education (second stream), including a foundation year (one year), followed by the obtaining of an Associate Degree (two years), with an additional two years for obtaining a four-year Bachelor Degree, two additional years for a Master Degree (two years) and three years for a Doctoral Degree (three years) (World Bank, 2018). The third stream of Cambodia's education system is Technical and Vocational Education and Training (TVET) (RGC 2014).

Technical and vocational education and training generally refers to education and training that focuses mainly on practical skills and the ability to perform tasks in a particular industry.

Figure 2.1 shows education streams between TVET and GHE. The 8 levels of the TVET track are: short course certificate; technical and vocation certificate 1, or C1; technical and vocational certificate 2, or C2; technical and vocational certificate 3, or C3; diploma; bachelor; master; and doctoral degree. Pre-secondary TVET courses and degrees are for students who successfully finish grade 9, but who could not complete high school education (due to failed exit examinations), whereas

post-secondary TVET courses and degrees are for students who have successfully complete high school. Regardless of the level, there are five learning outcomes that are emphasized under TVET: professional knowledge; analytical, interpersonal, and numerical skills; information technology; communication skills; and the ability to adapt and be flexible in skill usage.

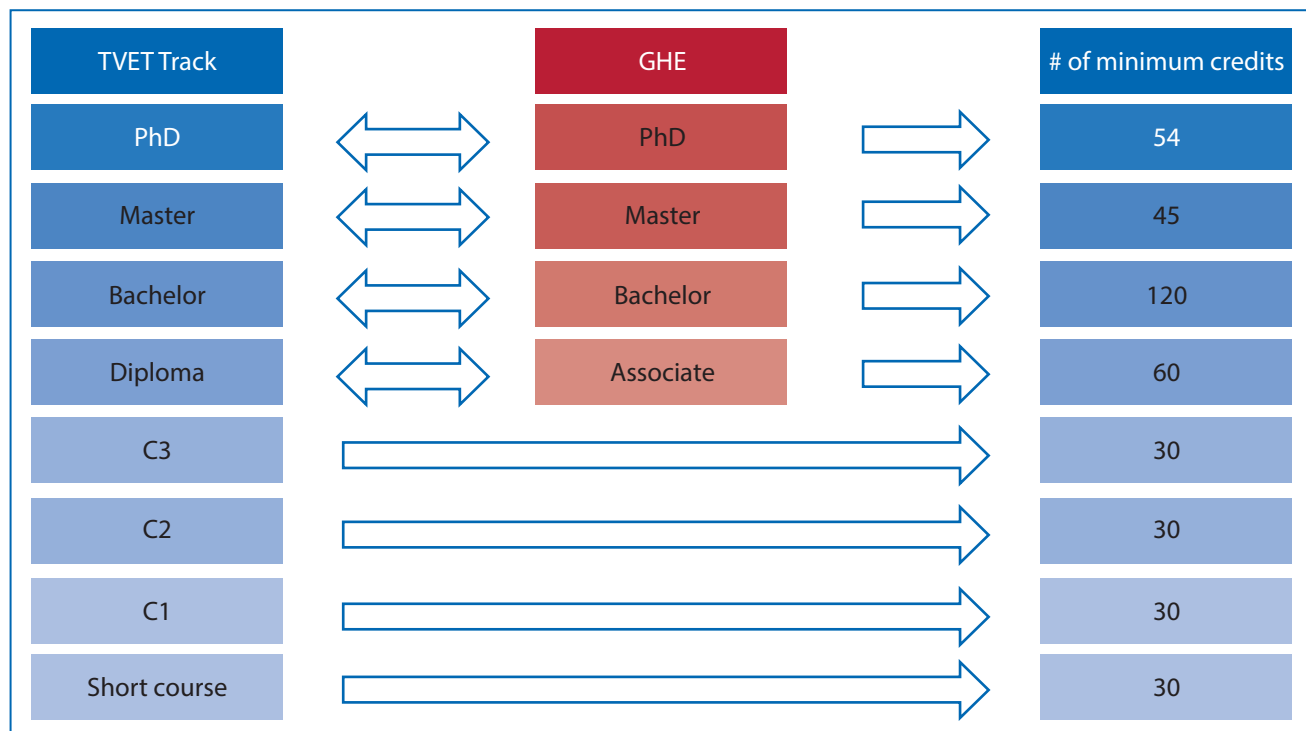
Short course certificate programs can last between 4 and 6 months (full time), and focus entirely on equipping trainees with target skills through "learning-by-doing", leaving little or no time for general subjects. Certificate Level 1 provides similar skills and training, but lasts longer than short course training. Eligible students for C1 need to successfully complete a short course training and have a minimum of one year of work experience. Additionally, they must have completed lower secondary school. It should be noted that certified degrees from diploma through PhD of the TVET track are equivalent, respectively, to associate to PhDs under the general higher education track, as Figure 2.1 demonstrates.

The Ministry of Education, Youth and Sport (MoEYS) manages general education and higher education (Andreas et al., 2018), while the Directorate General of TVET (DGTVE) of the Ministry of Labour and Vocational Training (MoLVT), manages the national TVET system (World Bank 2015). DGTVE is the secretariat of The National Training Board (NTB) and is responsible for supporting, growing and guaranteeing the quality of the public and private provision of TVET (Figure 2.2). The NTB consists of 35 members from 14 ministries with training institutions (NTB 2019) and is responsible for policy direction and coordination of TVET (World Bank 2015). The National Employment Agency (NEA) is an agency under NTB and MoLVT. Its aim is to improve TVET

relevance by enhancing the quality of labour market information services and providing this information to job seekers, employees, employers, and TVET providers. The National Technical Training Institute (NTTI) is also under the MoLVT. This higher education institute is responsible for providing training to prospective TVET

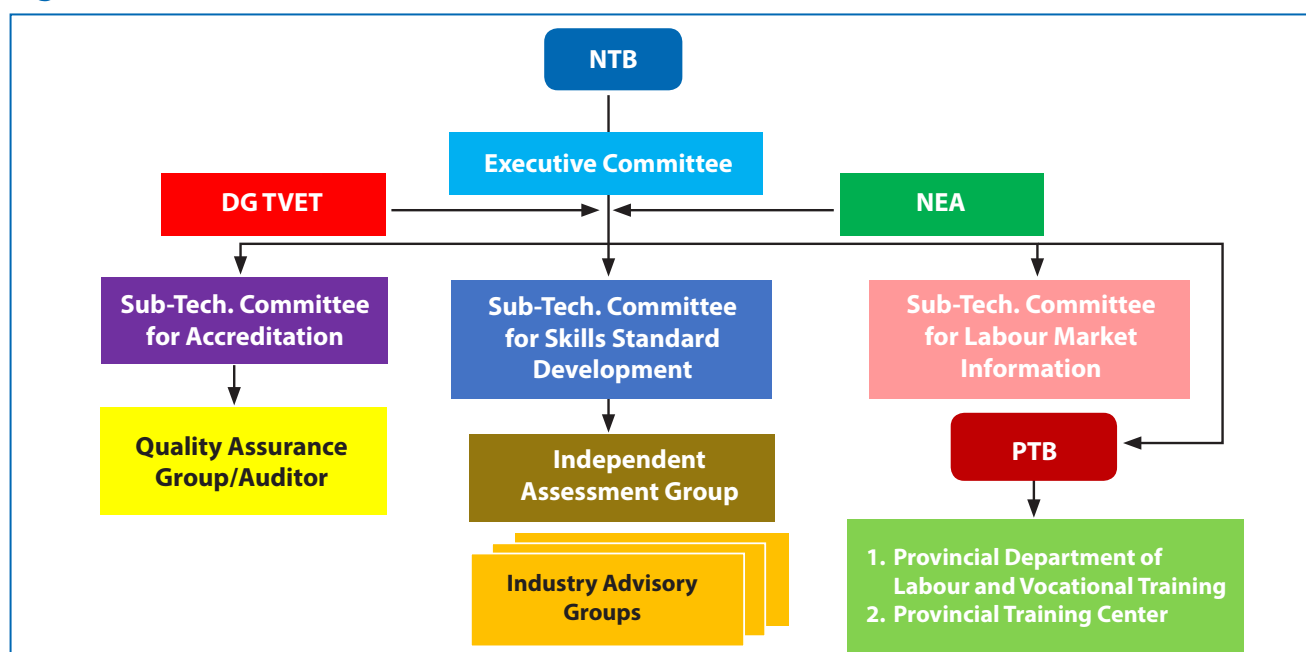
teachers, advancement trainers and administrative staff (Andreas et al., 2018). There are a total of 55 public TVET institutes, 52 private TVET institutes and 58 association/NGOs in Cambodia (Keo 2017). Of these, only 39 public TVET institutes, 43 private ones, and 24 associations/NGOs were registered under MoLVT (Keo 2017).

Figure 2.1: Education stream



Source: Author's preparation.

Figure 2.2: Governance structure of TVET in Cambodia



Source: (RGC 2015)

In the 2016-2017 academic year, 39 public TVET schools operated nationwide, 79 percent of which were located in the provinces with the remaining 21 percent located in Phnom Penh. Enrolment increased by 6.2 percent, with a total of 39,207 students enrolled in the academic period between 2014 and 2017. 29 percent of new students were female. Most enrolled in short courses (11,417), whereas 1,947 enrolled in C1; 453 in C2; 273 in C3; 8,503 in higher diploma programs; 16,540 in bachelor's programs; and only 73 enrolled in master's degree programs. The results regarding dropouts have been mixed, but there was a significant number of students dropping out in 2016-2017 compared to 2015-2016, totaling 70 percent overall and 21 percent being female students. (TVET MIS Office 2018).

General higher education (GHE) refers to education and training at a university, college or institute of technology. This type of education is different from TVET in that it is less focused on practical aspects and includes significant abstract and theoretical elements. The GHE track has four levels: associate's, bachelor's, master's and doctoral degrees. The minimum requirement for enrolment into any GHE level is a grade 12 completion certificate.

The official statistics from the MoEYS show that 219,069 students enrolled in university for the academic year 2015-2016 (MoEYS 2017). They also show that 46,695 students (total number of students at TVET public and private institutes, and associations/NGOs across all levels) enrolled in TVET during the same time frame (DGTNET 2018). In other words, approximately one student enrolled in TVET for every five that enrolled in university from 2015 to 2016. This is a notable increase compared to the academic year of 2013-2014, where one student enrolled in TVET for every 25 students that enrolled in university (Singtararith 2016).

Socio-cultural stigma associated with training in Cambodia and the misperceptions of TVET and of higher education could explain low enrolment rates in TVET (Madhur 2014). The difference in salaries earned between TVET and academic bachelor's degree holders is not notable. Both technicians and associate professionals can earn approximately 0.68 US\$ per hour (Wage Indicator, 2019). One study found, however, that students overestimate the salary received by university graduates compared to that received by graduates of vocational training (CAMFEBA 2008). Five common misperceptions among parents and students about TVET were identified:

(i) TVET work is not for females; (ii) TVET work is difficult, dirty, done outdoors and under the sun; (iii) university degrees accord a higher potential of landing jobs than do TVET degrees; (iv) TVET work is for people who are either not smart and had low results at school or are dropouts; (v) TVET work is for poor and rural farmers (Sothy, Madhur, and Rethy 2015). In the MoLVT announcement no. 1297 .K.B dated 29 August 2015, the ministry acknowledged three reasons for TVET misperceptions among high school students: (1) most students do not get enough information about TVET curricula, (2) limited dissemination of TVET information, vocation guidance and labour market information to high school students, and (3) most parents feel that TVET work is low-paying (MoLVT 2015a).

2.2. LABOUR MARKET INFORMATION

Labour market information is defined as "the delivery and analysis of labour force, employment, unemployment, wage, supply and demand, occupational, industrial, economic and demographic data for the analysis of manpower problems for a specifically defined area" (Massachusetts 2014). In 2016, there were about 10 million people aged 15-64 in Cambodia and the labour force participation rate was approximately 84 percent, thus the number of employed people aged 15-64 was approximately 8.6 million during that year. This is a 25 percent increase from 2007, when only 6.8 million people were employed (NIS 2018). The share of employment by sectors shifted from the agriculture to the industry and service sectors. In 2016, 36 percent of the country was employed in agriculture, 37 percent in services and 27 percent in industry.

Men are more likely to be employed than women in all geographic regions (Phnom Penh, urban and rural). However, women are more engaged than men in the agriculture sector, which accounts for nearly half of all employment in rural areas (NIS 2018). In addition to lower representation in the work force, female workers also receive a smaller wage share compared to male workers. In 2017, women aged 15-64 received only 35.1 percent of wages earned in the agriculture sector, followed by 27.3 percent in the industry sector and 37.6 percent in the service sector (NIS 2018).

In 2018, the average monthly wage of high-skilled workers in Cambodia was 2,007,200 KHR/month (around US\$500), while low-skilled workers earned only 517300 KHR/month (around US\$130) (Economics, 2019). Most high educated/skilled labour were employed in the education and health sectors, while skilled non-manual labour were concentrated in finance and insurance, ICT, and accommodation. Skilled manual workers were employed in the garment, footwear and apparel sectors, while unskilled workers were in the food and beverage and logistics sectors.

Minimum wage workers have seen wages increase over the last five years. This is especially true for workers in the garment and footwear sectors. In 2013, the minimum wage was US\$80 per month, increasing to US\$170 in 2018 (ILO, 2018). According to Prakas No. 465 MLVT/P on Minimum Wage for Workers in the Textile, Garment and Footwear Industries for 2019, starting from 1 January 2019, the minimum wage for these industries increased

to US\$182 per month (MoLVT 2018a), demonstrating a clear upward trend in wages.

According to NEA (2018), the employment rate once again increased from 2016 to 2017, when unemployment in Cambodia was as low as 0.1 percent (NIS, 2018). NEA also expects employment growth to continue during 2018 and 2019. As shown

Table 2.1, the annual employment growth rate between 2017 and 2019 was 36.5 percent. NEA expects the following 10 sectors to continue to grow throughout 2019: food and beverage (7.5 percent), garment, footwear and apparel (1.5 percent), rubber and plastics (3.1 percent), construction (1.3 percent), accommodation (4 percent), finance and insurance (5.7 percent), ICT (5.7 percent), logistics, warehousing and transportation (3.3 percent), education (2.1 percent), and health (2.3 percent).

Table 2.1: Employment growth by sector

Sector	2016	2017	2018	2019	2017-2019		
					Annual Absolute Change	Annual Growth Rate (%)	Contribution to Change (%)
Food and beverage	16,815	17,035	17,788	19,672	1,319	7.5	6.1
Garment, footwear and apparel	742,737	742,944	760,399	765,630	11,343	1.5	52.6
Rubber and plastics	30,760	32,858	34,763	34,911	1,026	3.1	4.8
Construction	7,135	7,542	7,624	7,743	101	1.3	0.5
Accommodation	34,652	36,680	38,534	39,633	1,476	4	6.9
Finance and insurance	73,882	78,611	83,822	87,863	4,626	5.7	21.5
ICT	12,757	14,012	15,429	15,639	814	5.7	3.8
Logistics, warehousing and transportation	9,010	10,233	10,867	10,902	334	3.3	1.6
Education	13,378	14,561	14,757	15,176	308	2.1	1.4
Health	7,724	8,497	8,775	8,896	199	2.3	0.9
Total	948,850	962,973	992,758	1,006,065	21,546	36.5	100.1

Source: (NEA 2018)

Despite continued employment growth across these sectors, there are four sectors with a high percentage of skill shortage related vacancies (NEA, 2018). These four sectors are accommodation (27.7 percent), finance and insurance (26.3 percent), garment, footwear and apparel

(10.9 percent), and ICT (10.8 percent). By occupation type, the four occupations with a high percent of skills shortages vacancies are technical and associated professionals (29.4 percent); clerical support workers (19.2 percent); service and sales workers (17.6 percent)

and professionals (16.8 percent). The highest-ranking skills with the most shortage are foreign language skills (45.6 percent), technical or practical skills (33.3 percent), custom handling skills (31.3 percent), oral communication skills (28.6 percent), teamwork skills (27.9 percent) and problem-solving skills (27.2 percent). Basic computer literacy/ability to use IT (19.7 percent), advanced IT or software skills (19.0 percent), and ITC related skills are increasing in demand.

2.3. POLICIES

On the policy front, the government has formulated a number of national policy documents which aim to meet a growing demand for a highly skilled workforce. These include the Cambodia Industrial Development Plan (2015-2025), National Employment Policy (2015-25) and, more recently, the National Technical Vocational Education and Training Policy (2017-2025). The National Technical Vocational Education and Training Policy, the most recent national policy document, outlines four strategies to achieving the stated goals and objectives: (1) improve Technical Vocational Education and Training quality to meet national and international market demands, (2) increase equitable access to Technical Vocational Education and Training for employment generation, (3) promote Public-Private Partnerships and aggregate resources from stakeholders to support the sustainable development of TVET, and (4) improve the governance of Technical Vocational Education and Training systems. The Master Plan for Technical Education at Upper Secondary Level (2015-2019) is another

relevant policy document aiming to enhance technical skills of grade 9 graduates who want to pursue a technical degree. The document outlines 8 strategies ranging from establishing legislative framework to supporting general and technical education system, to developing and revising technical education curricula and textbooks and mainstreaming gender into technical education (details in ANNEX 1).

2.4. INVESTMENT IN TVET

The Vocational Education and Training Sector Development Program (TVET-SDP) is a programme under MoLVT established to support the TVET sector in Cambodia. The total cost of this program is US\$42.26 million, which is being financed through a loan (TVET-SDP project) from ABD (US\$23 million) with additional financing from AFD (US\$15 million), as well as through RGC (US\$4.26 million). The project started from January 2015 and will run through December 2021 (MoLVT, 2018b).

According to the Ministry of Economy and Finance (2018), the budget plan of the Ministry of Labor and Vocational Training for TVET programme is 53,547.6 million riels (approximately US\$13 million). It consists of four sub-programmes, (1) developing and implementing national policies and guidelines on TVET; (2) mechanisms for enrolment of trainees and students in TVET; (3) strengthening management mechanisms of TVET and (4) TVET support services for the department at provincial and capitals.

Table 2.2: Budget plan of the Ministry of Labor and Vocational Training for TVET programme 2018

Sub-programme	Budget (in million riels)
1. Developing and implementing national policies and guidelines on TVET	1,369.7
2. Enrolment mechanism of trainees and students in TVET section	48,642.1
3. Strengthening management mechanisms of TVET	3,076.2
4. TVET support services for the department at provincial and capitals	459.6
Total	53,547.6

Source: (MEF 2018)

Between 2015-17, there were nine development partners who provided a total of US\$102.3 million to fund TVET. As shown in Table 2.3, ADB (US\$53.1 million),

Japan (US\$24.8 million) and Switzerland (US\$10.7 million) provided the most support to TVET (RGC 2018).

Table 2.3: Development Partner funding to TVET (in USD million)

	Total budget	2015	2016	2017
ADB	53.12	5.67	1.18	-
EUEC	1.86	0.42	0.31	0.20
France	3.26	-	2.91	-
ILO	1.28	0.28	0.41	0.58
Japan	24.81	3.45	3.84	3.35
Sweden	6.25	1.08	1.05	1.37
Switzerland	10.70	0.66	1.48	2.17
UK	0.06	-	0.01	0.03
USA	1.00	0.40	0.20	0.20
Total TVET	102.34	11.96	11.39	7.90

Source: (RGC 2018)

2.5. CHALLENGES AND OPPORTUNITIES

Despite the attention and policies on the labour markets, there are many challenges that persist related to skills development under technical and vocational education and training, a few of which are outlined below. The Law on Financial Management 2018 (Royal Government of Cambodia, 2017) can be referred to for more details.

The quality of TVET education has not yet fully responded to skill demands of the private sector. The main constraints have been a lack of a quality assurance system, outdated training methodologies, inauthentic experience of technical trainers in the industry, insufficient infrastructure, equipment choices, and relevant regulations.

Lack of public awareness on the importance of TVET skills. The majority of high school graduates seem to favour GHE (university) over technical education. TVET is also seen as “second chance” or “second rank” education with low earnings and mainly for the poor, marginalized groups and school dropouts¹. This perception has posed

a challenge for the responsible ministry to increase TVET enrolment and, more importantly, to retain trainees. MoEYS has faced a similar enrolment challenge with its upper secondary technical education program.

Limited financial resources for the implementation of the TVET system. Although there has been funding allocated to the TVET sector, the current budget is insufficient given the intended scale and complexity of providing and sustaining quality TVET training. The Ministry of Labour and Vocational Training has called for in-kind and in-cash contributions from the private sector and development partners to fill the current shortfall.

Lack of systematic coordination among line ministries. The Ministry of Labour and Vocational Training was appointed by the government to lead and manage the TVET sector, as defined in the sub-degree and circular. Nonetheless, implementation and compliance are inadequate as line ministries and institutes have not yet fully cooperated with the assigned role. For instance, the Ministry of Education, Youth and Sport manages a few technical and vocational institutions. It is also implementing the Master Plan for Technical Education at Upper Secondary Level (2015-

¹ This seems to be partially confirmed by summary statistics of our survey.

19), focusing on the two-stream education system of general and technical high schools (MoEYS 2015, 12). To be eligible for upper-secondary technical education, students must complete lower-secondary education. Technical education has three levels (years 1, 2 and 3), and usually lasts for a maximum of three years, after which graduates have the option to continue to higher education (university or TVET institutes under MoEYS) or to enter the workforce. Also, a certificate indicating completion of three-year technical education is equivalent to that of grade 12 completion. The various education systems being implemented by different line ministries may make coordinated efforts by the National Training Board (NTB) to implement national TVET policy more difficult. A lack of coordination could affect the quality of teaching/learning and curriculum standardization as respective line ministries implement their own systems.

Skill shortage

Employers are still not yet satisfied with the skills of the workforce and of young professionals in Cambodia (Sothy, Madhur, and Rethy, 2015). They struggle to find qualified candidates for specific jobs while job hunters struggle to find decent employment. There is a 'skill-mismatch' between the supply and demand side, with higher education and TVET providers (the supply side) educating students with skills that are not in demand by employers. This leads to a 'skill shortage' making it difficult for employers (the demand side) to find qualified candidates (MoLVT 2015b). About 47.5 percent of employers claimed to have experienced recruitment difficulties. The accommodation sector has the most difficulty filling vacancies (77.9 percent), followed by logistics, warehousing and transportation (64.1 percent), health (58.3 percent), education (53 percent), food and beverage (50.7 percent), ICT (36.5 percent), garment footwear, and apparel (29 percent), and rubber and plastic (7.3 percent) (NEA, 2018).

Migration

Underemployment or unemployment can make young labour workers engage in internal migration (rural-urban) and external migration (from Cambodia to other countries), drawn by the prospect of higher wages (CDRI, 2009). Though external migration is mainly considered as a source of jobs for the youth, non-regularized young labour may suffer from exploitation and working in

unsafe conditions. Migration will be a major challenge if the Royal Government of Cambodia does not adopt any policies or measures for the returnee migrants in the near future and may even threaten Cambodia's plans to become an upper middle-income country by 2030. Additionally, international candidates with professional skills move to Cambodia and are able to enter the labour market because of the skill shortage among Cambodian citizens, making employers more reliant on international employees (Sothy, Madhur, and Rethy, 2015).

Limited fiscal space and low investment

Limited fiscal space and low investment also pose a challenge to sustaining long-term growth in Cambodia. Limited fiscal space to finance public investments in infrastructure, human capital, health and social protection and continued dependence on donor support for public expenditures are obstacles to Cambodia achieving inclusive, productive, and employment-rich growth. Moreover, the country's ratio of domestic to foreign investment is also low compared with that of ASEAN's more progressive economies. Cambodia's current domestic investment-to-GDP ratio is just over 20 percent, while Malaysia, Singapore, Thailand, and Viet Nam have had a domestic investment-to-GDP ratio over 20 percent since 1995. Cambodia relies on foreign direct investment for a huge share of its investment, however its domestic investments will need to be equally strong to ensure fast and sustainable growth (ADB and ILO, 2015).

Low employment productivity in the garment sector

Though other sectors of the economy are import-focused, manufacturing has been the key driver of industrial growth in Cambodia for the last twenty years. Manufacturing focuses heavily on the garment industry (ADB, 2014), which represented approximately 65 percent of manufacturing value-added in 2011. Compared to Cambodia's neighbouring countries, the share of manufacturing, although expanding, is still quite low. (ADB and ILO, 2015). At the same time, the manufacturing sector provides many job opportunities for young employees, however labour productivity is still low. Manufacturing productivity is no greater than that of any other sectors, and is sometimes even lower (ADB and ILO 2014).

Limited industrial relations

Cambodia has significantly developed its industrial relations over the last decade, but it needs to progress further, especially in regards to social dialogue, collective bargaining, and compliance with labour rights and obligations. Industrial relations have received the most attention globally because of the strikes, protests, and violence in the garment sector at the end of 2013 and early 2014. Plans to generate harmonious labour relations through constructive social dialogue and ‘tripartism’ between business, labour and the government are threatened by the proliferation of the sector and trade unions’ lack of experience in the garment sector. In turn, problems with industrial relations can diminish output and discourage foreign investment. To date, collective bargaining in Cambodia has been imperfect and does not affect most workers, who are typically in the informal sector in any case. This is made worse by insufficient knowledge of and experience with collective bargaining among both employees and employers (ADB and ILO, 2015).

The country’s rapid demographic shift

The rapid demographic shift the country is undergoing can be an additional challenge for securing a productive job unless the country is well-prepared. The population was increasing more than 3 percent per year during the first half of the 1990s. In 2013, it only grew by 1.83 percent and the rate has been decreasing ever since. The young labour force coupled with an extremely low dependency ratio are tremendous advantages for the moment, nevertheless, the demographic opportunities are rapidly narrowing. Many members of the largest five-year age cohort, those aged 20-24, are already on the labour market but have relatively poor educational achievements. The following cohorts to enter the labour market will be better educated but will be successively lesser in number (ADB and ILO, 2015).

Vulnerable work

Working in the informal industry is a challenge for labour workers in Cambodia. Micro, small and medium-sized enterprises (MSMEs) accounted for 99.8 percent of business creation and 73 percent of employment in 2011, most of which was in the informal sector. 97 percent of these MSMEs were unregistered, meaning that their employees often lacked the same legal

protection of formal workers. These enterprises do not want to become formal enterprises for the following reasons: registration difficulty, costly and cumbersome administrative procedures, and avoidance of tax burdens and other legal obligations, such as compliance with labour laws (ADB and ILO, 2015).

The overall share of vulnerable employment decreased from 2008 and 2013, meaning that employee working conditions have increased (ADB, 2015). The share of vulnerable employment for women decreased from 76.0 percent in 2008 to 69.7 percent in 2012, whereas the share of vulnerable employment for men decreased from 67.1 percent to 58.8 percent over the 2004–2012 period (MoP, 2012). The decline in the share of vulnerable employment has been greater for men than for women, meaning that women’s disadvantage relative to men has increased. The decrease of the share of vulnerable employment for both men and women along with the increase in the share of wage employment shows greater opportunity for productive employment and decent work (ADB, 2015).

Limited social protection for employees

Social protection in employment in Cambodia is still in its infancy, with most people having little or no effective coverage. The lack of social health insurance affects the health and well-being of employees. National and global NGOs help to protect many of the poorest people in Cambodia with their funded projects. Currently, government programs only protect the formal sector, and the social protection of the smallest formal-enterprises is very limited. Some social protection schemes are being created by the government but most do not have a long-term funding budget (ADB and ILO, 2015). Strengthening social protection helps to protect both internal migration and international migration.

Employment opportunity

The United Nations Joint Programme has a programme, ‘UNited For Youth Employment in Cambodia’ which assists the Royal Government of Cambodia to support the implementation of the recently launched National Employment Policy. The development objective of this programme is stated as “young women and men increasingly obtain decent and productive employment opportunities”. It has three outcomes: (1) increasing young women’s and men’s admission to superior

academic and non-formal training including volunteerism to improve relevant technical and vocational skills; (2) outfitting young women and men, both in-school and out-of-school, with sufficient innovative and business abilities to make and create practical undertakings; (3) young women and men profit from a superior condition and reasonable treatment at work (UNJP 2017).

This programme joins a partnership between the Swiss Agency for Development and Cooperation (SDC) and the United Nations system (ILO, UNDP, UNESCO, UNICEF and UNV) to enact Phase 1 (2-year initial phase) with the potential for two successive phases (Phase 2 and Phase 3). Phase 1 aims to create a foundation and strengthen initiatives to support young women and men in their pursuit of decent jobs. This first phase will run for two years from September 2017 to August 2019.

Phase 2 aims to adjust the national policy framework and to develop the skills support mechanisms to prepare

young men and women to enter the labour force. The duration of this second phase is five years, from 2019 to 2024. Phase 3 aims to hand over all initiatives to the Royal Government of Cambodia, together with the ongoing management plan and the assessment of the programme against targeted outcomes and outputs. The duration of this third phase is five years, from 2024 to 2029 (UNJP, 2017).

From the perspective of a job hunter, the higher index of the recruitment also means better opportunities for employment. NEA (2018) showed that accommodation; health; logistics, warehousing, and transportation; food and beverage; finance and insurance; construction, and education were the sectors that faced high recruitment difficulties, where indexes were above 2.2. This index means that these seven sectors can have high employment opportunities if the previously stated challenges can be overcome.



3. METHODOLOGY

This study used mix-method, microeconomic and macroeconomic approaches. To assess at microeconomic perspectives, an econometric analysis was employed to estimate the returns of individual investment in TVET, supported by a qualitative analysis. For the macroeconomic approach, computable general equilibrium (CGE) models were used to identify the net returns to investment in education and/or training for the economy as a whole.

3.1. MICROECONOMIC APPROACHES

As far as the cost-benefit analysis of TVET enrolment is concerned, no empirical and rigorous study has been previously conducted. This section, thus, fills the gap by employing micro-econometric modelling to estimate the returns of individual investment in TVET. More specifically, this section aims to quantify economic returns to technical and vocational education on wage earnings and other labour market outcomes relative to those of general higher education. To do that, we employ quantitative analyses to assess the causal effects of TVET enrolment on monthly wage/salary, income from self-employment, school-to-work transition and the probability of being employed. Estimates are measured using a propensity score matching approach on 878 graduates of TVET schools and 558 graduates of GHE schools. We hypothesise that students who graduated

from technical and vocational education and training in the 2015-2016 academic year earn lower wages and have a lower probability of being employed than similar students who graduated from GHE in the same academic year. We also examine heterogeneous effects of TVET attendance by sex, age, years of schooling and residential location. Also, where possible, the study investigates economic returns to TVET education by major.

3.1.1. DATA AND VARIABLES

3.1.1.1. Sampling and sample size

A nationally representative sample of TVET graduates was surveyed. Generally, there were a few key decision points that have greatly affected the general survey design - particularly the accuracy of key estimates under the budget constraints given national representation sample size. For the feasibility of the survey and to reduce the complexity of dealing with a large population, only one academic year (2015-2016) was used as the target population. This academic year was proposed because of the fact that it provides enough time (about 2 years) for its graduates to have gone through different stages of employment, unemployment and re-employment². Participants in short courses were excluded because many of these courses are too short (minimum one week-long), making it difficult to find a comparison group. Thus, in the sampling frame, only TVET certificates, diplomas, and bachelor's degrees were included. These degrees are relatively similar to those

² Length of training exposure could affect outcomes (e.g., Rosholm, Nielsen, and Dabalen 2007; Behrman, Cheng, and Todd 2004). Card et al. (2011) evaluate the impact of training 10-14 months after graduation. Kluve et al. (2019) find that youth employment programs have bigger effects on labour market outcomes in the long-term. Card, Kluve, and Weber (2018) show that short-term average effects of active labour market policies and programmes on outcomes are close to null, however, the impacts are relatively more positive 2-3 years after completion. Ouch (2019) also indicates that length of training exposure was a factor affecting statistically insignificant effects. Thus, we think that our analysis of 24-36 months after graduation is sufficient to provide an assessment of, at least, medium-term impacts of TVET relative to GHE.

provided by institutes/universities under the jurisdiction of the Ministry of education, youth and sport (MoEYS).

Table 3.1 shows the sample size of the survey administered from late 2018 to early 2019 in various geographical locations. It should be noted that the research team planned to survey 1,000 TVET graduates and 600 GHE graduates. However, the team only managed to survey 878 and 558 TVET and GHE graduates respectively, leading to a total sample size of 1,436 for analysis. The discrepancy was due mainly to: (1) difficulties in making appointments; (2) unwillingness to provide interviews; (3) insufficient and, sometimes, incorrect contact information in the list of graduates

provided by respective sample schools; (4) incorrect information regarding graduation status, with certain students confirming that they only studied for approximately a week and did not complete the course; and (5) non-cooperation of a few sample schools. Administrative codes (province, district, commune and village) have been adapted to align with the ones used by the National Institute of Statistics in its Cambodia Socio-Economic Survey (CSES). This might help to control village-level information in the survey, where applicable and necessary, if there is a considerable overlap of administrative areas between this survey and that of CSES.

Table 3.1: Survey sample size

	C1	C2	AD	BA	Total
Technical and vocational education (TVET)	174	81	303	320	878
General higher education (GHE)	0	0	140	418	558
Total	174	81	443	738	1,436
TVET					
Electricity	67	33	80	63	243
Civil Engineering	0	0	39	136	175
Information Technology	56	26	37	18	137
Accounting and Finance	0	0	1	62	63
Automobile	51	22	75	0	148
English Language	0	0	70	0	70
Banking and Finance	0	0	1	41	42
GHE					
Electricity	-	-	0	71	71
Civil Engineering	-	-	1	72	73
Information Technology	-	-	70	74	144
Accounting and Finance	-	-	0	96	96
Automobile	-	-	1	0	1
English Language	-	-	67	0	67
Banking and Finance	-	-	1	105	106

Notes: C1: Certificate Level 1; C2: Certificate Level 2; AD: Associate Degree; BA: Bachelor Degree. There is no C1 or C2 degree provided at general higher education institutes/universities. Source: Author's preparation.

The quality of important outcome variables such as wages were checked using First Significant Digit (FSD) to ensure data conformity with Benford's Law (Judge and Schechter, 2009). The results show that wage distribution somewhat conforms with Benford's Law³, with the first digit (1) appearing about 30 percent of the time and the last digit (9) about 4 percent. By degree, wage/salary is also Benford conformed allowing the analysis to be extended to examine heterogeneous effects of TVET. It should be noted that Benford is not applicable with the other outcomes due to the fact that they are binary. Additionally, assets and expenditure are not Benford. This, however, is less of a concern because neither of them are used in this study as outcome variables.

The analysis is the to sample respondents who were formally employed (part- or full-time) for at least seven days. This does not affect the estimates because 92 percent of all respondents (1321=1436 times 0.92) were employed. It should be noted that all respondents were formally employed at the time the survey was taken, working an average of 46 hours per week (47 hours for TVET graduates; 45 hours for GHE) or 24 days per month (24 days for TVET; 23 days for GHE).

Understanding how graduates of TVET relative to those

of GHE perform in terms of self-employment is crucial given that entrepreneurship is encouraged. This study, nonetheless, could not analyse the impacts given insufficient observation (122=1436 times 0.085)—particularly when outcome comparisons between TVET and GHE graduates are made. The wages of 13 respondents were identified as outliers by all measurements used (i.e. Z-score, Median Absolute Deviation, and Box and Whiskers Plot). They have thus been excluded in the calculation of mean wages, but not in the regression analysis since logarithmic form is applied to approximate normal distribution of wage earnings. The monthly wages of another 42 respondents were also excluded because of either refusal, lack of knowledge or abnormalities.

Outcome comparisons were also made among and between graduates of TVET education. That is, labour market outcomes of C1 and C2 graduates were compared with those of associate's and bachelor's degree holders within vocational and technical education. The analysis allows for the examination of economic returns to C1 and C2 levels relative to higher TVET levels (AD and BA). It also complements the limitation of not having comparable data for those who dropped out⁴.

Table 3.2: Summary statistics of outcome variables

Variable	TVET				GHE		
	All	C1&C2	AD	BA	All	AD	BA
Monthly wage/salary earnings (C, log)	4.776 (0.524) N=688	4.435 (0.400) N=163	4.709 (0.438) N=244	5.031 (0.399) N=281	4.987 (0.472) N=477	4.689 (0.422) N=116	5.082 (0.447) N=361
Monthly wage/salary earnings per hour worked (C, log)	0.949 (0.493) N=688	0.600 (0.443) N=163	0.897 (0.479) N=244	1.197 (0.384) N=281	1.205 (0.526) N=477	0.912 (0.462) N=116	1.299 (0.511) N=361
Hours worked past 7 days (C, log)	3.819 (0.269) N=702	3.812 (0.325) N=168	3.807 (0.275) N=249	3.834 (0.224) N=285	3.781 (0.230) N=505	3.781 (0.207) N=121	3.781 (0.237) N=384

3 Benford's Law has become popular in ensuring data quality not only for surveys, but for administrative data as well. Its application has been wide ranging from large complex survey data to tax and clinical data. Readers are recommended to check Benford's utility at www.checkyourdata.com. This study was unable to do so, due to incompatibility issues between our computer and Java application, used to run the utility. However, a Stata do-file calculating various measures of the Law is available upon request.

4 We could have used the 2017 Cambodia Socio-Economic Survey data to compare labour market outcomes of school drop-outs with TVET graduates. We could not do that, for CSES does not have enough control variables for the employed models. In addition, how wages are measured in both datasets could also have implications on the comparison.

Hours worked past month (C, log)	3.170 (0.159) N=702	3.195 (0.199) N=168	3.164 (0.147) N=249	3.162 (0.142) N=285	3.138 (0.125) N=505	3.144 (0.112) N=121	3.136 (0.129) N=384
Employed immediately after graduation (1, 0)	0.830 (0.375) N=702	0.607 (0.489) N=168	0.843 (0.364) N=249	0.950 (0.216) N=285	0.863 (0.343) N=505	0.677 (0.469) N=121	0.921 (0.269) N=384
Employed since graduation (1, 0)	0.986 (0.113) N=691	0.975 (0.156) N=160	0.991 (0.089) N=247	0.989 (0.102) N=284	0.990 (0.099) N=504	0.991 (0.061) N=120	0.989 (0.102) N=384

Notes: Standard deviations are in parentheses. Source: Author's calculations.

Table 3.2 provides a summary of statistics of outcome variables by education level and degree⁵. A descriptive observation from the table is that outcomes of TVET graduates are relatively lower than those of GHE graduates. However, the magnitude is rather small, indicating that earnings of TVET graduates are not significantly worse than those of GHE graduates. In fact, TVET graduates with associate's or bachelor's degrees seemed to perform as well as GHE graduates with the equivalent degree. Surprisingly, TVET graduates performed better in terms of school-to-work transition, having a high probability of being employed immediately after graduation (0.951 versus 0.921 for BA and 0.843 versus 0.677 for AD). This partially, descriptively, confirms the idea that technical education could be a solution to address short-term employment issues, particularly for youth.

3.1.1.2. Sample characteristics

Table 3.3 highlights characteristics of sampled students prior to enrolment in TVET or GHE. Understanding these characteristics is crucial both for targeting purposes and for setting up a selection equation for propensity score matching estimation. 75 percent of the respondents are male, with an average age of 20 years old while in high school. Female are less likely to enrol in TVET at all levels with the highest underrepresentation in C1 and C2 levels (13 percent of total graduates). They tend to favour GHE bachelor's degree programs (32 percent). This indicates that female enrolment in higher education remains an

issue to be addressed. Also, low female enrolment in STEM-related degrees—three of which are electricity, engineering and information technology—was also found. This low enrolment could lead to a widening gender wage gap in the future when digitalisation, artificial intelligence and machine learning become the fields in which jobs are in high demand and encouraged by the government and private sectors. This is further confirmed in the regression analyses.

Mathematics ability remains an issue, with only 18.4 percent of respondents reporting that their mathematics ability is good, very good or excellent. The reported mathematics ability of students enrolled in TVET tends to be lower than that of GHE students. In other words, students with high mathematics ability are more likely to choose a bachelor's through GHE rather than TVET. OLS estimates are biased if the difference is not controlled for. The low level of mathematics ability is worrisome considering the fact that STEM jobs are encouraged. Despite this low ability, 9 out of 10 respondents, in both TVET and GHE, believe that mathematics is crucial for career success.

Socio-economic characteristics of a student's family also have important implications on enrolment decisions. TVET students are typically from households with low socio-economic status with parents who earn less and work in low-skilled occupations, compared to those of GHE students.

⁵ Difference in sample size both within or between TVET and GHE is due to non-responses.

Table 3.3: Characteristics of sampled students prior to TVET and GHE enrolment

	Whole sample				TVET			GHE	
	All	TVET (all)	TVET (AD&BA)	GHE	C1&C2	AD	BA	AD	BA
Sex (N = 1436)	0.745	0.765	0.739	0.715	0.827	0.768	0.712	0.821	0.679
Average age (N=1084)	19.514	19.489	19.459	19.545	19.708	19.669	19.320	20.432	19.386
Marital status (N=1436)	0.748	0.747	0.703	0.750	0.854	0.752	0.656	0.842	0.720
# of years respondents had attended school (N=1436)	15.295	14.798	15.589	16.078	12.866	14.613	16.512	15.092	16.409
Location of TVET or GHE school (N=1436)	0.765	0.643	0.794	0.956	0.274	0.577	1.000	0.935	0.964
Health condition during high school (N=1436)	0.184	0.226	0.208	0.118	0.270	0.224	0.193	0.128	0.114
# of friends respondents had during high school (N=1436)	37.225	35.965	37.972	39.207	31.062	35.528	40.287	32.900	41.320
Self-reported mathematics ability (N=1436)	0.184	0.148	0.176	0.241	0.078	0.122	0.228	0.071	0.299
Self-reported relevance of mathematics in career success (N=1436)	0.938	0.938	0.937	0.939	0.941	0.904	0.968	0.821	0.978
Respondents had Facebook account during high school (N=1436)	0.348	0.328	0.325	0.379	0.333	0.432	0.225	0.514	0.334
Life satisfaction during high school (N=1436)	0.444	0.447	0.473	0.439	0.384	0.521	0.428	0.342	0.471
Location of high school attended (N=1436)	0.229	0.179	0.211	0.308	0.101	0.168	0.253	0.264	0.322
Distance from home to high school (N=1436)	5.834	5.997	6.072	5.578	5.815	6.135	6.012	5.114	5.734
Whether respondents finished high school (N=1436)	0.754	0.678	0.841	0.874	0.282	0.689	0.984	0.528	0.990
# of siblings respondents had during high school (N=1436)	4.254	4.419	4.436	3.996	4.376	4.316	4.550	4.278	3.901
Father's place of birth (N=1436)	0.054	0.046	0.044	0.066	0.050	0.042	0.046	0.028	0.078
Father's completed years of education (N=900)	7.578	6.994	7.146	8.505	6.586	6.769	7.571	8.159	8.623
Father's occupation during high school (N=1432)	0.304	0.277	0.296	0.346	0.231	0.284	0.308	0.294	0.363
Mother's place of birth (N=1435)	0.078	0.062	0.059	0.102	0.070	0.049	0.068	0.064	0.114
Mother's completed years of education (N=999)	5.585	5.110	5.339	6.328	4.531	5.208	5.485	5.421	6.620
Parents' living standard during high school (N=1431)	0.781	0.752	0.756	0.825	0.744	0.733	0.778	0.685	0.872

Parents' level of earnings during high school (N=1408)	0.790	0.825	0.795	0.734	0.897	0.829	0.764	0.725	0.737
Parents had car during high school (N=1430)	0.121	0.096	0.109	0.161	0.062	0.100	0.118	0.135	0.170

Notes: standard deviations and number of sub-sample are not reported here due to space limitations, but available on request. The sub-sample size is statistically sufficient for the calculations.

Source: Author's calculations.

3.1.2. ECONOMETRIC MODELS

3.1.2.1. Setting the treatment effect equations

The study adopts an impact evaluation approach—employing counterfactual of outcomes that would have occurred in the absence of intervention. More formally, the average treatment effects (ATE) of TVET graduates is given by:

$$ATE = E(Y^1 - Y^0) \quad (1)$$

where Y^1 refers to outcome variables of TVET graduates and Y^0 outcomes of non-TVET graduates. Nonetheless, we are interested in the average treatment effects on the treated (ATET) as the following:

$$ATET = E(Y^1 - Y^0 | V=1) \quad (2)$$

$$ATET = E(Y^1 | V=1) - E(Y^0 | V=1) \quad (3)$$

However, in practice, we observe the following:

$$\alpha = ATET = E(Y^1 | V=1) - E(Y^0 | V=0) \quad (4)$$

$E(Y^0 | V=0)$ is a set of counterfactual outcomes of the comparison group—which in our case, is GHE graduates.

Within the above framework, we construct three types of analyses to assess economic impacts of attending vocational school—the basic Mincerian equation (with and without additional controls), ordinary least squares (OLS) and propensity score matching (PSM). We follow Loyalka et al. (2016) to calculate Huber-White standard errors to adjust for school-level clustering⁶.

ORDINARY LEAST SQUARE: our basic analysis to examine the causal links of outcomes of TVET and GHE is the OLS regression. The basic equation is given by:

$$Y_{ij} = \beta_0 + \beta_1 V_{ij} + \theta X_{ij} + \tau T_{ij} + \mu_{ij} \quad (5)$$

Equation 5 follows a standard Mincerian equation of earnings as a function of age, experience and squared experience, where Y_{ij} is a set of outcomes of student i in j school. V_{ij} is a dummy variable for whether or not student i attended technical and vocational school in j school at the time of the survey. X_{ij} represents a vector of socio-economic characteristics of the student and his/her family—measured before attending vocational school. If the assumption of zero conditional mean of the error term μ_{ij} holds, β_1 measures the impact of attending technical and vocational school relative to GHE on Y_{ij} . We also control for social, economic and political context T_{ij} in the location where students attended high school prior to TVET or GHE enrolment. β_1 is unbiased and internally valid if and only if $E(\mu_{ij} | V_{ij}, X_{ij}, T_{ij}) = 0$ —which is highly likely not satisfied in our case. Thus, we adopt the following quasi-experimental design to address the weaknesses of OLS.

PROPENSITY SCORE MATCHING: is a non-parametric approach and has been common in impact assessment of policy and programme interventions. The analysis is carried out in three steps.

PRE-ESTIMATION: propensity to enrol in TVET as opposed to GHE is given as:

$$\text{Pro}(V_{ij} | X_{ij}, T_{ij}) = \beta + \phi X_{ij} + \rho T_{ij} + \varepsilon_{ij} \quad (6)$$

where V_{ij} is a dummy variable for whether or not student

6 Our conceptual and empirical analyses are similar to those by Hanushek et al. (2017) and Caliendo, Mahlstedt, and Mitnik (2017). Other studies investigating effects of active labour market policies and using propensity score matching or a combination of difference-in-differences and propensity score matching include: Huber, Lechner, and Wunsch (2013); Chakravarty et al. (2019); Caliendo, Mahlstedt, and Mitnik (2017); Loyalka et al. (2016); Stenberg and Westerlund (2015); Chabé-Ferret (2015); R. K. Almeida and Faria (2014); Novella et al. (2018); Lechner and Wunsch (2013); Ibarrarán and Rosas Shady (2009); Rosholm, Nielsen, and Dabalén (2007); Heckman, Urzua, and Vytlačil (2006); Black and Smith (2004); Sianesi (2004). Abadie and Cattaneo (2018), Imbens and Wooldridge (2009) and Blundell and Dias (2009) provide excellent discussions on econometric methods commonly used in ex post program evaluation.

i attended vocational school at the time of the survey. X_{ij} represents a vector of socio-economic characteristics of the student and her/his family—measured before attending vocational school. T_{ij} is a list of location-specific characteristics (e.g. distance from home to vocational school). ε_{ij} is error terms with zero conditional mean, implying that there is no omitted variable or selection biases. It should be noted that Equation 6 is internally valid when individual characteristics are observed and estimated before the decision to enrol in either vocational or general education.

ESTIMATION: Probit regression can be used to estimate propensity to TVET enrolment, the score of which is used to match outcomes of both TVET and GHE graduates. The average treatment on the treated (ATET)⁷ is given by:

$$ATET = \frac{1}{N_{vs}} \left[\sum_{1 \in M} Y_i^{vs} - \sum_{1 \in N} \rho(i,j) Y_j^N \right] \quad (7)$$

where N_{vs} is the number of students who graduated from vocational school, and $\rho(i,j)$ is the weight used to aggregate outcomes for the matched students who enrolled in general education. ATET can be estimated using various matching algorithms, from nearest neighbour to Kernel. In this study, we use nearest neighbour ($n=1$) and ($n=4$) and kernel matching with 0.1-0.6 bandwidth. We also employ inverse probability weighting by Hirano and Imbens (2001) and radius matching (with and without bias correction) to test robustness of the estimates. It should be noted that if the zero conditional mean error assumption is violated and the overlapping region of common support is small, propensity score matching tends to produce inconsistent and biased results (refer to, for example, Roth and Tiberti (2017) a literature review and discussion on the issue). There are a few commonly used Stata commands to estimate ATET—teffects, psmatch2 and pscore, accompanied by estimation commands such as nnmatch. We use teffects as it calculates robust standard errors. Nonetheless, teffects does not test the balancing property of propensity score. Thus, we use pscore to check the property prior to running the teffects command (refer to Garrido et al. (2014) for some recommended steps when implementing the

propensity-score method). The approach by Halvorsen and Palmquist (1980) is used for the interpretation of semilogarithmic equations. That is, $\% \Delta = (e^{\beta} - 1) \times 100$. Refer to Appendix A1 for the detailed analysis plan.

POST-ESTIMATION: PSM estimates are internally valid and unbiased if and only if the above-mentioned assumptions are satisfied. Nonetheless, the CIA is hard to test empirically even though we are able to control for a number of unobserved factors. To address this, we conduct a number of post-estimation tests to understand the extent to which unobserved factors could potentially affect validity and unbiasedness of the estimates⁸. The first test is to estimate the impact using other matching techniques—two of which are Kernel ($0.01 < k < 0.9$) and Nearest Neighbour with various matching numbers ($2 < n < 100$). In addition, we adapt the bound methods proposed by Rosenbaum (2002), implemented by an mhbounds Stata command given by Becker and Caliendo (2007). The Mantel-Haenszel statistics given by mhbounds is only applicable for categorical variables. Thus, we employ rbounds Stata command with continuous outcome variables. Besides this, we also re-estimate propensity score on the matched sample of both treated and controls to test whether characteristics of TVET and GHE students remain significantly different after matching. Roth and Tiberti (2017) and Bertoli and Marchetta (2014) state that pseudo-R² after matching should be small, indicating no systematic and statistical differences in characteristics between graduates of TVET and GHE. Another important consideration is the influence of specification on the average treatment effects on the treated. There is no conclusive evidence in the literature, but Zhao (2008) finds that specifications of the PSM selection equation do not significantly affect (downward or upward bias) the ATT when the conditional independence assumption holds. Nonetheless, ATET would be sensitive to specifications if the CIA fails. Caliendo, Mahlstedt, and Mitnik (2017) concur with the findings stating that potential unobservables might influence selection equations, but not the average treatment effects on the treated. Other authors, however, find that specifications might have a negative impact on estimated results (Biewen et al., 2014). Given the inconclusiveness, we perform a number of specification tests.

⁷ Some studies (e.g., McKenzie 2017) estimate intention-to-treat (ITT) effects of target TVET participants. This is because not all participants could finish the training, or drop out. We do not estimate the effect given that our respondents are either TVET or higher education graduates.

⁸ Refer to Caliendo and Kopenig (2008) for practical advice when implementing propensity score matching.

3.1.3. ADDRESSING ENDOGENEITY

A topic of debate when quantifying economic returns to education is measurement and evaluation—the ability to control for observed and unobserved factors affecting education decisions of target populations (individuals, households, firms or country). This is because self-selection is common in education decisions (e.g. Oyer and Schaefer, 2019; Black and Smith, 2004; Card, 1999; Keane and Wolpin, 1997; Blackburn and Neumark, 1993; Willis and Rosen, 1979; Griliches, 1977). Taber (2001, 665) finds that “an increase in the demand for unobserved ability could play a major role in the growing college premium.” Education decisions and outcomes could also be dependent on both cognitive and non-cognitive skills (Altonji, Elder, and Taber, 2005; Heckman, 2000).

To sufficiently deal with endogeneity and selection, Randomized Controlled Trials have been popular—a method that, some believe, is superior in dealing with endogeneity and selection issues in comparison to quasi- and non-experimental methods. However, RCTs are no panacea, for it is not always possible to implement randomized design given ethical concerns (Deaton and Cartwright, 2018; Peters, Langbein, and Roberts, 2018; Deaton, 2010)⁹.

This study addresses endogeneity and selection by employing an extended version of the propensity score matching technique and by adopting selected methodological recommendations by Caliendo, Mahlstedt, and Mitnik (2017) —with some adjustments. In other words, we are controlling a rich set of observed variables while trying to construct proxies to account for unobserved factors¹⁰. We have a range of variables, categorized into standard personal characteristics, information about the current unemployment spell, regional information, pre-treatment outcomes, and detailed short-term labour market histories (Lechner and Wunsch, 2013). One of the important unobserved

factors is ability, and we control that by constructing a number of proxies—two of which are exam scores on STEM-related subjects and subjective evaluation of respondents’ comprehension level on each subject asked (e.g. Meer, 2007; Arcidiacono, 2004; Willis and Rosen, 1979). Social capital has been featured prominently in the literature—affecting choice of education, and thus, labour market outcomes (Verhaest et al., 2018; Hanushek et al., 2017). Answers to the questions ‘how many friends did/do you have outside home?’ and ‘do you have a Facebook account?’ are proxies for social behaviours of students which might represent either openness or extraversion. Work experience during high school years—i.e. prior to enrolment into vocational or higher general education—might also affect the decision, and thus, labour market outcomes. We, however, do not control for this because the majority of the sampled graduates have little or no work experience before vocational or general school enrolment. The National Employment Agency (2018, 30) finds that one of the skills and competences of post-secondary TVET students which needs improvement is life and working world experience.

3.1.4. ANALYSING HETEROGENEOUS TREATMENT EFFECTS

It is growingly common in empirical studies to investigate effects beyond the average, as impacts of a program intervention or policy can be heterogeneously benefiting some groups of target beneficiaries. Banerjee et al. (2016) recommends examining treatment effects beyond the average, as treatment could affect different groups—what they call the ‘distributional effects’. Teal (2016, 1) argues that “returns to training differ considerably, and averages are misleading”. Kremer and Holla (2009) also find the heterogenous effects of a scholarship program in Kenya. Other studies also find

⁹ Imbens and Wooldridge (2009) provide a review of empirical methods used in impact evaluations, ranging from RCTs to propensity score matching and to instrumental variables. The authors conclude that the development of empirical methods for the last two decades have been matured, and the existing econometric modelling has been beneficial for research practitioners.

¹⁰ Impact evaluation studies also employ an instrumental variables technique. However, the method is relatively less common than other methods. The majority of the literature we reviewed use propensity score matching (standard or extended), difference-in-difference or randomization. Glazerman, Levy, and Myers (2003) argue that the classic models employing instrumental variables or other exogenous variables to explain participation perform poorly in replicating estimates of experimental designs. Caliendo, Mahlstedt, and Mitnik (2017) conclude that PSM works as good as other quasi-experimental designs if researchers can control a rich set of observed and unobserved factors. They also demonstrate that failure to control for the unobserved significantly affects the selection equation, but not estimated results—further lessening the concerns of effects of the unobserved on results, particularly the ones that are likely to be fixed pre- and post-intervention. It should, however, be noted that PSM implementation is data demanding given its relatively rigid assumption of conditional independence of outcomes and treatment assignment. Mogstad and Torgovitsky (2018) revisit interpretations of the standard IV approach and discuss alternatives to it.

heterogeneous effects of training programs—Carter, Tjernström, and Toledo (2019); Card, Kluve, and Weber (2018); Stenberg and Westerlund (2015); Tripney and Hombrados (2013); Card, Kluve, and Weber (2010); Fares and Puerto (2009). Thus, focusing heavily on average effects could potentially be misleading, and lead to a “premature conclusion of the null impacts of the programs being evaluated.

In this study, we analyse the heterogeneous effects of wage differences between TVET and GHE graduates by estimating the non-parametric local approach with propensity score.

3.2. QUALITATIVE METHODOLOGY

As a part of the mixed method research, the qualitative study examines, within the same sample frame, the issues concerning youth employability through TVET promotion and development. Thus, research sites and most research participants for this qualitative study, such as the TVETs, universities and their respective graduates, were selected from the samples identified by the quantitative study. An overview of the study plan for this qualitative research is presented in ANNEX B1.

3.2.1. RESEARCH SITES AND PARTICIPANTS

The current qualitative study was conducted in four research sites, namely Phnom Penh, Battambang, Siem Reap and Svay Rieng provinces. These study areas were selected due to their major TVET enrolment intake, centre of excellence status, and geographic location. These different research sites allow for the study to compare and contrast them with each other in order to produce an in-depth understanding of the concerned phenomena.

A wide range of stakeholders have been purposefully identified through the available information collected

by the quantitative study, and through a snowball technique. The current study focuses on TVET graduates holding degrees across three majors: Civil Engineering, Electricity, Automobile; and on university graduates majoring in accounting and IT. Although the graduates are the main focus of the study, other research participants from different stakeholder groups are also included. Overall, the participants in this research can be classified into the following nine categories: (i) Policy Makers: Government officials at provincial and ministerial levels under MoLVT, MoEYS, MoIH, MEF¹¹, and development partners; (ii) TVET Management: Rectors and/or vice-rectors of TVET institutions; (iii) University Management: Rectors and/or vice-rectors of universities; (iv) TVET Trainers: Full-time trainers with at least three years of teaching experience in TVETs; (v) University Lecturers: Full-time and/or part-time lecturers with at least three years of teaching experience in universities; (vi) TVET Graduates: Female and male graduates holding certificates, associate’s and bachelor’s degrees within the top salary range, selected from TVET graduate samples of the quantitative study; (vii) University Graduates: Female and male bachelor’s degree graduates within the top salary range selected from university graduate samples of the quantitative study; (viii) Employers¹²: Business owners and/or management team of a business recruiting TVET and/or university graduates; and (ix) Parents¹³: Parents and/or guardians of TVET and/or university graduates.

3.2.2. METHODS

To ensure an in-depth understanding of the concerned phenomenon as suggested by Denzin and Lincoln (2011), the current qualitative study employed various tools to gather primary and secondary data. These include key informant interviews (KIIs), focus group discussions (FGDs), observations and document reviews. The FGDs and KIIs were facilitated and conducted in the Khmer language. Considering the specifics of various groups targeted, separate semi-structured interview guides were developed for each participant category in Khmer and English. However, the main questions exploring employability promotion through TVET

11 Ministry of Labour and Vocational Training, Ministry of Education Youth and Sport, Ministry of Industry and Handicraft, Ministry of Economy and Finance

12 The participants in this category were identified via a snowball sampling technique, starting from the interviewed TVET and university graduates.

13 The participants in this category were also identified via snowball sampling technique, starting from the interviewed TVET and University graduates.

promotion and development were the same for all research participants.

In total, the research team facilitated six FGDs with graduates—two with graduates of two universities, and four consisting of randomly selected graduates of five TVETs. The research team organized the FGDs for the university graduates separately from those for the TVET graduates. The FGDs were also purposefully separately carried out for female and male graduates of each educational institution. As a result, out of the six FGDs, there were two female-only FGDs—one with female TVET graduates and the other one with female university graduates. Given the focus of the study, the graduates of TVETs and universities form the majority of the participants. Therefore, besides the FGDs, the study team also conducted key informant interviews with TVET and university graduates selected from the sample set used in the quantitative study.

In contrast to the selection process of the FGDs, the participants for the KIs were purposefully selected according to their most suited stakeholder criteria. For example, the participants of the Policy Maker category were selected according to their positions in the institutions, while the participants of the Graduate categories were selected based on their top salary ranking status. In addition to the FGDs, the study team conducted a total of 48 KIs (of which 12 were female KIs): nine TVET graduates; one University Graduate; nine TVET Management; seven TVET Trainers; three University Management; three University trainers; ten Policy Makers; four Employers; and three Parents of the TVET graduates. It is worth noting that fieldwork was concluded after six FGDs and 48 KIs, as the gathered information became increasingly repetitive. An overview of the research participants is provided in ANNEX B2. Besides the primary data gathered from the fieldwork, the research also collected secondary data through relevant document reviews drawing on policy documents, program/project documents, reports and articles related to skills, employability and TVET development in Cambodia.

All the FGDs and interviews with the individual participants were tape-recorded with verbal consent from the participants. Written notes were also taken

simultaneously by two research assistants as backup. The tape-recordings were transcribed and partially translated into English for quoting purposes. In addition to the data gathered through FGDs and KIs, the research team also compiled observation data during and after each interview and FGD. The data analysis was also carried out throughout the fieldwork through a synthesis of field note comparisons. A thematic analysis was undertaken, with key themes and subthemes organized and attributes accordingly identified. Quotes, observations and patterns of responses to specific questions were structured and organized for the analysis.

3.2.3. LIMITATIONS

Although the team has made every effort to minimize bias in the study, there remain limitations in this research. The current research focused on publicly- and NGO-run TVETs under the MoLVT to draw lessons learnt and successful management practices. The research team is mindful of the fact that there are other privately owned TVETs who may perform better in this regard. Though, due to the subject of interest, some of these privately owned TVETs were not included in the sample pool. Moreover, this TVET selection was influenced by the good performance of the graduates produced by these institutes, identified by the quantitative research.

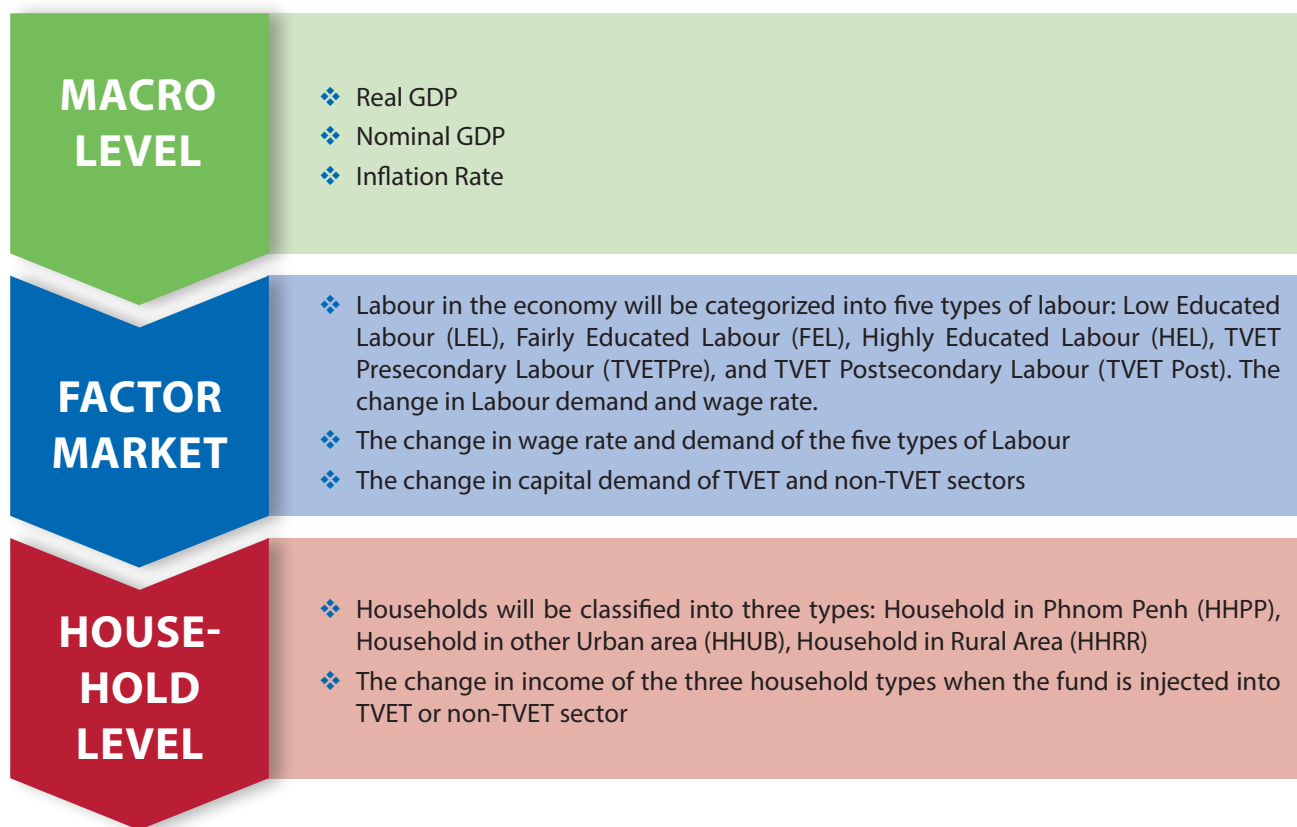
3.3. MACROECONOMIC APPROACH

The purpose of this approach is to examine the countrywide impacts of the increase in public spending on TVET and non-TVET education on Cambodia's economy. The study will try to answer two major questions:

1. What would be the impact on the economy if the government injected funds into the TVET sector?;
2. If the same amount of funds is injected into the non-TVET education sector, what would be the impact on the economy?

Three different levels of impacts on the economy will be examined, as indicated in Figure 3.1.

Figure 3.1: Analytical Framework



3.3.1. THE METHODOLOGY

This study proposed a computable general equilibrium (CGE) model to measure the impact of public spending on TVET and non-TVET sectors on the labour market and household incomes. CGE is a country-wide approach that could capture the entire relationship between sectors (inter-link industries), agents (households, firms and the government), income/expenditure, factor markets and other significant economic variables in the economy. A standard CGE model can provide a theoretical framework to address policy questions including those related to trade, fiscal and other important policy options. Within a model framework, various kinds of simulations can be made based on the theory and policy decisions, which could answer existing ‘what if’ questions.

This study used a standard static CGE model based on the PEP-1-1 (Version 2.1) model, developed by Decaluwé et al. (2013), as the analytical framework to examine the impacts of increasing public spending on TVET and non-

TVET sectors on Cambodian macroeconomics, labour market and household income levels. A static CGE model was designed and developed under short-term economic assumptions, which is logical in an economy’s short-run. For example, both capital and the number of labour is fixed while the capital rate and wage rate will adjust when there is a change in demand or supply. This is logical due to the fact that capital stock such as buildings or number of labour cannot be increased immediately within a one year period. Wage rates of labour and rate of return of capital will adjust if there is a demand or supply shock in the economy.

Yet, the above PEP-1-1 standard static model was slightly modified in this study by endogenizing the volume of TVET and non-TVET education capital (kedu) and exogenizing the education capital rate. Endogenizing kedu means that the capital stock of the two education sectors can be changed according to the model or to the demand or supply shock in the economy. This modification was carried out in order to minimize the price effect in education service, especially when there is a demand shock. It is also to reflect the reality that in

order to develop the TVET or non-TVET sector, the government needs to increase not only its current expenditure but also capital expenditure such as on buildings or equipment, so that the supply of services in this sector can increase in accordance to demand.

Limitations

Education is a dynamic sector which can not only absorb existing labour to provide more education services, but can also produce more labour or human capital for the labour market in the long-run. In this study, long-run impacts of public spending on the TVET or non-TVET sectors on human capital development could not be captured. In PEP-1-1 CGE model, there is no link between public education spending and human capital development. Simply put, the existing labour categories in Social Accounting Matrix (SAM) could only move across sectors, but not across categories. Specifically, low educated labour could not become highly educated labour even after receiving increased education and/or training within a certain period of time.

Despite this, the result from this study will be able to inform the government on the immediate impact of their policies (increase in their spending). This could allow them to be well-informed and prepared for the immediate results.

3.3.2. DATA

3.3.2.1. Available Micro SAM and other socio-economic data in Cambodia

This study employed Social Accounting Matrix (SAM) 2014, which was updated and modified by Dr. Bazlul Haque Khondker (2019) and consisted of 26 activities, 30 commodities, three types of labour, one type of capital, seven households and five categories of taxes.

Besides the above SAM, this study employed other major data sources such as the Cambodia Socio-Economic survey (known as the household survey), and the Cambodia Economic Census, mainly for education sector, factor market, and household disaggregation.

3.3.2.2. Micro SAM aggregation

Since the major objective of this section is to quantify the impact of public spending on TVET and non-TVET sectors on the labour market and on households' welfare, the focus here is on the education sector. Hence, to simplify the simulation process, the existing 'activities' and 'commodities' in the Micro-SAM were aggregated based on the standard ISIC code version 3.1 for 'activities' and on the CPC standard code for 'commodities'. Finally, the 26 activities were aggregated into 18 activities, and the 30 commodities grouped into 17 commodities. Later, 19 activities and 18 commodities were obtained, after the education sector was disaggregated according to TVET and non-TVET¹⁴.

Additionally, the seven households and three types of labour categories were also aggregated into one category, which will be reclassified in the following sections.

3.3.2.3. Education Sector Disaggregation

The education and TVET sectors are the major concentration of this study. However, there is only one education sector in the existing version of SAM 2014. Thus, in order to provide a more in-depth analysis on the impacts of public spending on TVET and on non-TVET sectors, the education sector in both 'activities' and 'commodities' were disaggregated into two categories: TVET and non-TVET education.

The disaggregation was carried out based on the Economic Census of Cambodia data, which was conducted in March 2011 and published in March 2012 by the National Institute of Statistic (NIS). This census covered all movable and fixed establishments in Cambodia's entire territory. There are more than 500,000 establishments in the whole country, including both public and private, formal and informal. From the census, we could generate the total income and total expenditure of any sector, including TVET and non-TVET, based on the standard four-digit ISIC code. Spending on labour (wages) and on taxes was also included in the census questionnaire. Unfortunately, unlike the standard input-

¹⁴ Please see the ANNEX C1 and ANNEX C2 to see how each activity and commodity was aggregated. Education was not disaggregated yet. It will be disaggregated into TVET and non-TVET in the next section. Thus, ultimately, we obtained the SAM that consisted of 19 Activities and 18 Commodities.

output survey, the census did not include details on the intermediate demand of each activity (enterprises) related to TVET and Non-TVET services. Thus, the intermediate consumption of each activity in TVET and non-TVET education sectors was disaggregated based on the total output ratios of the TVET and non-TVET sector. On the other hand, the intermediate consumption of the two sectors in other commodities was disaggregated based on the total expenditure ratios of the two education sectors. As this relates to intermediate consumption, wage and capital spending of the two education sectors was excluded from expenditure before calculating the ratio.

TVET and non-TVET education commodities sold their services only within their respective markets. This, therefore, results in a diagonal matrix relationship

between the three education commodities and three education activities as indicated in Table 3.4.

Table 3.4: Disaggregated Education income in Activities (million USD)

Activities	Sector	Commodity		Total
		TVET	Non-TVET	
	TVET	17.09		17.09
	Non-TVET		395.21	395.21

Source: Author's calculation using Cambodia Economic Census and SAM (2014)

3.3.2.4. Labour Market Disaggregation

In the previous SAM, labour was categorized into three types based on their skill level – low-skilled labour, mid-skilled labour, and high-Skilled labour. The three types of labour were aggregated and re-disaggregated into five categories.

Table 3.5: Labour Categorization

N	Labour Categorization	Criteria of Categorization
1	Low Educated Labour	0 – completed grade 8
2	Fairly Educated Labour	Grade 9 – incomplete grade 12
3	Highly Educated Labour	Completed grade 12 – University graduate
4	TVET-Pre-Secondary Education	Those who have completed TVET Pre-Secondary
5	TVET Post-Secondary-Education	Those who have completed TVET Post-Secondary

The income of each type of labour was disaggregated by employing the Cambodia Socio-Economic Survey (CESES 2014) – known as the household survey. CESES has recorded in detail the level of education, working hours, occupation, sector, and the wages of labour in the country. Yet, it is remarkable that in CESES 2014, wage amounts (currency value) were recorded only for labour working as employees but not for those working as employers, own-account workers and unpaid family workers. Excluding these non-employee workers could cause the underestimation of labour income in the economy. To tackle this, the average wage per hour per person by sector was estimated from the wage of

employees. Finally, the estimated average sectoral wage per hour of employees was multiplied by the working hours of non-employees in order to estimate income for the non-employee labour force. Noticeably, in CESES, each type of labour could have up to two jobs: a main occupation and a secondary occupation. This can be the case, especially in a developing country, where the income from the main occupation is not sufficient for one to survive. However, to estimate sectoral labour income, the authors used only the main occupation sector despite the variance in sectors between main and secondary occupations in some observations¹⁵. The

¹⁵ Please see ANNEX C3 for disaggregated labour income for each activity. Labour give all of their income to households, the labour expenditure will be explained in the household incomes.

structure of labour income from each sector will be shown in Section 5.

3.3.2.5. Household Disaggregation

There are up to seven household types in the existing SAM 2014. Thus, in order to assess the impacts of the policy changes on the regional household, the households have to be re-disaggregated. In this study, households were disaggregated based on their geographical location: 1-Phnom Penh (both urban and rural); 2- Other Urban; and 3-Other Rural households.

Household Income Disaggregation

According to the original micro-SAM, household income was obtained from three different sources: factor markets (labour and capital), government transfers, and remittance. Firstly, labour distributed their income mainly to households to which they belong. Data on household income attributed to labour was also obtained. Secondly, household incomes coming from government and rest of the world transfers were disaggregated based on the CESES 2014. Thirdly, household capital income was estimated from household rental income (rental income from either land and buildings, storage and warehousing, equipment and machinery, or charges for financial/insurance/real estate services), bank interest, dividends, and interest loans to others.

Household Expenditure Disaggregation

In CESES 2014, each household was questioned about their food, non-food and housing expenditures. Up to 22 items of food and 23 items of non-food expenditure, and 6 housing expenditures (utility related) were included in the questionnaire. These items were categorized into 18 commodities in accordance with the SAM.

It is worth noting that household spending on education was documented in the CSES 2014. However, CSES did not record in detail household spending on TVET and non-TVET. Therefore, in order to estimate household spending on TVET, this was estimated from households with members currently attending TVET schools. This household education spending was categorized as a household spending on TVET, and is differentiated from household spending on non-TVET. Household spending on direct taxes was also generated from CSES 2014.

3.3.2.6. Disaggregating Education Capital in SAM

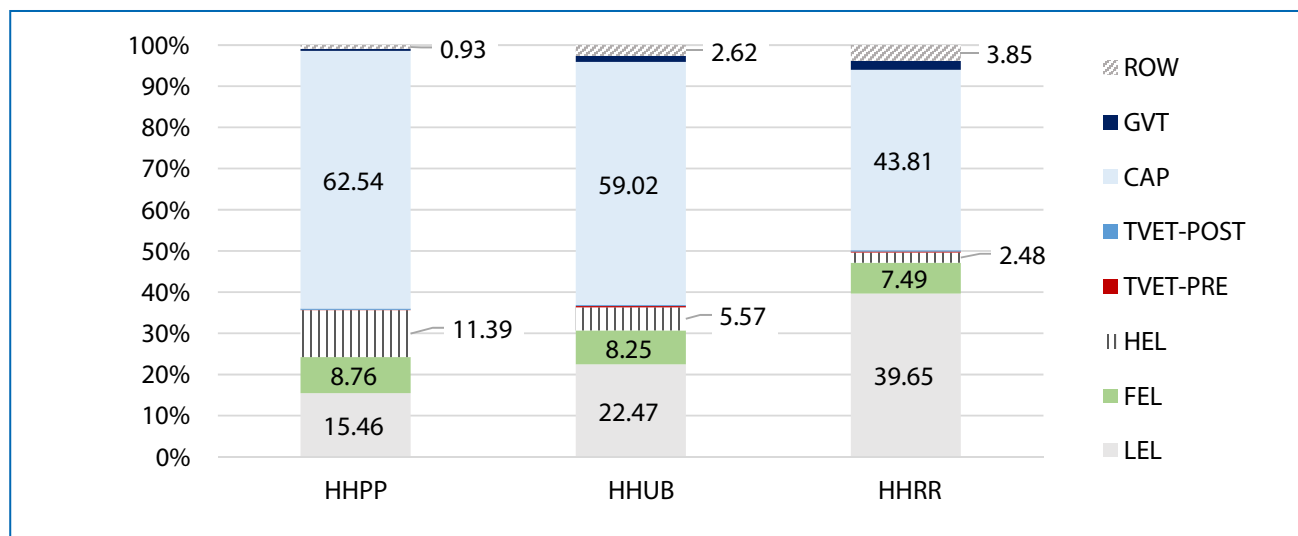
Only one type of capital, K, was present in the initial SAM2014. In order to develop the education sector, the government needs not only to increase its current expenditure but also to invest a certain amount of capital, in order to have clarity on how much the government needs to invest in education when it increases its education consumption. A separate row and column named 'Kedu' needed to be inserted in the SAM under the category of Capital 'K'. 'Kedu' received TVET and non-TVET education capital. The government owns all of the Kedu; hence, its endowment of all the capital income from Kedu. It is ideal to let the government own and earn the capital income from Kedu as it is the one who is going to invest in Kedu. As a result, the initial SAM structure had to be modified and balanced, and education capital, 'Kedu', was disaggregated from the Capital, 'K'.

3.3.2.7. Structure of the Economy in Base Scenario

It is worth understanding the structure of the economy before starting the simulation scenarios. As this study focuses more on the impact of public education spending on Cambodian macroeconomics, particularly on household income and the labour market, some important parts of the entire economic structure will be briefly looked at, such as sources of household income, factor endowment in household income, and the structure of government budget.

Figure 3.2 indicates the incomes received from different sources according to the three household geographical categories. As shown, households located in Phnom Penh and other Urban areas (HHPP and HHUB) received incomes mostly from capital, accounting for 62.54 and 59.02 percent of their total income, respectively. Around 40 percent of their income is from labour, compared to approximately 56 percent in rural households. Among the three categories, rural households earned the majority of their income from low-educated labour – up to 40 percent of total income. Households in Phnom Penh and Urban areas however, earned the majority of their income from high-educated labour. It is worth noting that the share of household income from TVET labour in each household category is relatively small compared to the other three educated labour, which is less than 1 percent of each household's total income.

Figure 3.2: Source of Household Income (%)

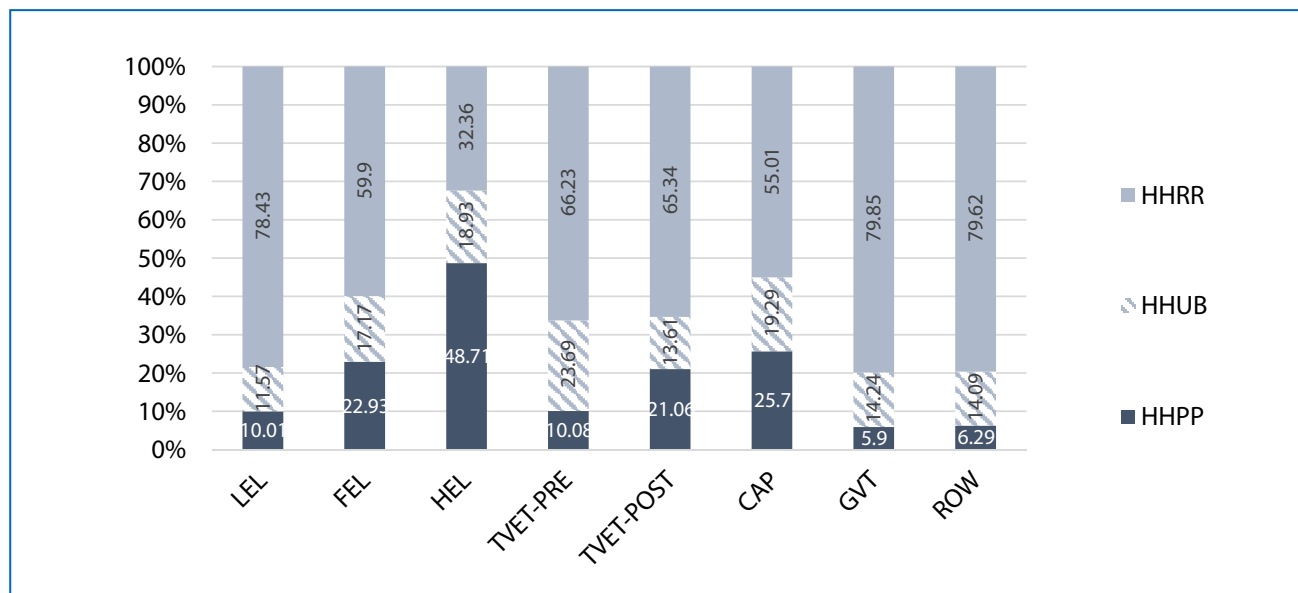


Source: Authors' calculation

Figure 3.3 presents the contribution and transfer of each factor to the household income. As shown in the table, almost half of highly-educated labour's (HEL) income is attributed to households in Phnom Penh (HHPP), while low-educated labour (LEL) and fairly-educated labour (FEL) provided mainly to other rural households (HHRR) and other urban households (HHUB). Up to 65 percent of

TVET presecondary school labour's (TVET-PRE) and TVET postsecondary school labour's (TVET-POST) income was given to HHRR. Noticeably, TVETPRE provided around 24 percent to HHUB, while TVET-POST gave around 21 percent to HHPP. HHUB and HHRR received most government and ROW transfers, with HHRR obtaining almost 80 percent of these transfers.

Figure 3.3: Factors contribution and transfer to Household income (%)



Source: Authors' calculation

Table 3.6 displays the factor endowment in each industry. According to the table, there are five sectors- Agriculture, Cassava, Fish, Manufacturing, and Non-TVET Education - that employed more labour than capital to produce output, with more than 50 percent of each sector's value added being endowed by labour. Interestingly, there are six sectors- Financial, TVET, Non-TVET, sector, Public

Administration, and Real Estate - that employed HEL more than LEL. It is also worth noticing that TVET-PRE and TVET-POST labour were employed by a greater extent by seven sectors: Health, TVET, Non-TVET, Financial, Electricity, Public Administration, and Real Estate.

Table 3.6: Factor Endowment in each industry (%)

	LEL	FEL	HEL	TVETPRE	TVETPOST	CAP	Kedu	Total
AGR	50.10	5.86	0.90	0.03	0.01	43.10	0.00	100.00
CAS	55.29	5.60	1.71	0.00	0.00	37.41	0.00	100.00
LSTOK	37.78	4.70	0.65	0.00	0.00	56.85	0.00	100.00
FOREST	39.90	4.72	0.31	0.00	0.00	55.07	0.00	100.00
FISH	48.39	2.72	0.56	0.10	0.00	48.23	0.00	100.00
MQ	27.62	1.35	0.65	0.00	0.00	70.38	0.00	100.00
MANU	39.55	12.41	2.60	0.09	0.03	45.31	0.00	100.00
ELEC	19.15	6.53	4.85	0.00	0.38	69.08	0.00	100.00
CON	21.87	4.62	0.65	0.00	0.00	72.86	0.00	100.00
WSAL	30.53	10.93	4.97	0.11	0.13	53.32	0.00	100.00
HOTEL	20.45	8.14	4.32	0.00	0.00	67.08	0.00	100.00
TRANS	21.26	8.80	3.09	0.07	0.04	66.73	0.00	100.00
FIN	4.11	5.03	28.42	0.01	0.77	61.65	0.00	100.00
RESTAT	11.16	6.48	13.14	0.04	0.28	68.91	0.00	100.00
PUB	14.48	11.84	16.01	0.28	0.39	57.01	0.00	100.00
TVET	1.43	5.40	26.28	2.08	2.24	0.00	62.59	100.00
NTVET	4.69	11.95	28.39	4.32	4.35	0.00	46.30	100.00
HEALTH	12.73	7.00	19.44	3.54	5.32	51.98	0.00	100.00
COMTY	24.60	13.91	9.76	0.13	0.17	51.44	0.00	100.00
Total	31.90	7.89	4.83	0.23	0.31	54.85	0.00	100.00

Source: Authors' calculation

Note: The table was transposed from the SAM

Table 3.7 indicates that TVET labour with both pre- and post-secondary education, earned income mainly from five sectors: Health, Non-TVET, Manufacturing, Wholesale and Retail, and Transportation. Differentiating the two, TVET-POST labour earned income to a greater extent from the Financial, Real Estate, and Health sectors, and

TVET-PRE labour mainly from the Manufacturing sector. Therefore, given the current structure of the economy, development of the Health, Non-TVET, Financial, Wholesale and Retail, Manufacturing, and Transportation sectors will generate more income to the two types of TVET labour.

Table 3.7: Labour income from each industry (%)

	LEL	FEL	HEL	TVETPRE	TVETPOST
AGR	24.65	11.66	2.92	2.10	0.59
CAS	4.36	1.79	0.89	0.00	0.00
LSTOK	4.11	2.07	0.47	0.00	0.05
FOREST	2.70	1.29	0.14	0.00	0.00
FISH	10.34	2.35	0.80	2.92	0.00
MQ	1.00	0.20	0.15	0.00	0.00
MANU	20.27	25.71	8.80	6.39	1.84
ELEC	0.34	0.47	0.57	0.00	0.71
CON	6.21	5.30	1.23	0.00	0.00
WSAL	8.97	12.98	9.65	4.55	4.09
HOTEL	3.68	5.91	5.14	0.00	0.00
TRANS	5.85	9.80	5.62	2.66	1.25
FIN	0.25	1.26	11.62	0.05	5.01
RESTAT	2.25	5.29	17.55	1.10	5.91
PUB	0.68	2.25	4.98	1.80	1.93
TVET	0.00	0.05	0.36	0.60	0.49
NTVET	0.23	2.35	9.11	28.66	22.07
HEALTH	1.24	2.75	12.50	47.07	54.04
COMTY	2.86	6.53	7.50	2.12	2.03
Total	100.00	100.00	100.00	100.00	100.00

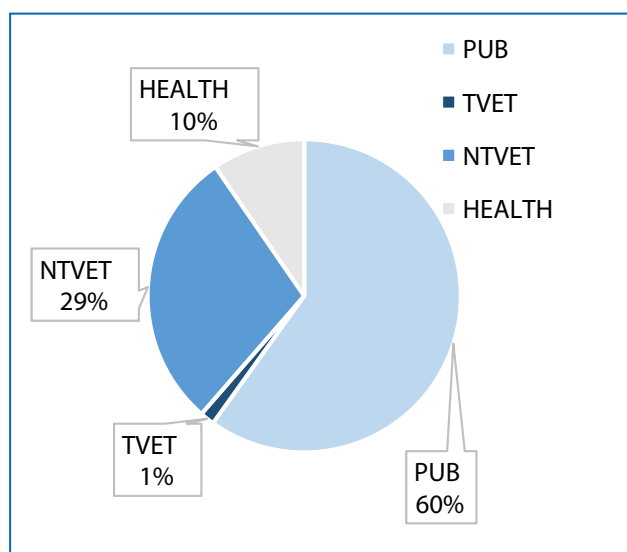
Source: Authors' calculation

Note: The table was transposed from the SAM

Figure 3.4 shows the structure of government spending on available commodities. Most of the spending was spent on Administration – around 60 percent while only

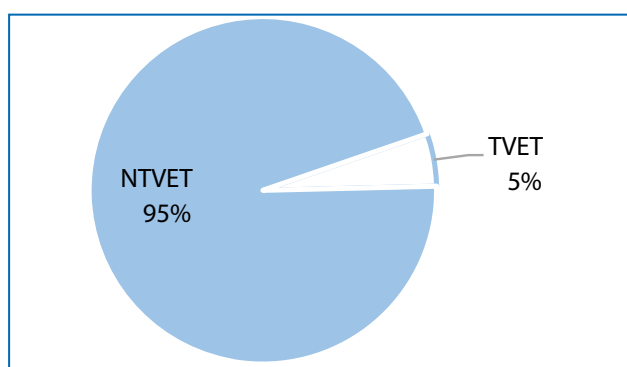
around 1.5 percent was spent on TVET and around 30 percent on Non-TVET education services. Approximately 11 percent was spent on health services.

Figure 3.4: Structure of government spending on each commodity (%)



Source: Authors' calculation from SAM2014

Figure 3.5: Structure of government consumption on education commodities (%)



Source: Authors' calculation from SAM2014

Figure 3.5 breaks down the education consumption of the government. According to the diagram, the government spent up to 95 percent of its education spending on non-TVET services while only around 5 percent was spent on TVET services.

Table 3.8 specifies the various sources of government income. According to the table, the government earned income from six different sources: capital, indirect tax, import tax, direct tax, export tax, and transfers from the rest of the world. Indirect tax income contributed up to 54.3 percent of the total income while direct tax and import tax contributed approximately 20 and 18 percent respectively.

Table 3.8: Sources of government income (%)

Govt. income	CAP	Kedu	TI	TM	TD	ROW	TX	Total
GVT	1.86	5.15	54.33	17.91	19.77	0.00	0.98	100.00

Source: Authors' calculation from SAM2014



4.

FINDINGS AND DISCUSSION

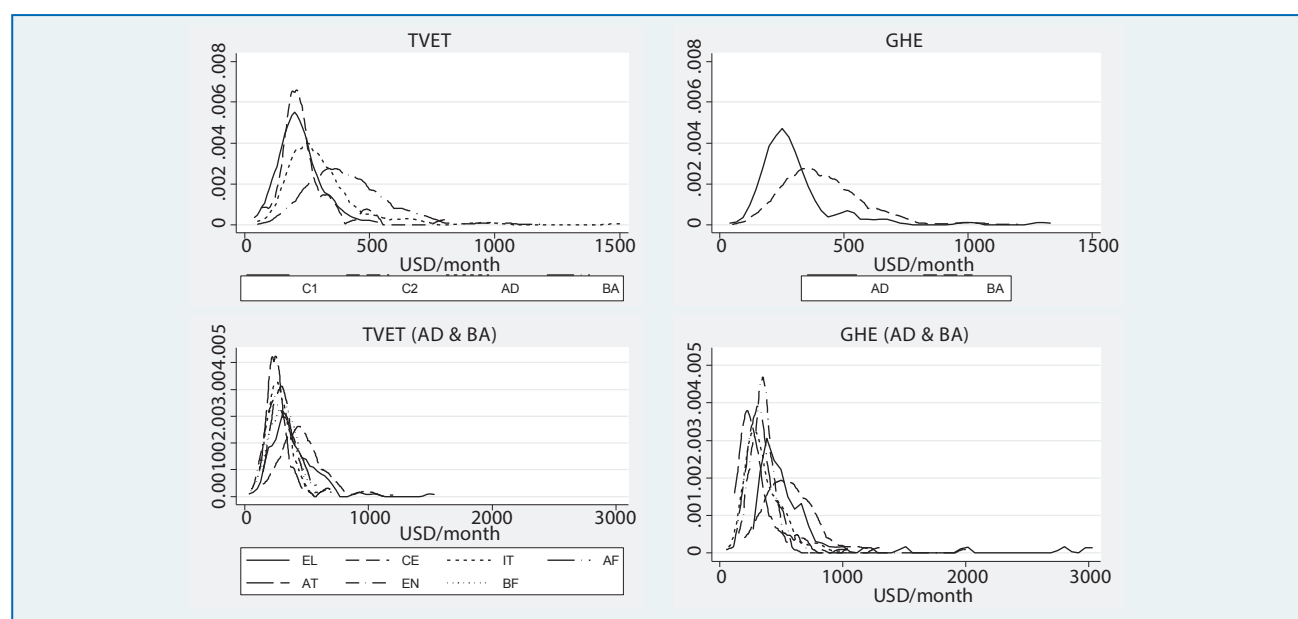
4.1. MICROECONOMIC RESULTS

4.1.1. SUMMARY STATISTICS

Figure 4.1 presents the distribution of monthly wage earnings by education level, degree and major. This allows us to understand the distribution and concentration of wages earned. A general observation is that the level of wage earnings is positively correlated with education level and degree. This is applicable for both TVET and GHE graduates. That is, within TVET, C1 graduates earn the lowest wage/salary, and wage

earnings are concentrated at the lower end of the distribution (between US\$100-500 per month). In addition, C2 graduates earn relatively high wages/salaries compared to those of C1 graduates, shown by a high wage concentration to the right of wage distribution. This is followed by TVET graduates with associate's and bachelor's degrees, who can earn up to US\$1,500 per month. The same trend is observed among GHE graduates, with those holding associate's degree (12+2 years of study) earning less than those with a bachelor's. This, again, is shown by a wage concentration at the lower end of the wage distribution. The maximum an average GHE graduate can earn is around US\$1,500 per month.

Figure 4.1: Nonparametric Kernel density estimates of the monthly earnings by level, degree and major

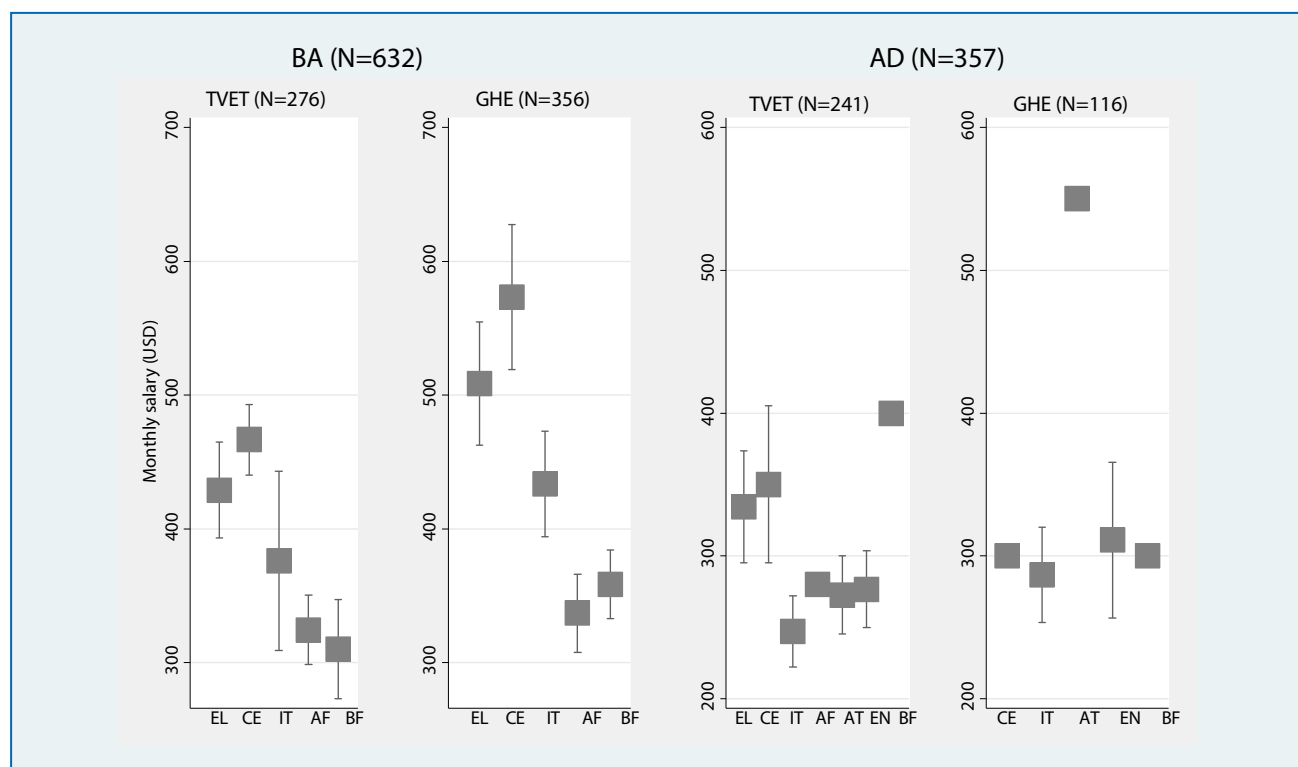


Notes: C1: Certificate Level 1; C2: Certificate Level 2; AD: Associate Degree; BA: Bachelor Degree. EL: Electricity; CE: Civil Engineering; IT: Information Technology; AF: Accounting and Finance; AT: Automobile; EN: English Language; BF: Banking and Finance. There is no kernel density estimate for a university bachelor's graduate in automobile. Source: Author's calculations.

Disaggregated by major, certain trends become clear. First, graduates of TVET and GHE with a STEM degree—electricity, civil engineering and information technology—earn more than graduates specialized in social science courses—accounting and finance, and finance and banking. Second, GHE graduates with STEM degrees earn relatively more than TVET graduates with the same degree. This is also observed among those with social science degrees. In order of highest wage earnings, graduates with civil engineering, electricity and information technology command the highest wages relative to those having majored in accounting or banking and finance. Lastly, wage distribution of GHE graduates, regardless of major, seems to depict a bigger variation than that of TVET graduates—implying that TVET graduates with the same major tend to earn roughly similar wages. It should be noted that these differences do not account for differences in other characteristics of respondents—such as work experience, social network or family background.

Figure 4.2 shows average monthly wage earnings by level and major. The data was disaggregated further to examine whether there are wage differences among and between TVET and GHE graduates with associate's or bachelor's degrees across different majors. The results show that TVET graduates earn on average US\$323 per month—US\$221 for C1, US\$240 for C2, US\$296 for AD, and US\$402 for BD. Graduates with GHE degrees earn an average US\$395 per month—US\$300 for AD and US\$426 for BD. Graduates with a bachelor's in civil engineering earn the highest (US\$467 for TVET; US\$573 for GHE)—followed by electricity (US\$429 for TVET; US\$509 for GHE) and information technology (US\$376 for TVET; US\$434 for GHE). This further confirms that graduates at both levels who specialized in STEM majors earn more than those majoring in social science majors. The test statistics (t-test) confirm significant wage differences between TVET and GHE graduates with bachelor's in civil engineering. Again, the difference does not account for differences in other characteristics which we deal with in the subsequent regression analyses.

Figure 4.2: Average monthly wage earnings by degree and major



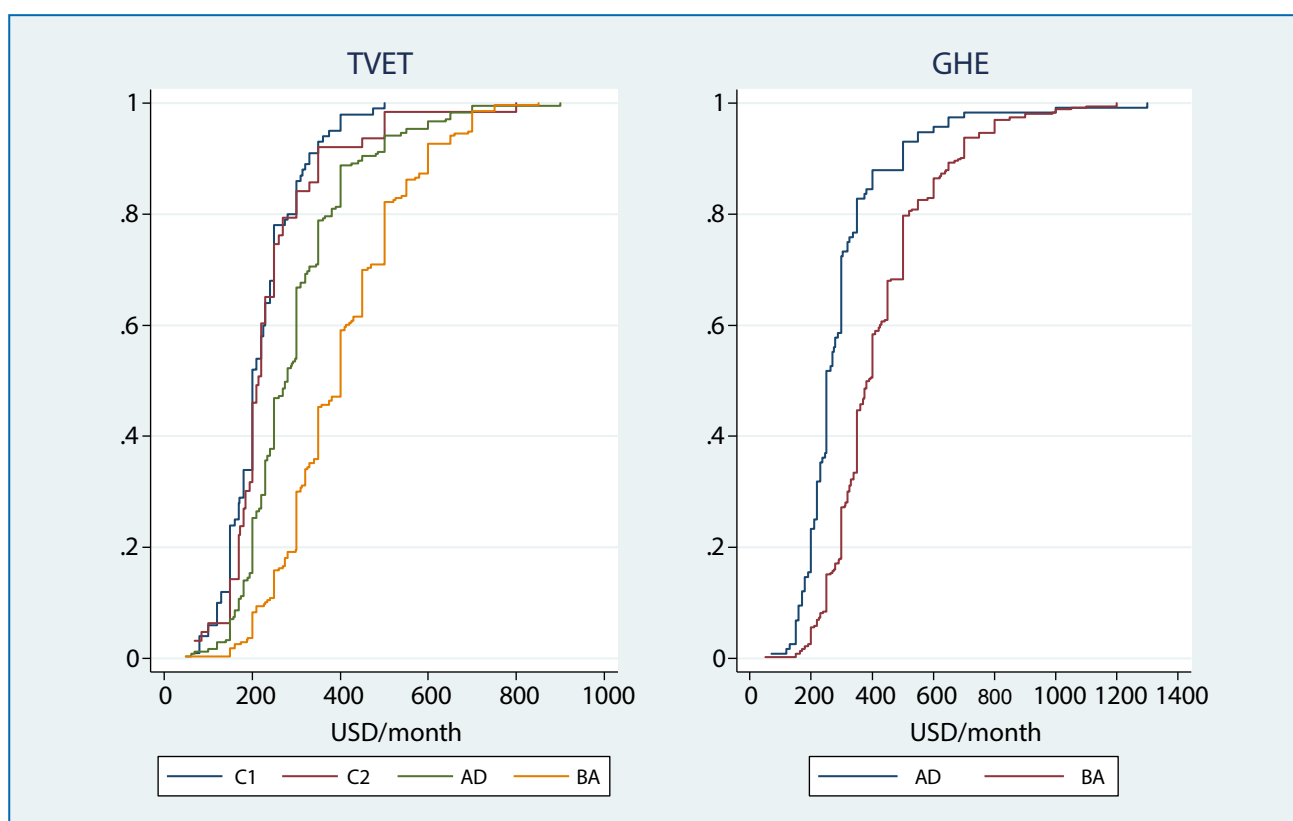
Notes: Refer to Figure 4.1's notes for abbreviations of each major. AD: Associate's Degree; BA: Bachelor's Degree. Monthly wage earnings of 55 respondents were excluded for being classified as either 'don't know', 'refused' or 'outliers'. We also re-estimate overall mean by replacing outliers with average value by degree and skill. The results are similar. Due to space limitations, the re-estimated averages are not reported here, but are available upon request.

Source: Author's calculations.

Figure 4.3 shows the cumulative density distribution function of average monthly earnings by education degree among TVET and GHE graduates. An average trend is that earnings increase by degree level; the higher the level, the higher the earnings a graduate has the potential to earn. This trend holds true within both TVET and GHE. Under TVET, for instance, graduates of C1 and C2 are the lowest earners compared to those with associate's or bachelor's degrees. Similar trends are observed among GHE graduates, with graduates with an associate's degree earning less than those with a bachelor's. International evidence shows that an additional year of education would provide an average economic return of 10 percent and that bachelor's level

graduates would command higher earnings compared to those of lower education levels (Psacharopoulos and Patrinos, 2018). The returns from a four-year university education could be relatively higher in developing countries than in developed ones. Fan et al. (2018), for instance, show that, in China, an entire four years of university education could provide a 29 to 36 percent increase in wage earnings, compared to three years of high school education. This study's naïve OLS regression results reveal a similar marginal rate of return of 10.1 percent. It should be noted that descriptive statistics shows that there seems to be no significant difference of wage earnings between C1 and C2 TVET graduates.

Figure 4.3: Cumulative density distribution of average monthly wages



Source: Author's calculations.

4.1.2. REGRESSION ANALYSIS

The empirical results (OLS and PSM) of differences in labour market outcomes between TVET and GHE graduates are presented here. It should be noted that outcome comparisons are made between graduates with associate's and bachelor's degree, leaving out those with C1 or C2 degrees from the regression analysis. This is due to the fact that good counterfactual groups could not be obtained, specifically within TVET education,

from which labour market outcomes are compared.

Signs of the estimates produced by either propensity score matching or OLS with or without matched samples are consistent. The estimated magnitude, however, is different considering that OLS estimators produced the same effects but three times smaller. Given that PSM deals with selection bias better, our conclusions and result interpretations are based on it.

It should also be noted that there are 34 non-response cases on monthly wage—7 for TVET and 27 for GHE. The majority of non-responses is among GHE graduates with bachelor's degrees in civil engineering (10 out of 27). The remaining is electricity (3), information technology (4), accounting and finance (2), English language (4) and banking and finance (4). Within TVET, the non-responses are mainly from civil engineering (4 cases), information technology (1) and automobile (2) graduates. Although

we exclude these observations from the subsequent analyses, we believe that it does not have a statistically significant impact on our estimated results. This is because the non-responses are non-random biasing toward civil engineering majors, and estimated results indicate that GHE graduates with civil engineering degrees earn more wages than TVET ones with the same degree.

Table 4.1: OLS analysis of TVET education on labour market outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: TVET versus GHE for AD and BA						
Average effects (TVET = 1)	-0.030	-0.074***	0.045***	0.026***	0.046**	-0.0001
	(0.025)	(0.028)	(0.016)	(0.009)	(0.020)	(0.006)
Gender (1 =Male)	0.221***	0.171***	0.049**	0.014	0.027	-0.0002
	(0.028)	(0.031)	(0.021)	(0.009)	(0.024)	(0.008)
Years of attending school	0.101***	0.110***	-0.007	-0.004	-0.016	-0.005
	(0.015)	(0.018)	(0.009)	(0.006)	(0.011)	(0.003)
Location of TVET school	0.180***	0.146***	0.035	0.029	0.049	0.012
	(0.045)	(0.055)	(0.033)	(0.020)	(0.037)	(0.011)
Other control variables	YES	YES	YES	YES	YES	YES
R-square	0.303	0.246	0.033	0.022	0.060	0.010
Obs.	998	988	1035	1035	1035	1031
Panel B: TVET versus GHE for BA						
Average effects (TVET = 1)	-0.082***	-0.124***	0.045**	0.018	0.027	-0.0000
	(0.031)	(0.033)	(0.018)	(0.011)	(0.019)	(0.008)
Gender (1 =Male)	0.253***	0.217***	0.034	-0.005	0.040	0.009
	(0.036)	(0.043)	(0.025)	(0.013)	(0.026)	(0.012)
Years of attending school	0.195***	0.214***	-0.018	0.019	-0.025	-0.010
	(0.037)	(0.046)	(0.023)	(0.013)	(0.025)	(0.008)
Location of TVET school	0.224***	0.067	0.154	0.091*	0.005	-0.009
	(0.078)	(0.150)	(0.132)	(0.048)	(0.067)	(0.007)
Other control variables	YES	YES	YES	YES	YES	YES
R-square	0.260	0.217	0.056	0.036	0.022	0.008
Obs.	640	640	667	667	667	666

Notes: Robust standard errors are in parentheses. *** p<1%, ** p<5%, * p<10%. Outcome variables are: (1) monthly wage earnings (log), (2) monthly wage earnings per hour (log), (3) hours worked past 7 days (log), (4) hours worked past month (log), (5) employed after graduation, and (6) employed since graduation. Difference in sample size of each model is due to non-response—which does not statistically affect estimates.

Source: Author's calculations.

Panel A of Table 4.1 presents outcome differences between AD or BA within TVET and ghe. On average, TVET graduates earn monthly wages 3.0 percent less, but the difference is not statistically significant. TVET graduates, however, are more likely (4.7 percent) to land a job after graduation compared to GHE graduates. The sign and size of other variables—sex and years of schooling of respondents—are consistent with those reported in Panel A above. We disaggregate the analysis further to assess the differences between TVET and GHE graduates with bachelor's degrees. As shown in Panel B

of Table 4.1, TVET graduates earn monthly wages 8.5 percent less than GHE graduates. They are more likely to land a job immediately after graduation, but the difference is not statistically significant. Again, sign and size of other variables are consistent with estimates presented in Panels A and B of Table 4.1. It should be noted that with the OLS estimates, gender wage gaps increase as education rises, implying that girls are either under-represented or under-performing compared to boys at the higher education level.

Table 4.2: OLS analysis of TVET education on labour market outcomes by major

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: AD and BA						
Electricity	-0.198**	-0.219**	0.023	-0.057*	0.033	-0.021
	(0.077)	(0.089)	(0.034)	(0.032)	(0.051)	(0.023)
Civil engineering	-0.192***	-0.247***	0.070**	0.005	0.030	-0.012
	(0.059)	(0.061)	(0.027)	(0.014)	(0.033)	(0.012)
Information technology	-0.061	-0.184	0.121	0.015	0.053	0.00317
	(0.075)	(0.122)	(0.089)	(0.041)	(0.078)	(0.006)
Accounting and Finance	-0.020	-0.087	0.068**	0.055**	0.036	0.027
	(0.065)	(0.066)	(0.032)	(0.025)	(0.048)	(0.019)
Banking and Finance	-0.166	-0.014	-0.097	0.011	0.024	0.005
	(0.080)	(0.088)	(0.070)	(0.022)	(0.046)	(0.005)
Other control variables	YES	YES	YES	YES	YES	YES
Panel B: BA						
Electricity	-0.104	-0.066	-0.034	-0.071**	0.021	-0.041
	(0.077)	(0.085)	(0.037)	(0.031)	(0.055)	(0.032)
Civil engineering	-0.208***	-0.251***	0.060**	0.0007	0.044	-0.018
	(0.063)	(0.063)	(0.026)	(0.014)	(0.032)	(0.013)
Information technology	-0.116	-0.146	0.026	0.009	-0.032	0.000
	(0.112)	(0.113)	(0.040)	(0.039)	(0.086)	(0.000)
Accounting and Finance	-0.019	-0.087	0.069**	0.053**	0.034	0.027
	(0.066)	(0.066)	(0.032)	(0.025)	(0.049)	(0.019)
Banking and Finance	-0.127	-0.019	-0.102	0.008	0.025	0.005
	(0.082)	(0.091)	(0.073)	(0.022)	(0.047)	(0.006)
Other control variables	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors are in parentheses. *** p<1%, ** p<5%, * p<10%. Outcome variables are: (1) monthly wage earnings (log), (2) monthly wage earnings per hour (log), (3) hours worked past 7 days (log), (4) hours worked past month (log), (5) employed after graduation, and (6) employed since graduation. R-square and Obs. for each model are not reported here due to space limitations, but available on request. Sample size for each model is statistically sufficient for calculations. Source: Author's calculations.

The location of the TVET school tends to determine the derived economic benefits of graduates, with graduates from Phnom Penh TVET schools earning higher wages and having a higher probability of getting a job after graduation. This indicates geographical inequality of TVET education quality. The rate of return of an additional year of schooling on monthly wage earning of a TVET graduate is 6.5 percent. Empirical studies in other countries find similar rates of return of an additional year of schooling—8 percent to wage earnings in the case of Indonesia (Joshi, Subramanian, and Swaminathan, 2018) and a global average of private returns of 9 percent (Psacharopoulos and Patrinos, 2018).

Table 4.2 presents OLS estimates on outcome differences between TVET and GHE graduates with AD or BA degrees (Panel A) and those with BA degrees (Panel B). We do not include C1 or C2 graduates in the estimated sample, because GHE does not provide certificate level courses. Within the AD and BA sample, TVET graduates seem to perform on par with GHE ones, except for those who majored in electricity or civil engineering. This means that TVET graduates with either one of these majors earn less monthly wages than GHE graduates. Nonetheless, TVET graduates continue to perform relatively better than GHE graduates in terms of their ability to land a job immediately after graduation. Labour market outcomes of TVET graduates further improve compared to those of GHE graduates when we further restrict the sample to those with bachelor's degree. It was found that TVET graduates perform relatively better in all majors except civil engineering, and, once again, that TVET graduates with bachelor's degrees are more likely to land a job immediately after graduation compared to GHE graduates with the same degree. The difference is not statistically significant, however.

On propensity score matching, the results show that TVET graduates perform on par with GHE graduates (Table 4.3) with the same degree level (AD or BA). Indeed, TVET is a way to expedite the school-to-work transition. This is indicated by the fact that there is no statistically significant difference in wages between TVET and GHE graduates. TVET graduates even have higher chances of landing a job immediately after graduation—15.3 percent for associate's degree and 11.7 percent for bachelor's degree holders.

These findings are consistent with those found in developing countries (e.g., Olfindo, 2018; Verhaest et al.,

2018; Wold Bank, 2018; Malamud and Pop-Eleches, 2010; Kahyarara and Teal, 2008). There are also empirical studies assessing the wage premium of TVET graduates compared to those of GHE graduates. For instance, Newhouse and Suryadarma (2011) show that, in Indonesia, TVET graduates earn wages 10 percent higher than GHE graduates. The authors also show that returns from public TVETs are positive, and even greater for women. Additionally, Chakravarty et al. (2019) also find that vocational training participation helps to increase non-farm self-employment activities, particularly among women in Nepal. In Brazil, Almeida et al. (2015) show that students who have completed upper secondary TVET earn wages 9.7 percent higher than those with a general secondary education, and 2.2 percent higher for those who have completed short-term training courses. The wage-earning difference is even more significant when comparing to wages earned by individuals with no education or who are primary/secondary school drop-outs. They also suggest that technical education is a cost-effective modality. In Nepal, Chakravarty et al. (2019) also find that vocational training participation helps to increase non-farm self-employment activities, particularly among females.

By major, there is also no wage difference found between TVET and GHE graduates majoring in electricity, information technology, and accounting and finance. The difference occurs between TVET and GHE graduates with bachelor's degrees in civil engineering and banking and finance. TVET graduates with a bachelor's in civil engineering earn monthly wages 23.6 percent (or 27.1 percent in hourly wages) lower than those of GHE graduates. The difference in other outcomes is not statistically significant. The results indicate that returns to TVET versus GHE are heterogeneous.

Labour market outcomes of TVET graduates at various levels are also compared, including C1, C2, AD and BA levels. The results, from both OLS with/without matched sample and PSM, show that TVET graduates with C1 and C2 perform relatively poorly in all measured outcomes. They earn wages 26.1 percent less than TVET graduates with associate's or bachelor's degrees; are 27.2 percent less likely to land a job immediately after graduation; and are 2.6 percent less likely to maintain a job after graduation. The differences are statistically significant, with, at the minimum, a 5 percent confidence level.

In addition, wages and other outcomes disaggregated

by male and female are estimated. Table 4.4 presents the results. In the male sample, TVET graduates of C1 or C2 perform significantly poorly than those with associate's or bachelor's degrees. That is, C1 or C2 graduates earn wages 39.1 percent (43.3 percent of monthly wage per hour) less than TVET graduates with associate's or bachelor's degrees. They are also 38.3 percent less likely to land a job after TVET graduation, and 3.0 percent less likely to keep the job after graduation—implying high employment vulnerability.

Furthermore, TVET graduates with an associate's degree perform on par with GHE graduates with the equivalent degree in all measured outcomes. They, in fact, have a higher chance of landing a job after TVET graduation (16.5 percent). Additionally, at bachelor's level, TVET graduates perform relatively poorly on all outcomes, except regarding employment immediately after graduation, where they excel compared to GHE graduates at the same level. On this front, TVET graduates still have a greater advantage.

For the female sample, coefficients of all measured outcomes are negative, implying that female TVET graduates perform relatively poorly compared to female GHE graduates, though the difference is not statistically significant. This seems to indicate that within-group wage differences among female graduates are not a problem, but between-group differences are. That is, the wage gaps between male and female TVET and GHE graduates are more concerning. The finding is consistent with findings in Cambodia and other contexts. For instance, employing the 2014 Cambodia Socio-Economic Survey, Cheng et al. (2019) found that men on average earn 15 percent more than women with the equivalent education and other characteristics, with education accounting for 12 percent of this difference.

Our data shows that, among male TVET graduates, 32 percent chose electricity as a major, and 24 percent chose civil engineering, compared to 13 and 7 percent of female TVET graduates, respectively. The common majors among female TVET graduates are accounting and finance, information technology, English language and banking and finance. Similar trends are also observed between male and female GHE graduates. The most common majors among male GHE graduates are information technology, civil engineering and electricity; while those of female ones are accounting and finance, banking and finance and English language. The

difference in major preference could be attributable to differences in subject competency. The survey data shows that females are good at subjects such as literature and English language, whereas males are good at mathematics and science subjects. These results are consistent with international evidence (e.g., World Bank, 2018a, 75).

Coupled with the fact that girls are more inclined to choose social science courses over natural science ones, the findings indicate a possible widening gender wage gaps in the future, particularly when STEM courses are encouraged and more in demand, and skill-biased technologies are common. The gender wage gap could also expand in the future due to spreading computerization. Using labour market data in Japan, a study by Hamaguchi and Keisuke (2018) found that female workers are more at risk of job displacement by computerisation and robotics due to the fact that they work in occupations which are more likely to be exposed to computerisation.

Using non-parametric local estimation, Panel A of Appendix B shows the results of heterogeneity effects of monthly wage earnings between TVET and GHE graduates based on propensity score, age and years of schooling. As earlier mentioned, the objective is to examine how differences in labour market outcomes between TVET and GHE graduates within the surveyed population. With respect to age, C1 or C2 graduates earn less than those with AD or BA. The effect, however, depicts a declining pattern of relatively significant negative effects at a young age as opposed to later in life. This could mean that at young age, with no or little experience, one's degree does not significantly affect wage differences. However, as one gets older and acquires more work experience, the obtained degree tends to play a secondary role in determining wage differences. Regarding years of schooling, an inverted U-shape relation is found. That is, TVET graduates with C1 or C2 earn significantly less than AD or BA when they complete approximately ten years of schooling. This basically refers to pre-secondary TVET, and the difference can reach up to 50 percent of monthly wage earnings. The negative effects decline as years of schooling increase. A possible conclusion drawn from this is that post-secondary TVET tends to provide higher returns than pre-secondary TVET. The wage differences between TVET and GHE graduates at bachelor's level are less clear.

As shown above, there is no, on average, statistically significant wage difference between TVET and GHE graduates. The heterogeneity effects show both positive and negative monthly wage earnings. That is, at a low propensity score, TVET graduates with bachelor's degrees earn monthly wages less than GHE graduates. The turning point, however, is from a propensity score of 0.45 after which the effects turn positive, implying that TVET graduates with the same degree earn more than those GHE ones. In addition, the effects in terms of age and years of schooling are less clear. Lastly, Panel D of the same appendix examines wage differences between

TVET and GHE graduates with bachelor's degrees in civil engineering. The results of heterogeneity effects confirm the average effects; that is, TVET graduates with bachelor's in civil engineering earn less than GHE graduates with the same degree. The negative effects increase when age and years of schooling rises, indicating that education qualification and experience gained from work are the main trust factors for gaining employment and high pay. In other words, employers seem to have a certain degree of trust when it comes to GHE graduates in the civil engineering field.

Table 4.3: Average Treatment Effects on the Treated (ATET)

	Propensity score matching						OLS (matched sample)					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Whole sample												
All	-0.179*** (0.040)	-0.209*** (0.045)	0.035* (0.020)	0.036*** (0.020)	0.049 (0.040)	-0.008 (0.005)	-0.045 (0.030)	-0.098*** (0.033)	0.047*** (0.019)	0.030*** (0.011)	0.037 (0.027)	-0.005 (0.008)
AD & BA	-0.102** (0.047)	-0.115** (0.048)	0.013 (0.020)	0.014 (0.013)	0.033 (0.042)	-0.004 (0.013)	-0.039 (0.029)	-0.065** (0.033)	0.024 (0.015)	0.017* (0.010)	0.029 (0.025)	0.009 (0.009)
AD	0.018 (0.053)	-0.011 (0.057)	0.012 (0.027)	0.042** (0.017)	0.055 (0.060)	0.000 (0.007)	0.031 (0.064)	-0.004 (0.070)	0.006 (0.031)	0.021 (0.019)	0.068 (0.064)	0.015 (0.015)
BA	0.037 (0.035)	-0.008 (0.038)	0.042* (0.025)	0.028 (0.018)	0.036 (0.026)	-0.011* (0.006)	-0.049 (0.036)	-0.086** (0.038)	0.042 (0.026)	0.020 (0.026)	0.017 (0.026)	0.003 (0.010)
Panel B: BA by major												
Electricity	-0.068 (0.076)	-0.012 (0.074)	-0.045 (0.037)	0.115*** (0.035)	0.059 (0.190)	-0.020 (0.016)	-0.097 (0.099)	-0.0491 (0.102)	-0.011 (0.043)	-0.049 (0.034)	0.075 (0.079)	-0.035 (0.025)
Civil engineering	-0.212* (0.110)	-0.240** (0.108)	0.020 (0.022)	0.015 (0.014)	0.026 (0.090)	-0.018 (0.012)	-0.071 (0.102)	-0.116 (0.098)	0.0238 (0.024)	-0.002 (0.018)	0.019 (0.038)	-0.005 (0.008)
Information technology	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
Accounting and Finance	0.032 (0.067)	-0.079 (0.075)	0.098 (0.066)	0.037 (0.065)	0.017 (0.070)	0.000 (0.008)	-0.031 (0.075)	-0.138* (0.079)	0.089* (0.049)	0.062 (0.040)	-0.005 (0.053)	- (-)
Banking and Finance	-0.183** (0.078)	-0.053 (0.080)	-0.113* (0.066)	0.003 (0.021)	0.027 (0.021)	0.027 (0.070)	-0.097 (0.080)	0.014 (0.093)	-0.106 (0.068)	-0.006 (0.027)	-0.014 (0.054)	- (-)

Notes: The matching algorithm is propensity score with $n=1$. Bias-adjusted robust standard errors are in parentheses. Outcome variables are: (1) monthly wage earnings (log), (2) monthly wage earnings per hour (log), (3) hours worked past 7 days (log), (4) hours worked past month (log), (5) employed after graduation, and (6) employed since graduation. Observations for each model is not reported here due to space limitations, but are available on request. Sample size of each model is statistically sufficient for calculations. (-) indicates insufficient observation *** $p<1\%$, ** $p<5\%$, * $p<10\%$.

Source: Author's calculations.

Table 4.4: Average Treatment Effects on the Treated (ATET) by gender

	Male						Female					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
All	-0.150***	-0.215***	0.035*	0.033***	0.037	-0.008	-0.157***	-0.181***	0.028	0.015	-0.094*	0.000
	(0.041)	(0.045)	(0.019)	(0.012)	(0.047)	(0.019)	(0.061)	(0.069)	(0.043)	(0.015)	(0.052)	(0.008)
Obs.	827	827	858	858	858	847	287	287	292	292	292	291
AD & BA	0.044	-0.005	0.065***	0.028**	0.091**	-0.003	-0.148***	-0.085	-0.008	-0.004	-0.036	0.014
	(0.042)	(0.045)	(0.021)	(0.012)	(0.039)	(0.013)	(0.050)	(0.060)	(0.041)	(0.016)	(0.045)	(0.018)
Obs.	689	689	716	716	716	713	267	267	272	272	272	271
AD	0.024	-0.034	0.042	0.019	0.153***	0.011	-	-	-	-	-	-
	(0.054)	(0.086)	(0.031)	(0.023)	(0.055)	(0.032)	(-)	(-)	(-)	(-)	(-)	(-)
Obs.	262	262	268	268	268	266	-	-	-	-	-	-
BA	-0.028	-0.106*	0.081***	0.031*	0.117***	-0.010	-0.103	-0.098	-0.025	-0.020	-0.013	-0.013
	(0.056)	(0.062)	(0.025)	(0.017)	(0.044)	(0.007)	(0.063)	(0.078)	(0.045)	(0.019)	(0.058)	(0.017)
Obs.	427	427	448	448	448	447	191	191	195	195	195	195

Notes: The matching algorithm is propensity score with $n=1$. Bias-adjusted robust standard errors are in parentheses. Outcome variables are: (1) monthly wage earnings (log), (2) monthly wage earnings per hour (log), (3) hours worked past 7 days (log), (4) hours worked past month (log), (5) employed after graduation, and (6) employed since graduation. Observations for each model are not reported here due to space limitations, but available on request. Sample size of each model is statistically sufficient for calculations. (-) indicates insufficient observation *** $p < 1\%$, ** $p < 5\%$, * $p < 10\%$.

Source: Author's calculation

4.1.3. MICROECONOMIC RESULTS: QUALITATIVE FINDINGS

The above quantitative results can be relevant to qualitative findings as described below:

No significant wage difference between TVET and GHE graduates

In the qualitative analysis, we tried to answer the question: What is the position of TVET graduates and their skills within the labour market? The findings suggested that TVET graduates seem to face more challenges, technically and emotionally, in retaining their jobs and advancing up career ladders compared to GHE graduates.

Retaining their Jobs

The data shows that, without internship experience, TVET graduates find it more challenging to perform their first assigned tasks in comparison to the GHE graduates. "I still remember my first day as an intern. It was dreadful.

I didn't know most of the things at work. [...] I think I now apply about 80 percent of the knowledge I have gained from my internship experience into my work," shared a TVET bachelor's degree graduate of FGD 6. Although their entrance into the labour market is less challenging, TVET graduates face more challenges in transitioning into their workplace and feel greater pressure to perform well, technically and emotionally, compared to the GHE graduates.

According to the interviewed TVETs, graduates, and employers, a number of factors have contributed to these challenges. First, is the lack of confidence in the technical competency of graduates as perceived by employers. According to the interviewed employers, the newly recruited graduates mandatorily undertake passive observations and/or perform tasks under strict supervision for a certain period of time. This is a common practice for automobile repairing jobs, where it can take up to six months for the new recruits to independently perform some of their tasks. "I don't care what qualification levels the graduates have. As long as they work with me, they have to start from the beginning. Our

work here involves machineries which can be dangerous for the graduates and other staff if they misuse them. [...] We deal with real customers' property, so we have to take precaution for the sake of our business reputation," explained Participant 1. Employers are more reluctant to allow graduates to independently carry out tasks due to the fear of them causing damages, as well as for safety reasons. In other cases, the lack of confidence in the graduates' competency is due to the poor perception of TVET accreditation in the labour market, especially in the provinces. Some interviewed employers admitted that they have little knowledge of the TVET system and its certifications. Therefore, they tend to be sceptical about the credibility of the certificates.

Second, the skill training provided by TVETs is inadequate and outdated. "I think, about 20 percent of what I learnt at school [TVET] could be applied at my work. [...] My workplace uses new models of equipment, while the model that I have learnt to fix at school [TVET] is like 13 years older," said a TVET diploma graduate of FGD 1. Technology used by the private sector is reportedly more advanced than that used by TVETs for their training purposes. These findings are similar to those of Idris and Rajuddin (2012). Therefore, without their internship opportunities, they are likely to feel incompetent to perform their first assigned tasks as employees. Given rapid technology development and limited resources of TVETs, internship placements have proved to be crucial for preparing TVET graduates for the labour market. The data illustrates that the private sector (employers) has been one of the key skills development providers in the form of internship placements and/or employee capacity building. Therefore, this finding further confirms the significance of any efforts to promote public-private-partnership (PPP) initiatives. In fact, the current findings indicate the need for the speeding up of PPP activities considering that low training quality is still evidently revealed to be one of the main challenges for TVETs, having been already identified as such in 2015 (MoLVT, 2017a).

Advancing their Career

According to the data, perceived career growth opportunities are plentiful for TVET graduates, for instance, within junior and/or middle supervisor positions. "... If we look at big enterprises, it seems hard to find local people to fill in the supervisory or junior management positions. Most of the supervisors are

foreigners who should have been in higher positions. I think, Cambodian skilled labour could have moved up from technical to supervisory positions. Actually, business owners would prefer to hire locals rather than foreigners for these positions for cost saving purposes," said Participant 35. This result is in line with the prediction of the National Employment Agency (2018a). However, TVET graduates' career ladder advancement progresses slowly and mostly within the same organization. The findings suggest that their low English and/or Chinese language proficiency, and the lack of higher qualifications seems to pose challenges to their career and self-development. At the time the interviews were held, only about 10 percent of the interviewed TVET graduates were pursuing a higher technical degree part-time and simultaneously along their demanding jobs. Their employers also play a key role in their career advancement through employee capacity-building. The capacity-building opportunities are, however, rather limited for TVET graduates working with local enterprises, especially in the provinces. According to Cambodian Labour Laws, employers who recruit a certain number of workers are required to provide annual capacity-building activities for their staff. However, the implementation of these regulations has not been strictly and/or fully carried out yet.

The data seems to suggest that becoming an entrepreneur is an alternative for career advancement among the interviewed TVET graduates. "I plan to run a home renovation business in the next five years," shared a TVET bachelor's degree graduate. Approximately 30 percent of the interviewed TVET graduates—mostly in civil engineering and electricity majors—plan to run a business utilizing their technical skills and knowledge. In contrast, only about 10 percent of GHE participants indicate a similar inclination towards the entrepreneurial path. It is worth noting that this finding may not entirely reflect the reality of the whole sample, as the selected research graduates for this qualitative study are top performers compared to their peers in the data pool. Therefore, they tend to possess certain attributes of high achievers which may enable them to discover more business opportunities than the others. The data also shows that some of the graduates' main reasons for wanting to become an entrepreneur are: personal and financial freedom, and self-satisfaction. These motives reflect some of the attributes indicated in entrepreneurship literature.

School to work transition: TVET graduates have higher chance of landing a job immediately after graduation

The qualitative data gathered from the FGDs and KIs reveals that about 92 percent of TVET graduates majoring in civil engineering, electricity, and automobile were able to successfully land their first paid job as soon as they graduated, while the remaining obtained theirs in the last semester of their senior year. For example, when asked when and how he obtained his first paid job, a TVET C1 graduate explains: “My first paid job was with a company installing electrical and Internet distribution systems in buildings in Phnom Penh. I got the job right after I graduated through one of my trainers’ recommendation.” The claims are different for GHE graduates majoring in Accounting and IT. GHE graduates need more time and more attempts in securing their first paid job. It is worth noting that, most TVET graduates indicate that they have had an internship placement of at least three months during their TVET studies. The internship placement is mandatory for students in some TVETs, especially in the provinces. Most compulsory internship placements are arranged for by the TVETs, however TVET students are also free to look for their own internship opportunities. On the contrary, undertaking an internship placement is not always the case for GHE graduates. Only around 20 percent of the interviewed GHE graduates claim to have looked for and/or undertaken internship placements during their studies at university.

The data further indicates that the modes of finding and securing jobs between these two groups are distinctive. “I had applied for a few job openings before I got this first job. I learnt about this first job opening through a job website, and submitted my CV and cover letter. I waited for three weeks before hearing from the company that I was shortlisted and invited to take a writing test. After the results of the test came out, I was again asked to come in for an interview,” explained a GHE bachelor’s degree graduate of FGD 3. As highlighted in the quote, GHE graduates normally go through common and formal channels and procedures for job hunting and recruitment. The participants in this group similarly report that the process includes surfing the web, social media, and/or newspapers for a job opening; submitting a curriculum vitae (CV) and cover letter; and going through interviews/tests. In contrast, TVET graduates

generally obtain their jobs through less formal procedures. They look for jobs through their social connections: friends, classmates, alumni, and/or trainers, as illustrated in the following quote. “One of my final-year trainers asked if I was interested in working with his friend’s company since I was about to graduate. I said ‘yes’ and then he put me in touch with the company’s manager,” said a TVET bachelor’s degree graduate of FGD 6. The data also suggests that the available job opportunities for TVET graduates are less competitive compared to those for GHE graduates. This result reflects the findings of the National Employment Agency (2018a), that opportunities for technical skill positions are expected to increase while their competitiveness is predicted to be low. The current study also finds that the majority of TVET graduates obtained a job most suited to their graduated skills, whereas only about 60 percent of GHE graduates reported working in a profession most suited to their degree major.

The findings could be explained by the fact that the construction sector and automobile usage have grown rapidly in Cambodia. As a result, the demands for technical skilled workers in civil engineering, electricity, and automobile mechanics has also increased, and is expected to do so over the next five years. In contrast, the market demands for GHE graduates majoring in accounting and IT have not grown at the same pace. As earlier mentioned in the quantitative section, the number of students graduating from TVETs is generally lower compared to those from graduating from GHE institutions due to their vast differences in enrolment intake. This low supply of TVET graduates creates even more room in the job market for the produced skilled workers. Another explanation could be the willingness of TVET graduates to accept perceived low offers without any negotiation due to their inexperience in job hunting and in interviewing. According to the data, all interviewed TVET graduates, when discussing job benefits, similarly recall accepting their first offers without any negotiation. This is not the case for most of the interviewed GHE graduates, most of whom negotiated for a better offer or rejected any offer lower than their expectations.

The current study also finds that, in fact, with these less-competitive job opportunities, TVETs and their graduates have overlooked the significance of other skills required for job hunting which could limit their career advancement opportunities and negotiations of

benefit. “No, we didn’t have CV and cover letter writing sessions. [...] At that time, I was so naïve as I was focused only on the subjects related to my major, so I found other subjects unrelated to my major boring,” said a TVET bachelor’s degree graduate of FGD 6. The data suggests that most TVET graduates have never had proper training on CV and cover letter writing and/or interviewing for various reasons. Firstly, these skills are not part of the training curriculum. Secondly, the graduates either consider these skills as low priority or irrelevant/unnecessary, with both the interviewed TVET graduates and the TVETs seeming to overlook the need to request for and/or to provide such training. In contrast, there are proper training slots devoted to the development of these skills at the interviewed GHEs. Although TVET graduates had been willing to accept their first offers, they have reported that they were nevertheless dissatisfied with the offers. Hence, ‘job-hunting’ and ‘interviewing’ training would have provided these fresh TVET graduates with knowledge about taboos surrounding the negotiation of benefits and equipped them with the proper skills to negotiate for a better offer.

By Major: specialization vs diversification

Having several TVETs located near each other and offering the same courses may not be efficient, given the costly operations of the TVET system and the limited number of enrolled students. According to the data from TVET management and from government officials, one of the reasons behind these overlapping training courses, for instance in the provinces, is to facilitate and encourage rural student enrolment, embracing the philosophy of bringing schools closer to their home. Another main reason, especially for income-generating TVETs, is to cater their services to suit students’ needs for business survival. “It depends on the current demands [of the students for the courses/majors]. And it also depends on each TVET’s ability and resources to provide the courses/majors,” said one TVET rector, responding to a question regarding whether or not each TVET should specialize in some skills rather than offering all skills and majors overlapping with other TVETs. In fact, this diversification of TVET services, with little collaboration, seems to instead diffuse the limited allocated resources, especially for TVETs depending solely on government funding.

The difference in students’ background/capacity (TVET students likely performed worse in high school)

According to TVET trainers, the limited general and foundational knowledge (e.g. mathematics, physics, ...) of the TVET students has posed challenges for both the students and trainers in acquiring and providing required knowledge. “My teaching style is very different here [compared to TECHNO]. Teaching at TECHNO is less work for me than that at a TVET as TECHNO students are high performers in general. They have to pass an entrance exam and, as we all know, only top-grade students can pass the TECHNO exam. So, their absorbent capacity is higher than the TVET students. At the TVET, I sometimes need to repeat myself five times in order for the students to be able to follow my lessons,” said a lecturer comparing his experience of teaching at TECHNO and at a TVET in Phnom Penh.

Urban vs rural (1. Urban and rural earning gaps exist between students attending university/institutions based in Phnom Penh, 2. Students live in Phnom Penh likely to enrol in GHE)

The data indicates that there are initiatives that have been put in place by the interviewed TVETs to help improve TVET graduate employability in various forms, in terms of quality improvement and market entrance. The interviewed TVET management, trainers, and government officials from relevant ministries similarly expressed that major efforts have been devoted to improving TVET training quality over the last few years. “We have improved our curriculums to meet the market demands. We have also strengthened the quality of our students through more practices at the TVET workshop. Then, we send them to practice at companies as interns. We have built good relationships with many companies, so that our students and graduates can find internships and/or job opportunities with them. We have also strengthened our partnerships with other institutions abroad to allow our associate’s degree graduates to pursue their bachelor’s or master’s degrees over there. Besides this, we have also strengthened soft-skill training, especially in English language,” explained Participant 26. The efforts, though varying in degree, include:

- ❖ updating course curriculum to incorporate new technology
- ❖ providing more capacity-building to trainers
- ❖ improving student evaluations and market research
- ❖ upgrading workshop buildings and equipment
- ❖ refining soft-skill training
- ❖ increasing number of internship placements
- ❖ improving internship placement matching
- ❖ strengthening relationship with the private sector through more outreach initiatives
- ❖ establishing partnerships with other international educational institutions for exchange programs
- ❖ keeping informed about TVET graduates through regular database updates
- ❖ facilitating career fairs

With these initiatives in place, there appears to be differing views regarding their effectiveness. According to the data, the implementation of these reported initiatives seems to be progressing slowly, especially at the provincial level. For instance, although each TVET has a curriculum development committee, the training materials for each subject/course varies from one trainer to another. Data from TVET management and trainers indicates that teaching resources for both trainers and students are inadequate. “We can’t afford enough devices for each student, so we divide students into groups. And we give each group one electrical device to practice with per workshop session. So, each of them within the group needs to take turns to work on the device,” said Participant 10. Due to the limited teaching resources, efforts to update the course curriculum have proved to be challenging. They become more challenging for the trainers at provincial level with limited English language proficiency. Most of the interviewed trainers rely on the Internet, specifically YouTube, as one of their main sources for refining their course curriculum. This finding supports those of Dasmani (2011) that since TVETs mostly rely on materials

and tools for training, their short supply would negatively affect practical skills acquisition of graduates.

The practical industrial experience of the trainers and their classroom facilitating skills have been slightly improved. Interviews with TVET Management, trainers and government officials at ministry levels reveal that, in general, capacity-building opportunities for TVET trainers have been increased over the years. However, the frequency, duration, rotation and nature of the training provided have yet to meet the expectations of the TVET trainers. According to the trainers, the capacity-building opportunities would be ideally helpful and effective, if: (i) every trainer obtains at least one training per year to refresh his/her technical and/or facilitation knowledge; and (ii) the technical training is for, at least, three months and at a respective factory, i.e. on-the-job training for TVET technical trainers. The data further reveals that there are cases where new workshop equipment has not been fully utilized due to the lack of trainers’ operating knowledge. Moreover, the data indicates that soft-skill sessions seem to be less prioritized as they are irregularly held and their contents are not student friendly. For instance, some of the interviewed graduates recalled that the content of the materials included either new concepts and/or concepts abstract to them, making it hard to relate to and follow the trainers. Moreover, the teaching style of the sessions was more teacher-centred and textbook-based. The data further points out that the content of some compulsory technical courses taught by some trainers at TVETs appears to be inadequate. Consequently, TVET graduates are required to take additional private classes with trainers in order to fully comprehend the content of the courses, however not all the students can afford these extra classes. Therefore, as a result, the skill sets provided to graduates fail to prepare them to perform their jobs effectively, as well to advance their careers. These findings are similar to those of Dasmani (2011) and Islam and Mia (2007).

The data also reveals that resource constraints with late disbursement, and low participation from the private sector have been generally cited by the interviewed participants as some the main challenges in TVET development. “We would normally visit as many companies as possible to look for internship

opportunities for our students. [...] There are cases where some companies refuse to talk to me as they might have been mistaken about my intentions for the meeting. Well, some of them even thought that I came to ask for their money,” explained Participant 4. However, there seems to be little evidence suggesting any efforts to maximize the outcomes of the given resource constraint situation. Indicating this, are cases where more than one TVET is operating in one area. These TVETs are practically neighbours and yet are offering similar technical skills training. Surprisingly, they have little to no collaborated activities, including exchange programs for trainers and/or students. The current study finds that the disconnections among the TVET institutes, as identified in MoLVT (2017a), are still evidently in existence.

The data further suggests that TVETs, especially at the provincial level, continue to face human resource challenges in terms of quality and quantity. Frequent staff turnover is one of the common issues cited in the interviews, especially among the provincial TVETs, hindering the TVETs’ long-term development plans. The recruitment and placement process of technical trainers at provincial TVETs seems to mainly adopt a top-down approach. This practice leaves them with little room to headhunt their own potential trainers. As indicated by the data, TVET trainers from the surrounding local areas tend to work with the TVETs longer than newcomers. The capacity of the support and technical staff also poses another challenge to TVET development. “There were times when the office staff didn’t bother to come to our classroom to let us know that our trainer couldn’t come to teach the class while we have been waiting for the trainer in our classroom for 20 minutes. Each time, we had to go to the office and ask the staff just to find out about our trainers’ absence,” complained a TVET C2 graduate of FGD 1. According to the graduates, customer services at TVETs have been perceived as underperforming according to market standards. Planning and budgeting are another challenge, with the results implying a lack of necessary human resources in facilitating TVET transformation. Whenever referring to TVET quality improvement, attention has normally been placed on the capacity-building of the technical trainers. The findings of the current study however, suggest that capacity-building of support staff is as important for a smooth TVET transformation.

Girls are less likely to go into STEM majors

Among the interviewed TVETs, the percentage of female students enrolling into certain observed majors such as civil engineering, mechanics, and electricity, is at a record low. The interviewed TVET management, trainers and female graduates admit that gender stereotypes still plays a key role in discouraging female students from enrolling into TVETs, especially in civil engineering, mechanics, and electricity. In addition, interviewed female TVET graduates also reveal that the nature of the work and physical requirements, for instance in mechanics and electricity majors, are intense and have made them feel inadequate in performing their assigned tasks. However, female TVET graduates majoring in IT seem to feel indifferent from their male counterparts in terms of their abilities and performance.

Most of the interviewed female TVET graduates who majored in skills such as mechanics and electricity did so to fulfil their personal and/or family business goals. For instance, a female TVET graduate enrolled in a mechanics degree program, aiming to use the certificate to open a car repair business for her family. Similarly, as emphasized by a trainer of a TVET in Phnom Penh, the work nature of some skills is not preferable for female graduates. However, female students tend to perform better in class than male students. “There is a very few numbers of female students in the industrial sector, roughly 5-10 percent. However, they usually perform better in class and obtain a better job than male students. To study technical skills, it requires a strong commitment to endure hardship such as working outdoors under the sun. For female students, if they don’t commit, they can’t study. 90 percent of female students chose to study technical skills as advised by their parents and relatives who own a construction business or company. There’s only 10 percent of them that choose to study it based on their interests. Yet, they are very smart, committed and curious. Sometimes, they ask too many questions,” said a trainer from a TVET in Phnom Penh.

Graduates of C1&C2 perform relatively poorly

The interviewed C2 graduates reveal that they have actually furthered their studies at TVETs after their C2 degree in order to obtain a higher qualification, with an expectation of getting paid more at work. According to the interviewed graduates, the Certificate degree

graduates face more challenges in class and at work compared to higher TVET qualification holders. They commonly refer to finding lessons hard to follow and being afraid and/or shy to ask the trainers for clarifications. The interviewed TVET graduates majoring in mechanics reveal that they feel discouraged and inadequate at work due to their limited knowledge acquired from the TVET program and their poor perception of how their view on them. “Most of my C1 and C2 students can’t read and write well. So, I have to spend more time explaining to them. As a result, my lessons aren’t normally finished as planned,” said a TVET trainer. According to the interviewed TVET trainers, C1 and C2 students have the lowest absorption capacity due to their limited foundational knowledge of certain fundamental subjects such as mathematics, reading and writing.

How are TVET and University graduates incentivized and/or motivated to value skills?

According to the data from FGDs and KIs, pursuing a technical skill seems to be a relatively new concept, especially among GHE graduates. Almost 90 percent of the interviewed GHE graduates admit that they had little to no knowledge about TVET and/or its curriculums. In fact, they claim to have never heard about the TVET system throughout their studies in high school. “No, I’ve only heard of university studies and majors as there were guest speakers from various universities who came to my high school,” responded one of the GHE bachelor’s degree graduates of FGD 2. TVET graduates on the other hand, typically learnt about TVETs through their close circles of family and friends who had personal connections in or familiarity with the TVET system. The data seems to suggest that there are branding issues with TVETs in the general population, as they have been in operation for decades.

The data indicates that the lack of public awareness of the TVET system and skills promotion has narrowed career options for GHE graduates when deciding to pursue higher education, especially for those in the provinces. GHE graduates have revealed that they were so focused on the skills offered by universities that they did not consider other pathways. “To be honest, I didn’t even know what I wanted to learn when I had started my university studies. After talking to a lecturer, I decided to go for the IT major due to its popularity. [...] My current

work involves electrical work more so than IT. If I had had known about skills at TVETs, I would have chosen electricity as a major instead,” explained a GHE bachelor’s degree graduate of FGD 4. There are cases where GHE graduates have admitted that they would have chosen to pursue a technical skill at a TVET rather than go to a university had they known about them. The most common reason provided for this is to fulfil one’s personal interest. Fredman (2014) finds similar results with students choosing to acquire skills at a TVET rather than a degree at a university for reasons related to personal interest.

However, the majority of interviewed GHE graduates seem to hold a stereotypical image of technical skilled workers. They tend to presume that technical skilled workers would normally work as labourers in factories and/or construction sites. They seem to share the common public view that TVETs are only meant for the lower class or poor school performers. With this view in mind, they may have less interest in TVETs in general. This is illustrated in one of the selected research sites, where a TVET campus is located across the main street from a university. The TVET has been operating in the area long before the university, however, the interviewed graduates of that university reported to have never noticed, heard of and/or visited the TVET campus.

In fact, regardless of the public perception at large, the data seems to reveal a hopeful emerging trend in young graduates valuing technical skills. For instance, one of the interviewed graduates, following a passion and childhood interest, turned down a full scholarship at a university to pursue a technical skill at a TVET. Moreover, one of the interviewed GHE graduates ended up enrolling into a technical skill program at a TVET after graduating from a university, with the main motivation being to chase his future dreams of running a business. About 10 percent of the TVET graduates attest to this new trend. Although the graduates have had good high-school grades, they did not apply to any universities. Instead, they enrolled into a TVET to obtain a technical skill, motivated by similar, earlier mentioned reasons: childhood interest and goals of starting a future business. This discovery seems to imply that the value of technical skills offered by TVETs, to a limited extent, has been more recognized recently among job seekers. This result may be explained by the rising demand for technical skilled

labour in the market and the perceived derived entrepreneurial opportunities.

Regarding skills selection, the data shows that, similar to the majority of GHE graduates, most of the interviewed TVET graduates selected their skills and TVET through a consultation with their parents, relatives and/or friends. Many of them followed suggestions from their personal and most trusted mentors who have successfully participated in the labour market. About 30 percent of TVET graduates knew immediately which skills they wanted to pursue through TVET, based on their favourite childhood hobby. The data seems to indicate that word of mouth is an effective promotional method for potential young TVET students. "I chose the skill and TVET as suggested by my uncle," said a TVET diploma graduate of FGD 1. The data further shows that after participating in the workplace, the interviewed graduates tend to appreciate the quality of the training and workshop equipment more than the nice look of the campus. "I don't understand why my TVET decided to build another building rather than improving the old equipment at the workshop. We need more modern learning equipment than a new building. I think it's a waste of money," said a TVET diploma graduate of FGD 1. The majority of the graduates admit that due to their naivety and limited exposure at the time, the appearance of a TVET campus had swayed their decision when choosing which TVET to attend. They are keen on sharing these experiences to warn other potential students from making the same mistake. They would therefore recommend a TVET to their relatives and/or friends based on its training quality and equipment.

Furthermore, the data implies that secondary and high-school teachers may play an important role in TVET awareness raising and in improving the understanding of skills development among potential TVET students. Based on their personal experience and general observations, the graduates believe that secondary and high-school students tend to listen to the advice of their teachers the most.

According to the data, the interviewed graduates and parents alike would generally value a skill based on its perceived high economic return. For instance, the parents would encourage their children to pursue studies that they believe would allow the children to earn a good salary. This finding, as argued by Fredman

(2014), is a typical showcase of the 'return to investment in education' assumption commonly dominated by explanations of Human Capital Theory. By far, high achievers in this aspect are dominated by GHE graduates. Therefore, cases of successful TVET graduates in comparison to GHE graduates is more likely to garner more attention from the potential students and parents. As revealed by the data, universities have excelled in their branding, marketing and promotion. They directly reach out to high school students through organizing of guest speaker events, and/or other intentional promotional campaigns. In contrast, according to the data, TVET promotional initiatives are too rural-concentrated. This approach may be purposefully designed to target specific groups of people in order to serve the main goals of TVET policies. However, this approach may no longer be applicable in the context of today's competitiveness and climate.

To sum up, although still struggling with common stereotypes, technical skills have been evidently valued, to some extent, among job seekers due to the growing demands for these skills and their perceived entrepreneurial opportunities. Graduates have been motivated to value technical skills based on a number of factors such as their economic return, childhood interests, passions and future plans. The experiences of graduates also offers a glimpse into how to reach potential young students and parents, by finding the right persons of influence such as teachers, and focusing on the right places: high schools and/or urban areas.

4.1.3.1. Lessons Learnt from the Three Cases:

The current study finds that most of the challenges identified in the National Technical Vocational Education and Training Policy (2017-2025) still persist. However, the data suggests that TVETs have experienced them, somewhat, differently. In fact, there are cases where some TVETs have become creative in addressing quality improvement challenges, which can be drawn as lessons for application by others. Box 1 and 2 highlight some of the strategies employed by three TVETs in Phnom Penh to improve their training quality and graduates' employability. Due to their major similarity in operational and practical nature, the good practices of TVET two and three are grouped into one box and presented as Case B.

Box 1: Case A

“Improving the training quality is as important as strengthening relationships with the private sector,” explained the Rector.

Some Highlights of the Organizational Arrangement:

- ❖ A vision beyond producing only skilled workers, but to also be a resource for the society as a whole, regardless of background
- ❖ An established and functioning organizational structure with clear job responsibilities, qualified staff and regular auditing
- ❖ Regular annual staff performance evaluation, incorporating results from regular anonymous evaluations conducted by students

How training quality and private sector involvement are being improved:

- ❖ Applying a school-and-company based approach
- ❖ Building their image by focusing on the quality rather than quantity of the students
- ❖ Hosting guest trainers from abroad to provide training courses at the TVET lasting from 6 months to 1 year
- ❖ Recruiting top graduates and equipping them with proper training to ensure teaching quality
- ❖ Regular upgrading of qualifications of their trainers to higher degree levels
- ❖ Involving the graduates who hold top positions in companies to review TVET course curricula
- ❖ Applying strict morals and student regulations
- ❖ Maintaining close and good contact with graduates
- ❖ Facilitating the development of their graduate alumni establishment, by offering an office space within the campus
- ❖ Having an active and functioning graduate alumni: The alumni has registered its name with the Ministry of Industry, hosts regular alumni meetings, has a proper board member and organizational structure with regular staff employed by the alumni stationed at the office
- ❖ Incorporating self-development courses into the curricula as a compulsory course
- ❖ Conducting regular anonymous evaluations by students for quality improvement purposes
- ❖ Building relationship with private sector through graduates
- ❖ Conducting promotional campaign by visiting students in their classes at school

Source: Compiled by Author, 2019

Box 2: Case B

Quality Improvement and TVET Promotion:

- ❖ Recruiting experienced and highly qualified trainers, driven by the question of what the trainers can bring to the TVET
- ❖ Valuing good senior trainers
- ❖ Standardizing teaching materials for each subject. All trainers for the same subject would discuss and finalize the contents of the course materials to organize a standard textbook for the subject
- ❖ Partnering with TVETs abroad for equipment improvement and exchange programs
- ❖ Providing a dual training system: one- to two-year exchange programs for their students to study with their partner TVETs abroad
- ❖ Offer free additional classes for up to one semester to build students competency, provided upon request by the student
- ❖ Providing free English language classes to students
- ❖ Building capacity of their trainers through on-the-job training at factories for 2 weeks
- ❖ Approaching the private sector to build a relationship through their existing networks, including through their former graduates
- ❖ Promoting their image as a TVET through students entering national competition events
- ❖ Visiting grade 11 and 12 high school students at least once a year to promote the TVET
- ❖ Disseminating the TVET's brochures to grade 12 high school students during their state

Source: Compiled by Author, 2019

4.1.4. DISCUSSION

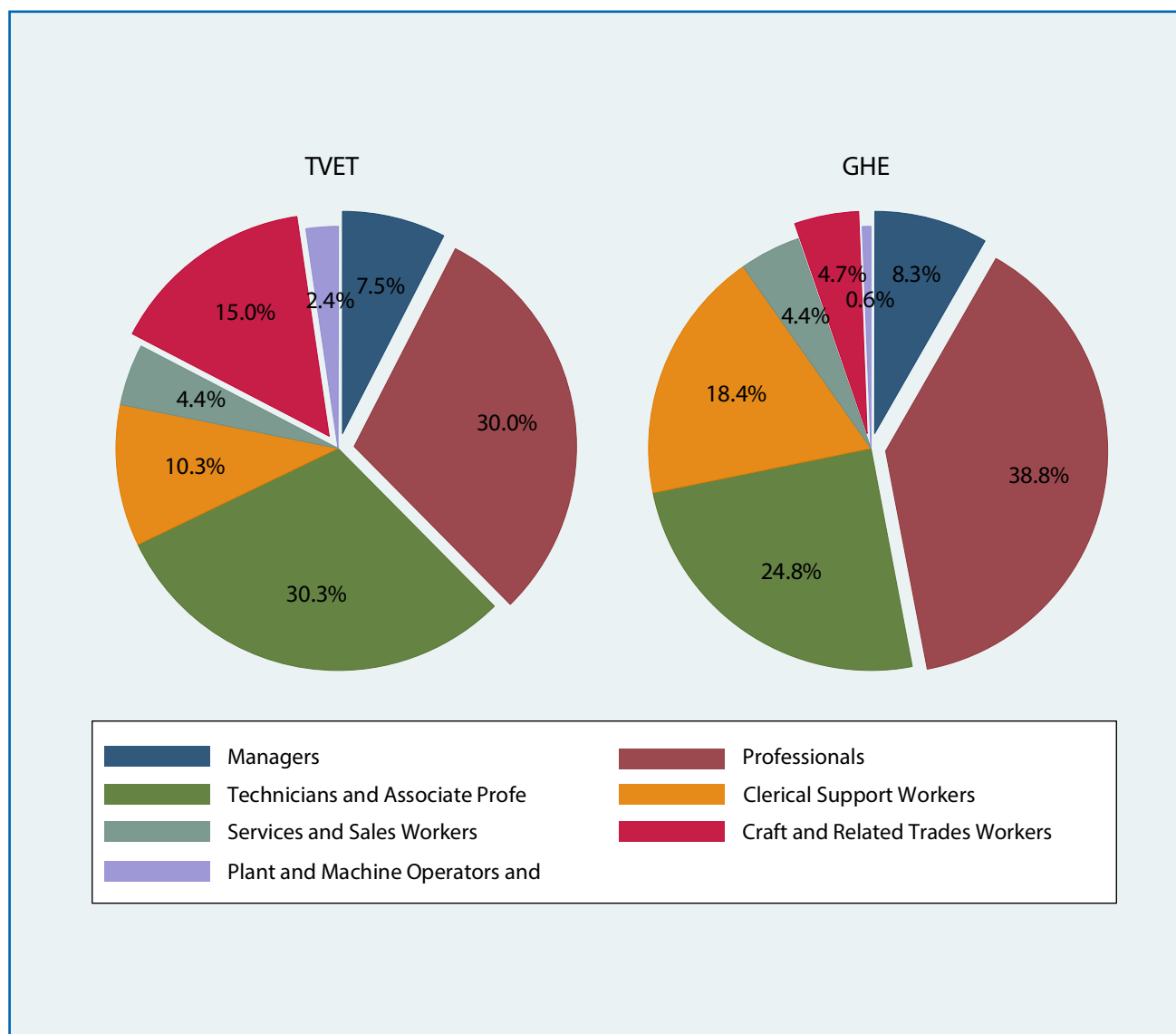
The set of results presented earlier fits within one or more of the following explanations.

Growing labour market demand for technical skills

A possibility is that the demand for skilled and technical labour is rising. Given the low supply of this labour force, this would lead to a shortage of skilled and technical labour, placing upward pressure on wages. Nationally, total incomes (in nominal terms) of an average Cambodian household rose by ten percent annually, reaching KHR1.96 million (about US\$490) per month in 2017. The share of wage income per total incomes

increased to 53 percent in the same period—a 17 percent rise from last year. The share of self-employment income decreased, amounting for 42 percent of total incomes (National Institute of Statistics, 2017). By education level, nominal wages paid to TVET graduates increased by five percent per annum during 2015 to 2017. Wages among TVET graduates are also projected to increase further in the next five to eight years, given the current market demand. Our qualitative analysis also indicates the high demand among private firms to recruit TVET graduates over GHE graduates—the main reason being that TVET students are more willing to accept the offer, partly because of their low bargaining power in wage negotiations.

Figure 4.4: Labour force profile of graduates by professional level



Source: Author's calculations.

The current labour force profile in small, medium and large enterprises is indicative of the need for professional qualifications demanding technical and vocational education and training over general higher education.

Figure 4.4 highlights the labour force profile of TVET and GHE graduates. Overall, the data shows that the labour force profile concentrates on professionals and technicians and associate professionals—33.4 percent for the former and 28.5 percent of the latter. Managers accounted for 7.7 percent of the total. A similar pattern is

observed when the labour force profile is disaggregated by education level (TVET vs. GHE). That is, within TVET, 30.7 percent of TVET graduates were technicians or associate professionals, 30.0 percent professionals and 15.0 percent craft and related trade workers. Only 7.4 percent of the total were managers. Under GHE, 38.4 percent were professionals, 25.4 percent technicians and associate professionals and 18.4 percent clerical support works. 8.2 percent were managers. The presented labour force profile partially indicates occupational segregation, with GHE graduates wanting to work in white-collar

occupations more so than those TVET graduates. Thus, given that demand for blue-collar skills is expected to rise, TVET graduates will be more in demand. On the supply side, TVET enrolment in public training and registered training institutions under the Ministry of Labour and Vocational Training rose by 14.3 percent between the 2016-2017 and 2017-2018 academic years, reaching a total of 44,806 enrolled students. During the same period, the graduation rate increased to 75.5 percent annually.

Prior work experience could also explain the lack of wage differences between TVET and GHE graduates. Our data shows that TVET students were more likely to participate in internships or apprenticeship programs during college—59.3 percent versus 54.1 percent of GHE graduates. The OLS regression results indicate a statistically significant increase of 5.3 percent on wage earnings if the student participated in internships or apprenticeships during the course of their studies. As mentioned in the qualitative analysis, although TVET graduates face challenges in terms of lack of confidence and skill inadequacy, their internship placements have proved to be crucial in preparing them for the labour market. This, therefore, further confirms the significance of any efforts to promote PPP initiatives.

On the public policy front, the government also focuses on technical and vocation education in its efforts to improve human resources in response to the growing economy and, more importantly, the coming digital economy. Under the Rectangular Strategy 4 (RS4) for Growth, Employment and Efficiency and the National Strategic Development Plan 2019-2023, there is an emphasis on increasing the education response to labour market demands and improving livelihoods in accordance with the concept of “one youth has at least one skill in life”. With a total fund of US\$5 million, the Skills Development Fund- jointly developed by the Ministry of Economy and Finance and the Asian Development Bank in 2018- is a policy agenda aiming to stimulate the participation of the private sector in skills development of the workforce. This is in response to the observed skills mismatch and insufficient involvement of the private sector in skills building. The initiative is

taken under the assumption that on-the-job training is crucial for both employers’ and employees’ profitability, through increased labour productivity, and career growth of employees. The government also continues to raise awareness on the importance and necessity of technical and vocational skills for building the future of the youth, their families and the country.

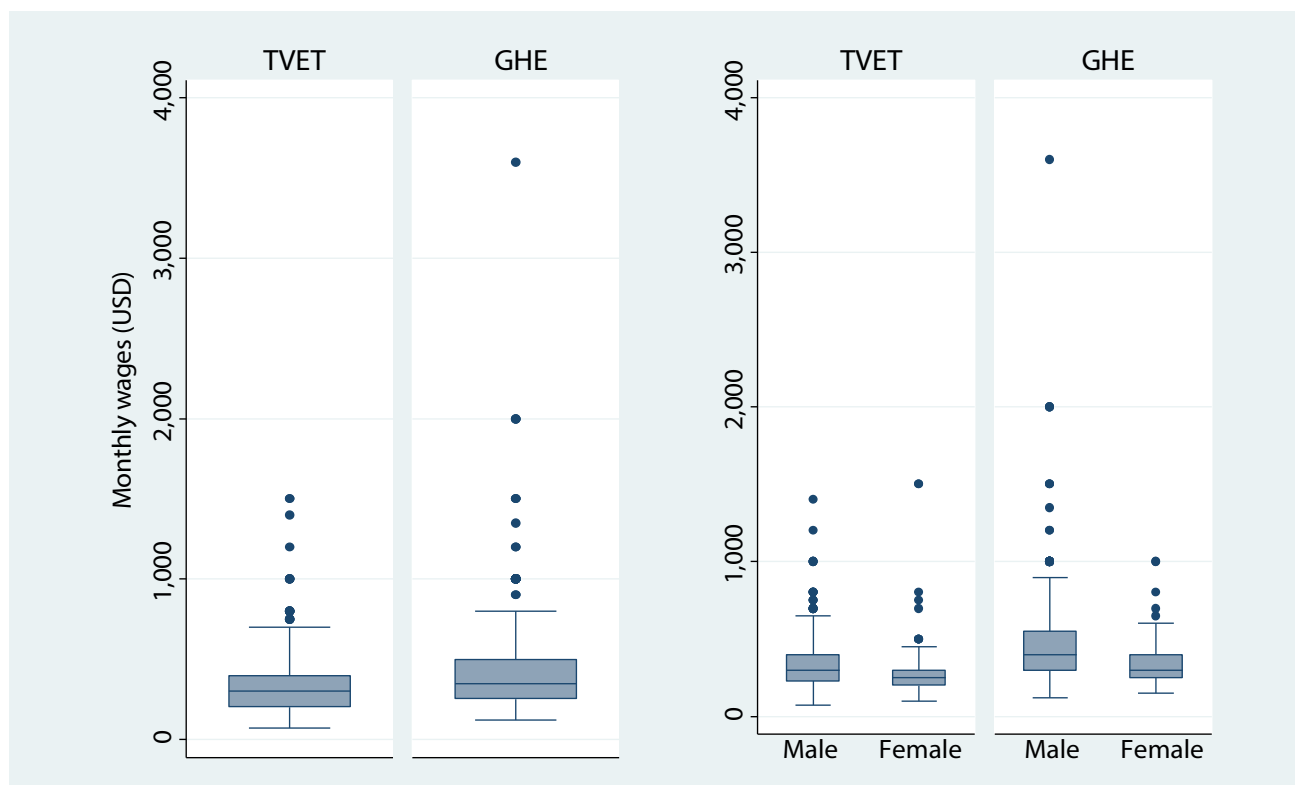
Over-supply of university degrees despite increase in jobs demanding less than a university degree

Over-education of GHE graduates can also contribute to the growing demand for TVET graduates. If that is not the issue, the current situation is potentially due to the fact that GHE graduates are over-qualified beyond what is required of the job vacancies on offer, or that the labour market cannot absorb the large number of fresh graduates produced through GHE. In fact, the number of GHE students graduating grew by an annual average of 15 percent between 2014 to 2018, reaching 30,000 individuals in the 2017-2018 academic year. The number of TVET graduates is lower even though the annual growth rate increased during the same period, amounting to 20,000 graduates in 2018.

Our data indicates similar trends, with, reservation wages of GHE graduates found to be higher than those of TVET graduates. In other words, the lowest wage level (US\$432) for an average GHE graduate to accept a job offer is higher than that of a TVET graduate (US\$326) (see

Figure 4.5). The difference is highly statistically significant, with a confidence level of less than 1%. By gender, male graduates demand more than female ones regardless of education level (TVET and GHE). This relatively high reservation wage could be a contributing factor for employers hiring TVET graduates with similar characteristics to GHE graduates. The finding is also confirmed by our qualitative analysis of employers’ perception on the ease of recruiting TVET graduates over GHE ones. All of the interviewed TVET graduates, when discussing job benefits, similarly recalled accepting their first offers without any negotiation, which is not the case for most GHE graduates.

Figure 4.5: Reservation wages by education level and gender



Notes: Three respondents reported a minimum wage required to accept a job offer of US\$2,000 or more per month. These observations are more likely outliers in the distribution and could affect the mean. We excluded the observations and found similar results of statistically significant differences of reservation wages between TVET and GHE graduates. This is also applied to differences by gender.

Source: Author's calculations.

Skill mismatch is another possible explanation for the demand for technical skills provided by TVET. When asked the reasons why they wanted to change their current jobs, a majority of the respondents reported that they wanted to better use their skills/qualifications, indicating that their current occupation does not correspond to the skills they acquired. By education level, this reported reason is more common among GHE graduates than TVET ones. 36.2 percent of responses from TVET graduates indicated wanting to better use their qualifications/skills compared to 43.0 among GHE graduates. Obtaining better pay is another reason, with no differences depicted between TVET and GHE graduates. Most qualitatively interviewed TVET graduates secured a job suited to their acquired skills, more so than GHE graduates.

Growing popularity of STEM jobs

The study shows that both TVET and GHE graduates majoring in STEM—electricity, civil engineering and information technology—command higher wages than those with social science majors. The popularity of these sectors might explain the fact that TVET is considered an effective solution. The National Employment Agency (2018) presents a job outlook index (JOI) by profession, estimating jobs which were in demand in 2018. The results show that STEM jobs, computer, information technology and multimedia, were the most common—having many vacancies and ease of landing a job. Sales, purchasing and marketing, administration, economics, finance and law were the least common. That is, there were few vacancies in these sectors, and high job competition. However, the qualitative analysis found

that current TVET schools are overlapping and diversified, which does not take advantage of the growing popularity of STEM job and also diffuses limited available resource, especially in the cases of TVETs that depend solely on government funding. Also, gender stereotypes are believed to be a main factor in the underrepresentation of females in STEM programs. It should also be noted that, besides technical skills, employers also consider soft skills—communication and interpersonal and problem-solving skills. The same report highlights the lack of English competency among job seekers in almost all professions.

In summary, we find no statistically significant wage differences between graduates of vocational education and higher education. Indeed, TVET graduates tend to have comparative advantages in terms of expedited school-to-work transition compared to GHE graduates. However, these results do not reflect the high level of their employability in general. The experiences of graduates indicate that the technical and general skills provided by TVETs are inadequate for them to retain jobs and advance their career. Also, females earn less than males, and are more likely to enrol in social science courses. In high school, females have a tendency to prefer English language and literature subjects over mathematics and other STEM subjects.

Our results contribute to TVET-GHE debates by pointing to the trade-off between smooth and quick school-to-work transitions provided by vocational education and training, and adaptability and flexibility provided by general academic education. TVETs have a high potential to equip the young labour force with technical skills. However, in order to effectively contribute to youth employability, TVETs need to be specialized and to prioritize quality improvement. For further research,

deciding whether the current dual system of TVET and GHE is effective in skilling students and what level of high-school education is more favourable and sufficient for TVET students to achieve adaptability and flexibility are of policy relevance. Current debates also seem to be directed towards the long-term impacts of vocational education and training, particularly how flexible TVET students are in manoeuvring the world of work and in dealing with the fast-changing technology advances which could soon make certain jobs obsolete. Thus, the ability to adopt and adapt—characteristics that employers are looking for—is crucial.

4.2. MACROECONOMIC RESULTS

4.2.1. SIMULATION SCENARIOS

There are two main simulation scenarios in this study used in order to figure out the different impacts of public spending on TVET and non-TVET education sectors on Cambodian macroeconomics, factor market and household income levels. The study will compare the different impacts of injecting financial resources into TVET and non-TVET education sectors.

As indicated in Figure 4.4 and Figure 4.5, government spending on TVET is relatively low compared to spending on the non-TVET education sector. The simulation starts by increasing spending by US\$10 million (approximately 67 percent increase of total TVET spending) into the TVET sector. The same amount will be spent on non-TVET education sector. The source of funds is through ROW transfers, such as ODA from development partners or transfers from abroad.

Table 4.5: Modelling Designs for all scenarios

Model Design	Description
Labour is mobile across sectors.	Labour can move across sectors within its education category; for instance, low educated labour in the financial sector can move to work as low educated labour in the TVET sector but cannot become fairly educated or highly educated labour.
Economy is running on full-employment.	Following classical economic theory, labour can always find a job. Wage rates will adjust if there are changes in the demand for labour.

Non-education capital is fixed and immobile across sectors.	Capital stock, except education capital stock, of each sector cannot increase in the short-run. When there is a demand or supply shock, the rate of capital will adjust. Also, the capital stock of each sector is not mobile across sectors. For example, a hospital building will only be used as a hospital, and cannot be converted to a bank or school building.
The volume of education capital (KEDUTVET, KEDUNon-TVET) is endogenous and immobile across sectors. The rate of KEDU is exogenous.	Different from capital stock of other sectors, capital stock of the two education sectors (TVET and non-TVET) are set as endogenous in the model, which means they can be increased or decreased according to the demand and supply of the sectors. The rate of education capital is fixed.

Table 4.6: Description of Scenarios

Scenarios	Description	Specific simulation design
Simulation Scenario1	<p>US\$10 million will be injected into the TVET sector through an increase in government spending on TVET such as providing scholarships or subsidizing TVET school fees.</p> <p>This amount will be financed mainly by ROW transfers (ODA) (Khondker, 2019).</p>	<ul style="list-style-type: none"> ❖ Total government consumption is endogenous ❖ Composite government consumption is exogenous ❖ Government saving is fixed
Simulation Scenario2	<p>US\$10 million will be injected into the non-TVET sector through an increase in government spending in this sector such as providing scholarships or subsidizing non-TVET school fees.</p> <p>This amount will be financed mainly by transfer from rest of the world (ODA).</p>	<ul style="list-style-type: none"> ❖ Total government consumption is endogenous ❖ Composite government consumption is exogenous ❖ Government saving is fixed

4.2.2. SIMULATION RESULTS

4.2.2.1. Macroeconomics Impacts

The injection of financial resources into the economy through increasing public spending on TVET and non-TVET education sectors will simply raise final consumption in the economy, which could create a positive impact on output and GDP. However, given the level of production and supply flexibility, this kind of policy could cause a certain level of inflation in the short-run.

According to Table 4.7, the level of real GDP increase in the two scenarios is almost the same. Real GDP increases by US\$7.47 million, which is around 0.04 percent in simulation 1 while it grows by US\$7.33 million in simulation 2. On the contrary, nominal GDP increases more in simulation 2 than it does in simulation 1, clearly indicating the higher inflation rate induced by simulation 2. It is observed that the inflation rate (CPI) in scenario 2 increases by 0.064 percent, while only by 0.051 percent in scenario 1. This can be explained by the higher increase in wage rates, household incomes, and household final consumption in scenario 2, which will be

illustrated in the following sections in separate figures and tables.

Increase in demand from the government for TVET and non-TVET services requires these sectors to raise their supply of services in order to meet the increased demand. This will surely require more labour and capital ¹⁶. Since in the short-run, labour numbers cannot increase, labour from other sectors will have to move into the TVET and non-TVET sectors in order to supply more services in accordance to demand. This will cause a shortage of labour and an increase in wage rates in other sectors. Existing labour obtains higher wages, which will positively impact household incomes. Households earn greater incomes and increase their consumption on available commodities, which will ultimately cause price increases in all sectors, as indicated in Figure 4.6. Nevertheless, as shown in Table 4.8, the increase in wage rates due to the movement of labour from other industries to the TVET and non-TVET sectors would decrease production or output of many industries, particularly industries that were previously hiring more HEL from both TVET and non-TVET sectors.

Table 4.7: Changes in Basic Economic Indicators (%)

Indicators	Sim1		Sim2	
	%	Value Million USD	%	Value Million USD
GDP at Market Price	0.091	16.94	0.103	19.15
Real GDP	0.04	7.47	0.04	7.33
Consumer Price Index	0.051	-	0.064	-

Source: Authors' calculation from the model

Table 4.8: Output by industry (%)

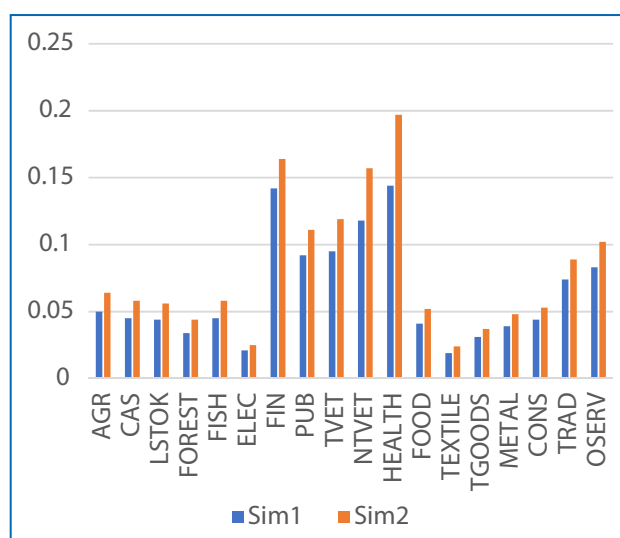
Sectoral Output_XST	Sim1	Sim2
AGR	0.011	0.013
CAS	-0.013	-0.018
LSTOK	0.002	0.002
FOREST	-0.011	-0.015
FISH	0.014	0.017
MQ	-0.019	-0.025

¹⁶ Education capital (kedu) is endogenous in the model, which means it can be increased according to demand.

MANU	-0.026	-0.035
ELEC	-0.026	-0.026
CON	0.004	0.001
WSAL	-0.046	-0.063
HOTEL	-0.019	-0.025
TRANS	-0.020	-0.029
FIN	-0.083	-0.092
RESTAT	0.019	0.019
PUB	0.000	-0.001
TVET	58.565	0.048
NTVET	0.033	2.560
HEALTH	-0.038	-0.059
COMTY	-0.065	-0.081

Source: Authors' calculations from the model

Figure 4.6: Price of Local Product (%)



Source: Author's calculations from the model

4.2.2.2. Factor Market Impacts

Figure 4.7 specifies the increase in wage rates for all types of labour in both scenarios 1 and 2. According to the figure, wage rates of all type of labour increase more in scenario 2. This can be described by the different production structures of the TVET and non-TVET education sectors. In order to produce its services, the non-TVET education sector requires more labour than the TVET sector does. As indicated in table 3 in the above section, only 37 percent of factor endowment in the TVET sector is from labour, while the figure is up to around 54 percent in the non-TVET sector. Therefore,

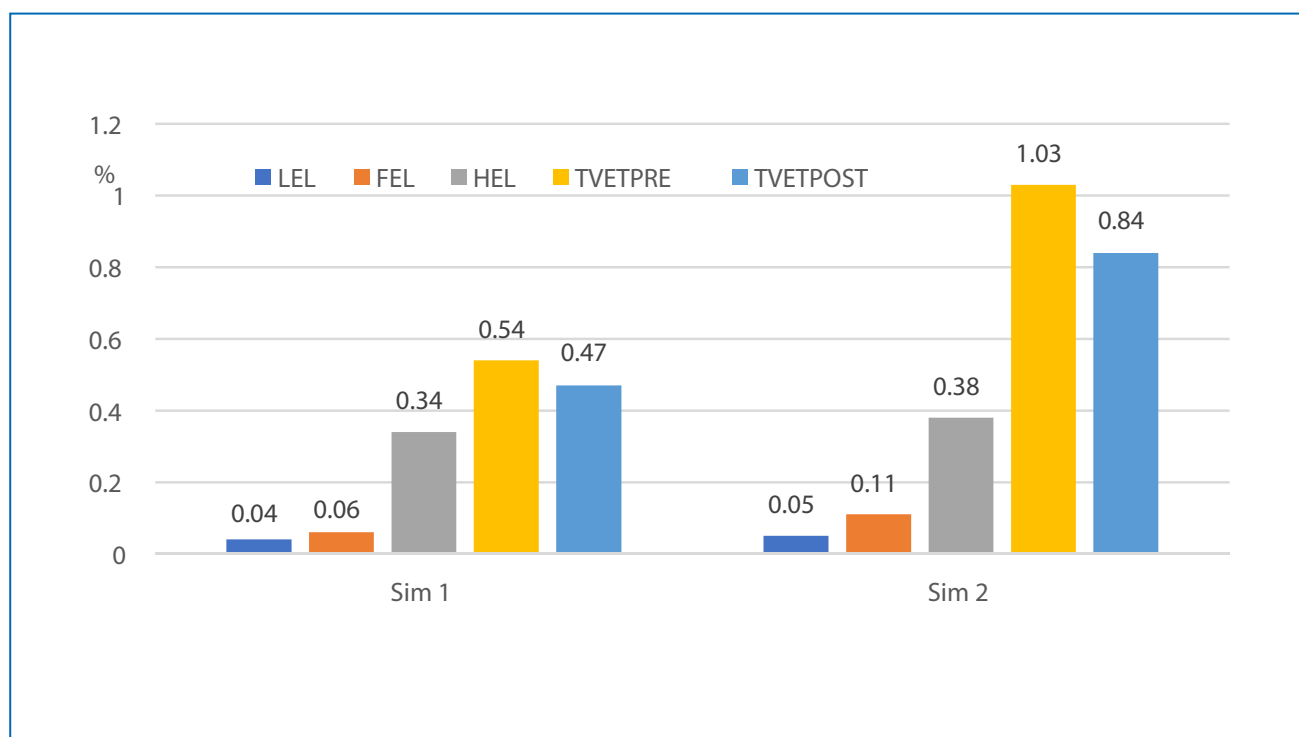
even though the same amount of funds were injected into both sectors, impacts on wage rates of labour vary – the non-TVET education sector applies more positive pressure on wage rates, inducing higher labour incomes.

Additionally, it is worth noting that the percentage change of wage rates of TVETPRE and TVETPOST labour are the highest among the five types of labour categories. Actually, to produce their services, the TVET and Non-TVET education sectors require more HEL than TVET labour – the TVET sector employed HEL accounting for up to 26 percent of the total factor of production. Hence, HEL would obtain the highest actual incomes (in value terms) among the five types of labour. Yet, wage rates of both TVETPRE and TVETPOST labour increase by a higher percentage than those of HEL. This could be due to the fact that the contribution to the economy from the existing amount of TVET labour remains relatively small. A small increase in actual income for these two types of labour will cause a high increase in percentage change. Also, the available existing number of TVETPRE and

TVETPOST labour in the economy is relatively small comparing to HEL. Therefore, the increase in demand for TVET labour will put more pressure on the wage rates of this type of labour than on HEL. As a result, the percentage share increase in wage rates of TVETPRE and TVETPSOT labour is higher than that of HEL's.

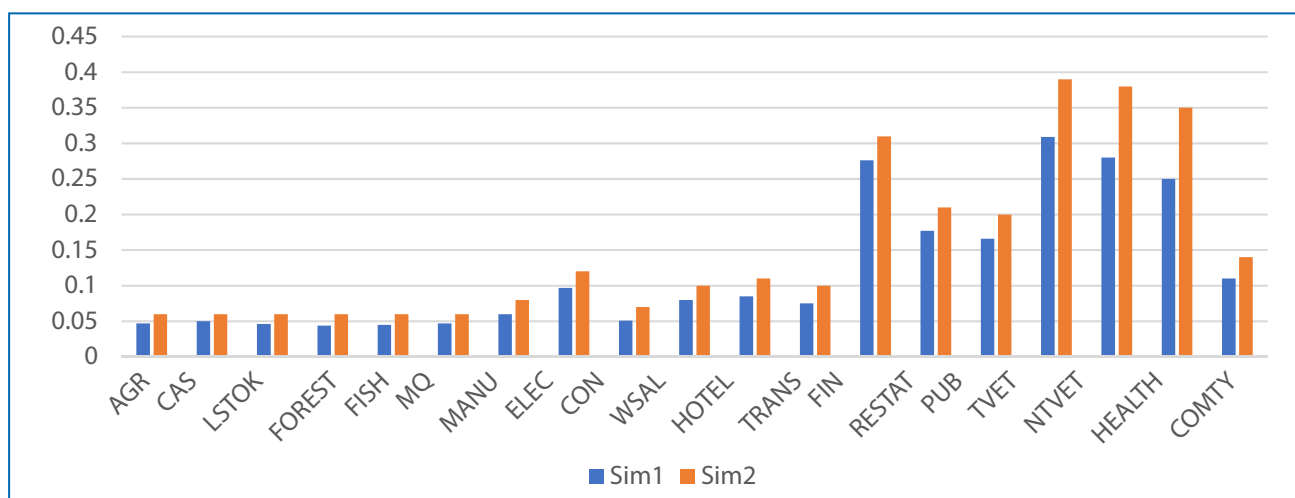
Last but not least, Figure 4.8 indicates wage increases in all sectors of the economy resulting from the policy-driven increase in public spending on the TVET and non-TVET sectors. Since labour is freely mobile across sectors, the increase in demand for all types of labour, particularly for TVETPRE, TVETPOST, and HEL, puts more pressure on the wage rates of both sectors – wage rates in the TVET and non-TVET education sectors increased by approximately 0.3 percent. This has induced labour to move from other sectors into the TVET and non-TVET sector. As a result, wage rates of other sectors will need to be increased in order to retain their labour and to maintain a new balanced equilibrium.

Figure 4.7: Wage rate by labour type (% change)



Source: Authors' calculations from the model

Figure 4.8: Wage rate by industry (% change)



Source: Authors' calculations from the model

Table 4.9 shows the percentage increase of capital demand in order to respond to the increase in public spending on TVET and non-TVET. In simulation scenario 1, TVET capital needs to be increased by approximately 59 percent in response to the US\$10 million injection of funds by the government. The percentage change for TVET is higher than non-TVET due to the fact that the available amount of existing TVET capital is relatively small compared to capital in the non-TVET education sector.

Table 4.9: Capital Demand of Education sector (% change)

Capital Demand for Education (Kedu)	Sim1	Sim2
TVET	58.84	0.27
NTVET	0.26	2.87

Source: Authors' calculations from the model

4.2.2.3. Impacts on Government income

Government income from direct tax, which is the tax collected from household income, increased more than others type of income. Income from indirect tax, which is the consumption tax, also increased. Noticeably, the collection of export tax decreased due to higher domestic consumption and higher price production.

Table 4.10: Government income from different sources (% change)

Government Income	Sim1	Sim2
Total Government Income_YG	0.454	0.468
Government income from Capital (YGK)	2.583	2.023

Gvt. Income from indirect tax_TICT	0.032	0.040
Gvt. Income from direct tax_TDHT	0.082	0.101
Gvt. Income from import tax_TIMT	0.024	0.028
Gvt. Income from export tax_TIXT	-0.016	-0.021

Source: Authors' calculations from the model

4.2.2.4. Impacts on Household Incomes

The final indicators used to study the impact of public spending on TVET and Non-TEVT are household income and expenditure. The increase in final government consumption on TVET and non-TVET sectors has boosted the demand for services from these two sectors, requiring more intermediate goods and services as well as more factors of production. As each household obtains the factor endowments from labour and capital differently, the impact on each household could be different from one simulation to another.

Table 4.11 indicates that the income of all household types increases in the two scenarios. It is striking that household income increases more in scenario 2 than it does in scenario 1, either in terms of percentage change or actual amount. This reflects that injecting funds into NTVET could generate more income (in terms of nominal value) to the three types of households. However, when the inflation rate is taken into account, the whole economy benefitted more from the policy in simulation 1, given the higher increase in real GDP.

As per the table, rural households receive a higher actual amount (value increase) of income than the other two

household types. On the other hand, HHPP and HHUP obtain higher incomes in terms of percentage change. It is worth noting that the number of HHRR in Cambodia is much higher than HHPPs and HHUBs. Hence, the total income of HHRR in the economy will inevitably be higher than that of the other two household types. However, a higher actual amount increase of total income of HHRR does not indicate that each HHRR benefits more than the other two household types. The percentage change in income should rather be focused on.

Households in Phnom Penh and households in other urban areas benefit more from the economy since they obtain a higher percentage increase of total income than rural households do. This could be due to the fact that HEL, who benefitted the most from the two policy simulations, mainly provided part of their incomes to households in Phnom Penh and some to households in urban area. TVETPRE and TVETPOST labour also provides part of their incomes to households in Phnom Penh and other urban areas. This causes the total income of each household in Phnom Penh and in other urban areas to increase by a higher percentage.

Figure 4.9 and Figure 4.10 specify the percentage change of household consumption on other commodities after the increase in their incomes, resulting from the two simulation scenarios. According to the figures, after obtaining higher incomes, all type of households increase their consumption on almost all commodities,

except in the Financial, Health, TVET, and non-TVET education sectors. Households reduced their spending on these commodities due to the high increase in their prices. The increase in public spending on TVET and non-TVET services boosted the demand for these services, raising wage rates of HEL in particular, and increasing sectoral prices of all sectors. Since the Health and Financial sectors are the two employing a significant number of HEL and TVET labour, the raise in wage rates of these labour types induced an increase in the price of health and financial services making them the highest among all commodities. This explains the reduced consumption of these commodities by households. Additionally, the increase in government spending on the two sectors, through school fee subsidies or scholarships, would somehow reduce the burden for households from spending on school fees, resulting in them reducing their spending on these two sectors.

Table 4.11: Household Income by Type of Household (% change)

Household	Sim1		Sim2	
	%	Value Million USD	%	Value Million USD
HHPP	0.094	3.21	0.114	3.89
HHUB	0.076	2.08	0.095	2.60
HHRR	0.063	6.59	0.081	8.44

Source: Authors' calculation from the model

Figure 4.9: Household Consumption by commodity (% change) Simulation 1

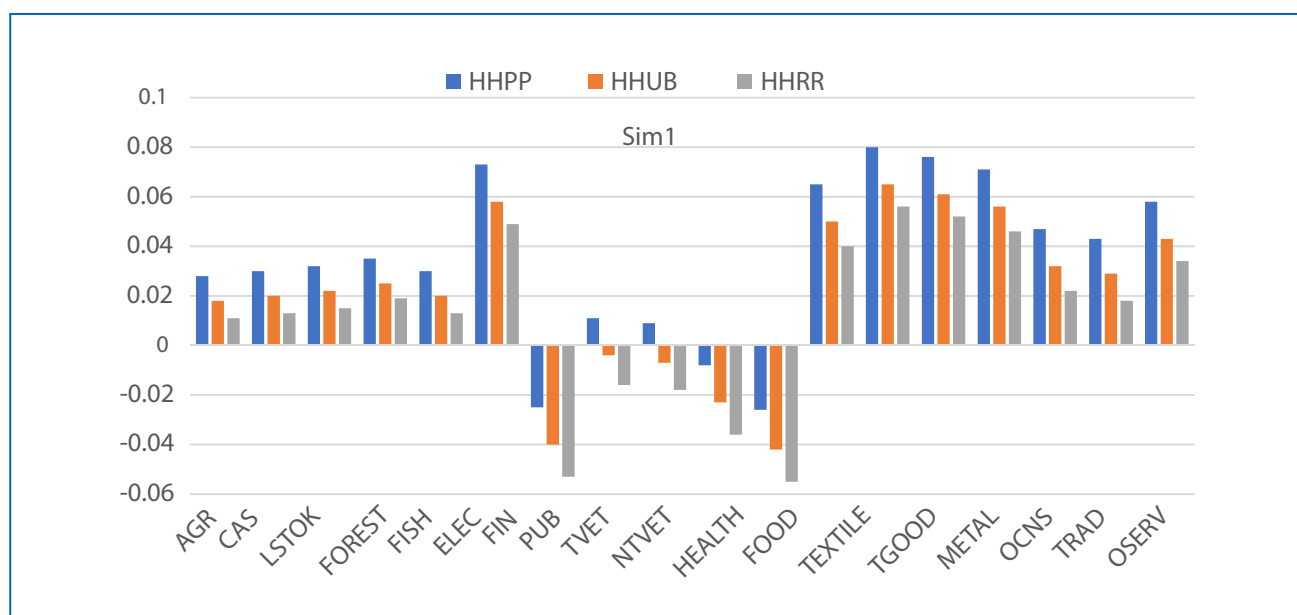
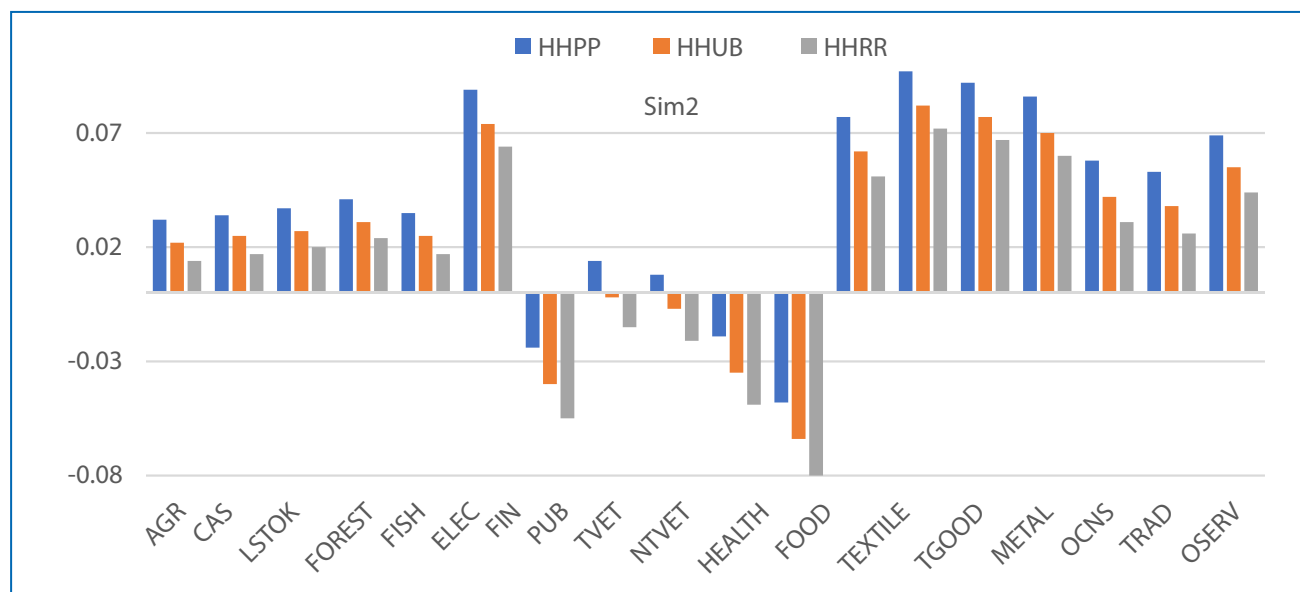


Figure 4.10: Household Consumption by commodity (% change) Simulation 2



Source: Authors' calculation from the model



5.

POLICY CONCLUSIONS AND RECOMMENDATIONS

Given the findings and explanations, we recommend the following for policy consideration.

Degree and major segregation. 80 percent of TVET graduates who completed Certificate Level 1 or 2 return to pursue an associate's or bachelor's degree, indicating that ability and skill competency gained from C1 or C2 might not be sufficient for job requirements or career advancement. Thus, the Ministry of Labour and Vocational Training may need to reconsider whether or not to provide C1 or C2 courses. Also, the Ministry of Education, Youth and Sport may need to reconsider whether or not to provide associate's degree programs as GHE graduates from these programs perform relatively poorly in comparison to TVET graduates with the equivalent degree. The focus, thus, should be on medium- and long-term TVET courses.

Quality rather than quantity. Relevant ministries may want to focus on providing a few good skills that are in demand by the market rather than trying to provide all kinds of skills. Electricity, information technology and accounting and finance are suggestions. Other estimates point to the demand for construction and hospitality skills over the next five to eight years. There is also a need for specializing of TVETs rather than them overlapping with one another. Given the expensive TVET operation costs within the context of resource scarcity, specializing in certain skills based on their market niche may help to reduce the current inefficiency in allocation of resources. Moreover, specialization also facilitates effective resource channelling. Perhaps during this early stage of the new TVET branding, each TVET could distinctively specialize in specific skills rather than offering similar skills to one another. Therefore, starting with the 39 TVETs under the Ministry of Labour and Vocational

Training, all TVETs, upon close consultation with stakeholder, should identify and agree on their potential skills development focus.

Improving the quality of all aspects of TVETs.

Administrative, managerial and technical development should be equality prioritized in all TVET development efforts. The findings of this study support the idea of PPP in TVET quality improvement. However, in order for such partnership models to be successful, support is needed from development partners, ministries, and the private sector such as: Ministry of Finance, Ministry of Industry and Handicraft, Ministry of Labour and Vocational Training, local and international Chambers of Commerce and/or Business Associations. There is a need to ensure that the curriculum of all TVET programmes are up-to-date and of high quality. One way to achieve that is to conduct regular private-sector consultations to understand current and future private sector demands for skills. Given that TVET institutions at provincial level perform relatively poorly in comparison to those in Phnom Penh, there is a need to focus such activity at this level.

Expediting of income diversification activities. All relevant ministries and TVETs themselves should speed up their efforts in diversifying sources of incomes for TVETs. This includes preparing TVETs ready to offer private, weekend and/or evening classes. On the one hand, the extra income may help ease the burden of limited and late budget disbursement, to some extent. On the other hand, it may help motivate and attract more qualified trainers to remain with the TVETs. The income diversification may require the TVET management and personnel to obtain a set of skills necessary for effectively coping with and managing this

new operational setup. Given their different development stages and situations, the skill sets given to each TVET should be individually tailored to fit its specific needs. Nevertheless, all skill sets should include entrepreneurship courses.

Upgrading workshop equipment rather than campuses. In any given limited budget situation, all infrastructure development efforts should prioritize workshop equipment upgrading rather than classroom and/or campus improvement. Although some may argue that a physically appealing TVET campus would improve the image of TVETs and help attract more potential students. This may work for a small portion of potential students and for the short-term. As suggested by the data, ultimately, quality of education being received is more important to potential students than what the campus looks like.

Basic subjects. The results show a lack of competency in mathematics and science subjects at high school level. The majority of surveyed students do not particularly enjoy these subjects, preferring literature and other non-STEM ones instead. They, however, acknowledge the importance of STEM subjects in achieving academic and career success. Thus, improving and strengthening teaching and learning of STEM subjects at lower and upper secondary education levels is highly recommended. In fact, this suggestion is not new, and the government, particularly the Ministry of Education, Youth and Sport, has already stepped up these efforts. Findings of this study support this.

English language competency. Continue to strengthen English language competency of TVET graduates. This would call for all TVET programmes to include English language competency components.

Females in STEM. Our results show that female graduates earn, on average, less than male graduates—

TVET or GHE. Wage differential is in the range of 20.7 to 28.8 percent (OLS estimates). The difference is more significant by major, particularly in electricity, civil engineering and information technology. In addition to reducing workplace discrimination and cultural biases against women—which could lead to a decrease in gender wage gaps—increasing their enrolment and retention in STEM courses is in the best interest of all relevant stakeholders and highly relevant given the rapid increase in skill-biased technologies. Understanding why girls are underrepresented in STEM subjects is also an objective of further research.

In a nutshell, our findings contribute to the current discussion of the benefits of technical and vocational education and training, either as an alternative or as a complementing education strategy in addition to general higher education. The findings of a lack of significant wage differences between TVET and GHE graduates, and a higher chance of landing a job after TVET graduation is encouraging, and somewhat countervailing, due to the perception that TVET is second-tier or second-rank education. Despite this, the challenge ahead for the government and the private sector is to encourage more students into the TVET sector—a tough battle that is worth the fight.

Finally, a more relevant thinking point for policymakers and practitioners is to provide education that allows students to adapt to the changing environment of the working world. This would demand a mixture of skill-specific subjects that equip students with the right skills needed by employers, as well as general skills that allow them to quickly adapt to changes in demand, should their existing skills become obsolete. The latter is even more relevant with the current speed of technological changes—which will affect the wages and employability of both fresh graduates and of the employed.



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ANNEX 1:

POLICIES

Policy and law directly to employment

National Employment Policy 2015-2025

There two goals of “**National Employment Policy 2015-2025**” for support employment in Cambodia are Goal 1 “To increase decent and productive employment opportunities” and Goal 3 “To enhance labour market governance”.

There are three objectives for Goal 1

1. First objective, the royal government wants to encourage decent and productive opportunities in macroeconomic policy framework through four measures: conducting annually monitoring and access macroeconomic performance, involving in policy dialogue through an inter-ministerial forum, creating and monitor job targets and improving the capacity of the inter-ministerial committee.
2. Second objective, royal government wants to encourage decent and productive opportunities in the sectoral development policies through four measures: evaluation jobs needs for males and females, finding importance subsector with high job potential, encouraging job in the priority subsector(s), encouraging domestic investment and FDI in priority subsectors and coordinate with proposed activities of Goal 2 and Goal 3 to meet potential job needs
3. The third objective is encouraging decent and productive job by allowing the transition of workers and economic unit from the informal to the formal economy with some measures include encouraging formal business registration; improving awareness among the business informal sector about registration; orientation informal and formal sector employees and employers on labour law and other related regulation, Job study, access and dissemination, income and efficiency implications of the informal business formalization; giving incentive to those who transform their information business into formal sector, inspire participation in decent employment creation; and encouraging entrepreneurship.

There are six objectives for Goal 3

4. First objective, royal government wants to build up information system and database of the labour market by making annual labour force survey; extending and improve this information; implement existing data collection and labour market information regulation with related stakeholders; frequently making annual

analyses to diverse target audiences; and building up capacity of accountable institute on data collection, manage and analyse.

5. The second objective is building up employment service effectiveness and increase outreach by building up the delivery of job services; building up guidance for various target groups on career, vocational and employment, in coordination with relevant stakeholders; facilitate of matching job hunters and employers' requests in the importance subsector(s); frequently making national and local employment forum to bring together job hunters and employers; building up network among education and TVET institutes, employers and job hunters; create more job centres; develop awareness of the service provided by job centres among job hunters and employers; and agree private companies give domestic recruitment services.
6. The third objective is making better work conditions and employee protection by building up labour inspection mechanism, improving the database of enterprises for monitoring work condition; reviewing the possibility of the ratifying relevant conventions that are applicable to the Cambodian context, modify the labour law, building up coordination with appropriate stakeholders, and expand coverage of social protection.
7. The fourth objective is to harmonize industrial relations and build up the wage-setting mechanism by studying and accessing legal and regulatory framework; build up the Arbitration Council and the labour advisory committee; build a more strong and evidence-based to the wage-setting system; build up labour a mechanism for settlement of labour disputes and generate labour court; and enhance the representation and collective bargaining capacity system at various levels.
8. The fifth objective is to make a possibility study to create an unemployment scheme by making feasibility assessment on creating an unemployment scheme in line with the Framework of Social Protection Strategy, raising awareness among stakeholders on the cost and benefit of unemployment scheme, and making initial stakeholder consultations on unemployment scheme.
9. The sixth objective is to supervise and protect migrant employees in gaining decent employment and skill acknowledgement by governance of labour migration, protecting and empowering migrant employees, building up service delivery for social and economic reintegration for returned migrants, progress information management system on migrant employees sent overseas and returning employees, enforce and encourage the application of the labour law, immigration law and other regulation linked to the management of foreign employees in Cambodia.

Labour Law and Legislation

10. Cambodia's Labour Law covers several areas including internships, probation, anti-discrimination, and job safety and health. The contract is made between the employee and the employer. As far as employment is concerned, the minimum age for wage work is 15, while it is 18 dangerous labour. Base on the type of work to be done, the probationary duration may not last longer than one to three months. With regard to anti-discrimination, an employer's wage should be equal irrespective of origin, sex or age. Night work and dangerous work are also regulated by Labour Law. Young people between the age of 15 and 18 are unable to carry out dangerous work, the exact nature of which is determined by the labour ministry. Minors aged 16 to 18 may be hired in factories or gold ore refineries at night if it is for training or an apprenticeship purpose. Future more, minors cannot work more than 8 hours a day and between one-time slot, to another, there must be at least 13 hours (ILO 2016).

Policies indirect to employment

The Rectangular Strategy Phase IV of the Royal Government of Cambodia (RGC) continues to implement from Phase III for “Growth, **Employment**, Equity and Efficiency”. The strategy goal 2, a strategy goal among the four strategy goals, is set by the Royal Government for their continued commitment to implementation for **employment**. This strategy goal creates more jobs for Cambodia citizens, especially for the youth. This strategic goal focuses on both quality and quantity of jobs. The rectangle 1 “**human resource development**” is set to respond to “quality and quantity of jobs” of the strategy goal 2. The rectangle 1 focuses on the strengthening of the quality of education, science and technology, technical training (TVET), and including gender in both education and TVET (RGC, 2018).

A. Policies for improving education

A.1. Rectangular Strategy Phase IV

The side 1 of the rectangle 1 of the Rectangular Strategy Phase IV focuses on:

1. Increasing salary and quality of teachers, education staff, and school principals, improving learning materials and experimental equipment
2. Encourage studies and stop school drop-outs by continuing to invest in the construction of primary schools at the village level and the secondary schools at the commune level
3. Teachers have to teach full-time and follow the curriculum of the Ministry of Education, Youth and Sport and improve the education institute governance
4. Technical education at high school level is expanded to help youth for enhancing career orientation by promoting the public-private partnership (PPP) with a concept of “One province has at least one general education and technical high school in the medium term and one district has at least one general education and technical high school in the long term”
5. “One youth has at least one skill in life” concept is created to respond labour market demand
6. Enhancing higher education

The Side 4 of rectangle 1 also responds to employment by:

7. Focusing on improving gender equity in education (RGC, 2018)

A.2. National Employment Policy 2015-2025

Goal 2 of “National Employment Policy 2015-2025” connect with side1 and side 2 of rectangle 1 of strategy goal 2 of The Rectangular Strategy Phase IV. Enhancing skill and human resource development is goal 2 of “National Employment Policy 2015-2025”. There are three objectives of Goal 2 and these objectives are set for both education and TVET (RGC, 2015b).

8. First objective, the royal government wants to enhance and expand the development of soft skills through four measures. All trainees, students and workers can receive soft skills of long-life employment by education and TVET programmes and short-course of soft skills. Other measures are the mainstreaming the soft skills into the curriculum of secondary school, TVET programmes and training of entrepreneurship skills. Last measure, public and private sectors have a very important role to participate in soft skill development programmes

9. Second objective is strengthening the quality of education and TVET in accordance with national, international and ASEAN standards and make easy to access these programmes. The ten measures are set to achieve this objective. First measure is taking ASEAN standard as a benchmark. The second measure is improving connection between education and TVET policies and the Cambodia Industrial Development Policy 2015-2025. Third measure is creating centres of excellence and competency testing centres. Providing bridging programme, providing the opportunity to vulnerable groups access to education and TVET and strengthen the 2nd opportunity to receive education project, are other three measures. The other two measures are increasing quantity and improve quality of teachers, education organizations and TVET organizations. The first and second point of the side 1 of the rectangle 1 also raises for the improving teacher quality and increasing education institutes. The last two measures are conducting monitoring and evaluation of education and TVET and developing national TVET policy
10. Third objective is improving education and TVET to respond demand for labour market. The royal government uses 8 measures to achieve this objective. First measure is organizing the sector-based approaches in education and TEVET by linking to “To promote decent and productive employment opportunity in the sectoral development policies (agriculture, industrial and service sector)”. The second measure is improving connection between education and TEVET provider and private sector. Third measure is providing more activities to students through work-based learning, internship and apprenticeship. Fourth measure is improving connection between stakeholders by improving existing institute mechanism and creating new institute mechanism. Skills development, provision of professional training, financial contribution, policy advice, needs participation of private sector is fifth measure. Other two measures are accreditation of professional programs within the framework of ASEAN and research and development of new technologies. The last measure is monitoring and evaluation education and TVET that response to labour demand (RGC, 2015b)

A.3. Cambodia Industrial Development Policy 2015-2025

The Cambodia Industrial Development Policy 2015-2025 also focuses on skills and human resource development for education to improve employment in the industrial sector. There are 9 points are set for improving education section:

11. Students can receive a second opportunity to finish secondary education (RGC, 2015a). This point is not set only for industrial sector but it is also set in objective 2 of the goal 2 of National Employment Policy 2015-2025 for supporting employment in other sectors (RGC, 2015b)
12. Strengthen the quality of some subjects include mathematics, sciences, literature and technology for primary and secondary schools
13. Encouraging students to study at least 9 years
14. Adding some soft skills in education program to improve the base of industrial development (RGC, 2015a). Soft skills are also set in objective 1 of the goal 2 of National Employment Policy 2015-2025 for supporting employment in other sectors (RGC, 2015b).
15. Encouraging the continuing education program to improve understanding of career and technical skills selection
16. Increasing training of some technical skills such as “electricity, electronics, mechanics, chemistry, standards and metrology for technical secondary and higher education”
17. Establishing more technical secondary schools (general education programme) with subject of “electricity,

electronics, information and communication technology, computer science, machinery, motorcycle and automobile assembly and maintenance, agro-processing and handicraft”

18. Enhance training from cooperation between three parties “government-training institutions-companies/factories”

19. Improve some subjects of university level such as agricultural sciences and other important sciences and engineering (RGC, 2015a)

A.4. Education Strategic Plan 2014-2018

To respond to challenges of youth education for employment, Ministry of Education Youth and Sports of Cambodia adopts Education Strategic Plan 2014-2018 to focus on seven key sub-sectors, among which are General Secondary Education, Youth development, Higher Education and Non-formal Education. MoEYS set Higher Education Vision 2030 policy to support Higher Education subsectors of this strategy that will be detailed below. Therefore, subsectors of Secondary Education, Non-formal Education and Youth development will be detailed here:

20. General Secondary Education : There are three objectives to improve general secondary education are to guarantee equitable and expanded access to general secondary education schools that respond all standards of quality in general education and motivate physical and sporting activity, to guarantee that graduates of general secondary school are equipped with the right skills and are able to hire or enter into higher education, to guarantee a fully functioning result-based management system for general secondary education.

21. Non-formal Education: There are three objectives to improve non-formal education are to increase the number of literates by access to non-formal education programs for out of school and analphabet children and youth, out-of-school children and youth and the illiterate knowledge and life skills that respond to the learner’s and community’s need to improve their quality of life, guarantee the full function of the non-formal education result-based management systems.

22. Youth development: Improving youth with three objectives are providing opportunities for young people to access quality and equity education, developing young people to be physical and emotionally healthy, inspiring young people to take initiatives and be creative in an entrepreneurial and leadership spirit (MoEYS, 2014a).

A.5. Higher Education Vision 2030 policy

Higher education vision 2030 policy set eight key strategies for students to complete their studies at higher education (MoEYS, 2014b).

23. Royal government help qualified students can study at higher education institutes by pay attention on “the upper secondary education curriculum and examination system, expand equitable access to higher education for qualified students, and strengthen the capacity of the Department of Higher Education”.

24. All higher education institutes help students with their good quality study programme include providing scholarship and improving some subjects include science, technology, engineering, creative arts and mathematics.

25. The royal government want to ensure qualified students can access to lifelong learning and professional development by providing license to higher education institutes with their capacity, building capacity of

higher education institutes for national and developing minimum standards

26. Developing quality of higher education institutions to meet national standard by helping all staff get professional skills and exchange programme with famous universities in other countries.
27. Royal government encourage higher education staff and students to develop research for Cambodia culture
28. The royal government want to students can graduate with knowledge and skills by including critical thinking, analytical and leadership skills, practical applications, and credit-based lifelong continuing education programs into study programme of higher education
29. "Ensure that all programs are developed in conjunction with analysis of national training provision and skill needs"
30. Improving cooperation between relevant ministries and agencies (MoEYS, 2014)

B. Policies for improving TVET

B.1. Rectangular Strategy Phase IV

The side 2 of rectangle 1 focuses on 5 points to respond to the concept of "each youth specializes in at least one skill in life" include:

1. The Royal Government of Cambodia continues to implement the "National Policy Framework on Education, Technical and Vocational Training 2017-2025" to respond to labour market demand
2. Encourage TVET institutes cooperate with enterprises to create training for workers, improving TVET programmes to respond to new technologies, promote the implementation of "National Fund for Skills Development"
3. Continue to organize technical training centres to support the actual sectors, especially for industrial sector by two types of cooperation. First cooperation is the cooperation between the state, private sector and non-governmental organizations. Second cooperation is the cooperation between training institutions and enterprises
4. Insight and encourage TVET institutes to create multiple skills to respond labour market
5. Providing information on TVET programme when students study at Providing at secondary and high school levels of the general education system (RGC, 2018)

The Side 4 of rectangle 1 also respond to employment by:

6. Focusing on improving gender equity in vocational training (RGC, 2018)

B.2. National Employment Policy 2015-2025

As mention above, the goal 2 of the National Employment Policy 2015-2025 is set for both education and TVET. There are three objectives of this goal include (see more detail in B.2) (RGC, 2015b):

7. First objective is "To enhance and expand the development of soft skills"

8. Second objective is “To improve the quality of, in compliance with national, international and ASEAN standard, and access to education and technical and vocational education training (TVET)”
9. Third objective is “To improve relevance of education and TVET to labour market demand”

B.3. Cambodia Industrial Development Policy 2015-2025

The Cambodia Industrial Development Policy 2015-2025 also focuses on skills and human resource development in TVET for improving employment in industrial sector (RGC, 2015a).

10. Adding some soft skills in TVET programme to improve the base of industrial development (RGC, 2015a). Soft skills are also set in detail in objective 1 of the goal 2 of National Employment Policy 2015-2025 for supporting employment in other sectors (RGC, 2015b).
11. Encouraging the continuing TVET programme to improve understanding of Career and technical skills selection
12. Increase training of some technical skills such as “electricity, electronics, mechanics, chemistry, standards and metrology for technical secondary and higher education” for TVET
13. Establish more technical secondary schools (TVET schools) with subject of “electricity, electronics, information and communication technology, computer science, machinery, motorcycle and automobile assembly and maintenance, agro-processing and handicraft”
14. Prepare technical and scientific training plan for industrial sector
15. “Incentives-based apprenticeship schemes” is an important programme for support industrial sector (RGC, 2015a). This programme is also set in objective 3 of the goal 2 of National Employment Policy 2015-2025 for supporting education and TVET (RGC, 2015b).
16. Improving technical training by cooperation with foreign investors
17. Enhance training from cooperation between three parties “government-training institutions-companies/factories” (RGC, 2015a). This point of this policy is set base on the side 2 of rectangle of the Rectangular Strategy Phase IV (RGC, 2018).
18. Provide more on-site technical and vocational training to factory workers to improve their skill (RGC, 2015a)

B.4. National Technical Vocational Education and Training (TVET) Policy 2017-2025

The first point of the second angle of rectangle 1 of the Rectangular Strategy will focus on pursuing National Technical Vocational Education and Training (TVET) Policy 2017-2025 implementation. This policy has four goals (MoLVT, 2017).

19. The three objectives are set up to receive the first goal “To improve TVET quality to meet national and international market demands”. These three objectives include improving quality of TVET base on Cambodia Qualification Framework (CQF), improving quality of teachers and resource to respond new technology and labour market demand, and improving technical and vocational park in industry or economic zones.

20. Royal government set up 5 objectives to receive second goal of this policy “To increase equitable access to TVET for employment generation”. These objectives are improving registration system for TVET, improving skill for vulnerable people and women, improving Cambodia qualification framework for all training institutions and stakeholder to expand TVET provision, improving knowledge about TVET system, and creating one-stop service and other convenient services for TVET.
21. The four objectives are set up to receive the third goal of this policy “To promote Public-Private Partnerships (PPP) and aggregate resources from stakeholders to support for sustainable development of TVET”. The four objectives of goal 3 include encouraging Public-Private Partnerships and cooperation with other stakeholders for TVET system and development study programme, preparing National Skills Development Fund from stakeholders, and preparing for tuition fees for TVET institutes and providing scholarship.
22. Royal government set up three objectives to receive the last goal of this policy “To improve the governance of TVET system”. These objectives are improving regulatory framework of TVET to create skills respond to labour market, preparing the fund for TVET institutes based on their results, continuing to improve information management system of TVET and labour market, and studying about skill demand (MoLVT, 2017).

B.5. Vocational Training and Employment Development Strategic Plan 2014-2018

Vocational Training and Employment Development Strategic Plan 2014-2018 has for outputs.

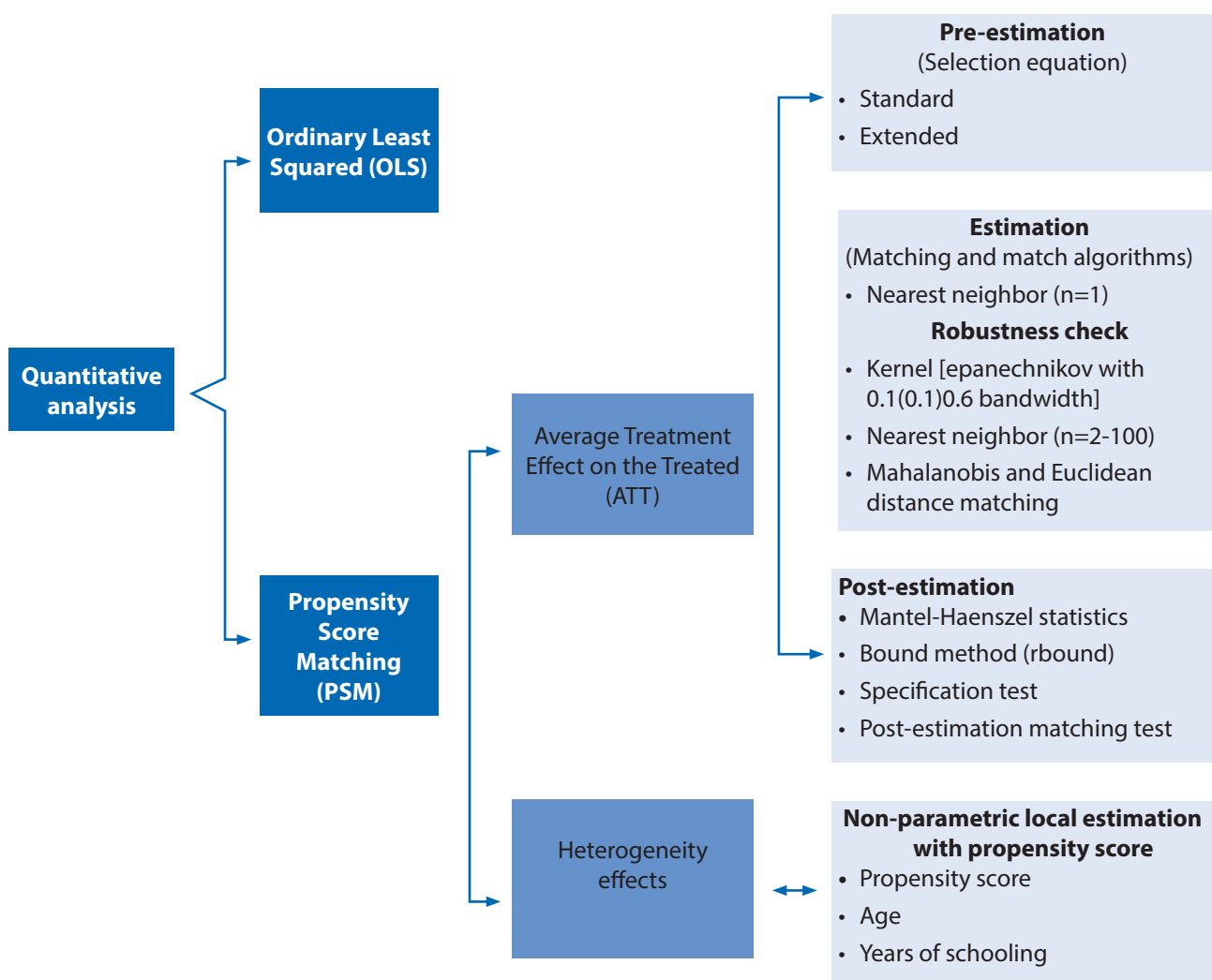
23. Output 1: Increased Access to TVET by presenting the Vocational Skills Certificate (VSC) at CQF Level 1, improving policies for recognition of prior learning and current competencies (RPL/RCC), founding TVET fee program for levels 2–4 training for disadvantaged youth and women, piloting women’s dormitories with vocation mentorship program, and promoting social marketing of TVET.
24. Output 2: Enhanced quality and relevance of TVET System by strengthening TVET Quality Assurance System, creation of TVET competency-based assessment and certification system, making better for TVET instructor training system, improving voucher skills training program, developing Skills Bridging Program (SBP) and developing TVET facilities.
25. Output 3: Improved participation of employers in TVET transfer by reinforce internship program, create Sector Skills Councils (SSC) and create Centers of Excellence (COE).
26. Output 4: Strengthened governance and management in TVET System by reinforce RTCs and PTCs to provide CQF Level 2 and above courses, build up financing of recognition of prior learning and current competencies (RPL/RCC), make stronger project management systems (MoLVT, 2015)

B6. Education Strategic Plan 2014-2018

Education Strategic plan 2014-2018 also has a subsector of technical secondary education high school to improving TVET. This subsector has three objectives are to guarantee equitable and expanded access to technical secondary education schools that respond all standards of quality in technical education and motivate physical and sporting activity, to guarantee that graduates of technical secondary education high schools are equipped with the right skills and are able to hire or enter into technical training, to guarantee a fully functioning result-based management system for technical secondary education.

ANNEX A1:

QUANTITATIVE ANALYSIS PLAN



Source: Author's preparation

ANNEX A2:

DEFINITIONS OF OUTCOME, TREATMENT AND OTHER CONTROL VARIABLES



Variable	Definition
Dependent	
Monthly wage/salary earnings	The amounts a respondent earns a month from her/his main occupation.
Wage/salary per hour	The amounts a respondent earns an hour from her/his main occupation (monthly wage/hours worked)
Hours worked past 7 days	The number of hours worked past 7 days in main occupation
Hours worked past month	The number of hours worked past month in main occupation
Employed immediately after graduation	Binary variable taking a value of 1 if the respondents had a job after graduation
Employed since graduation	Binary variable taking a value of 1 if the respondent had worked in the main occupation since graduation
Treatment	
C1&C2 versus AD&BA	Binary variable taking a value of 1 if the sample respondents graduated with C1 or C2 degree and 0 with AD or BA.
TVET versus GHE	Binary variable taking a value of 1 if the respondents were a TVET graduate and 0 a GHE graduate
Other controls	
Sex	Sex of respondents (1 male, 0 female)
Age	Age of respondents when they were at high school
Marital status	Marital status of respondents when they were at high school (1 single, 0 otherwise)
Migration	Binary variable taking a value of 1 if the respondents used to migrate, 0 otherwise
# of friends	The number of friends outside home the respondents reported having while they were at high school
Mathematics ability	Self-reported mathematics ability during high school (1 excellent, very good or good; 0 otherwise)
Life satisfaction	The level of life satisfaction respondents reported having when they were at high school (1 satisfied, 0 otherwise)
Facebook account	Binary variable taking a value of 1 if the respondents reported having a facebook account during high school
High school location	Geographical local of high school, 1 if in Phnom Penh, 0 otherwise
Distance (home to high school)	Average length (kilometre) from home to high school
Father's occupation	Binary variable taking a value of 1 if the father was in a highly skilled occupation while the respondents were at high school
Father's age	Age of father
Father's place of birth	Binary variable taking a value of 1 if the father was born in Phnom Penh and 0 otherwise
Mother's occupation	Binary variable taking a value of 1 if the mother was in a highly skilled occupation while the respondents were at high school
Mother's age	Age of mother
Mother's place of birth	Binary variable taking a value 1 if the mother was born in Phnom Penh and 0 otherwise
Parents' living standard	Parents' living standard when the respondents were at high school
Car ownership	Binary variable taking a value of 1 if parents owned a car when the respondents were at high school
Sibling	The number of siblings the respondents had during high school

Source: Author's preparation.



ANNEX A3:

SELECTION EQUATION

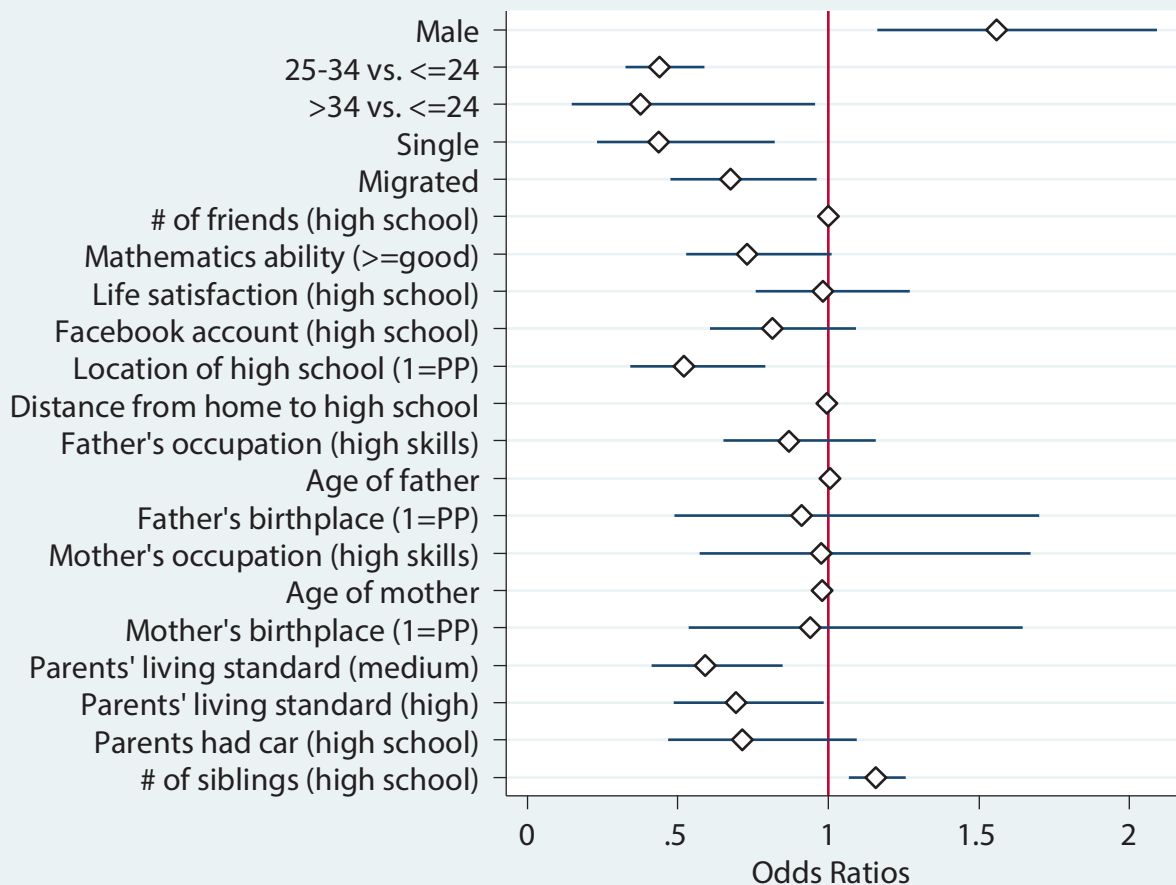
	(All)	(C1&C2)	(AD&BA)	(AD)	(BA)
Sex of respondents	0.443***	1.563***	0.224	-0.499	0.333*
	(0.150)	(0.308)	(0.153)	(0.330)	(0.193)
Age of respondents 16-24 (Ref.)					
25-34	-0.825***	-1.736***	-0.514***	-0.124	-0.041
	(0.151)	(0.262)	(0.159)	(0.308)	(0.248)
More than 34	-0.979**	-0.732	-0.887*	-0.907	-0.574
	(0.477)	(0.648)	(0.515)	(0.749)	(0.865)
Marital status during HS (1 single)	-0.826**	-0.511	-0.775**	-0.847	-0.511
	(0.322)	(0.410)	(0.337)	(0.519)	(0.498)
Migration status (1 migrate, 0 otherwise)	-0.392**	-1.315***	-0.174	0.086	-0.002
	(0.180)	(0.256)	(0.196)	(0.336)	(0.265)
Number of friends during high school	-0.001	-0.005*	-0.001	0.001	-0.001
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)
Self-reported mathematics ability	-0.314*	-0.696**	-0.216	0.973**	-0.337*
	(0.165)	(0.349)	(0.169)	(0.476)	(0.198)
1 if respondents satisfied with their life	-0.018	-1.000***	0.114	0.856***	-0.201
	(0.131)	(0.231)	(0.136)	(0.258)	(0.173)
1 if respondents had facebook account (HS)	-0.206	-0.490*	-0.121	-0.050	-0.292
	(0.150)	(0.262)	(0.156)	(0.292)	(0.204)
Location of high school (1 = Phnom Penh)	-0.654***	-1.886***	-0.386*	-0.278	-0.139
	(0.213)	(0.440)	(0.226)	(0.400)	(0.299)

Distance from home to high school	-0.005	-0.048**	-0.003	0.021	-0.014
	(0.010)	(0.021)	(0.010)	(0.022)	(0.013)
Father's occupation (1 = highly skilled)	-0.141	-0.148	-0.108	0.186	-0.192
	(0.147)	(0.254)	(0.152)	(0.296)	(0.190)
Age of father	0.005	0.003	0.004	0.026	-0.008
	(0.012)	(0.019)	(0.013)	(0.024)	(0.016)
Father's birthplace (1 = Phnom Penh)	-0.092	0.615	-0.114	0.466	-0.254
	(0.318)	(0.591)	(0.330)	(0.699)	(0.416)
Mother's occupation (1 = highly skilled)	-0.023	-1.428*	0.083	-0.221	0.396
	(0.273)	(0.787)	(0.272)	(0.596)	(0.311)
Age of mother	-0.020	-0.038*	-0.011	-0.023	-0.009
	(0.013)	(0.022)	(0.014)	(0.027)	(0.017)
Mother's birthplace (1 = Phnom Penh)	-0.062	-0.010	-0.035	0.373	-0.068
	(0.285)	(0.585)	(0.291)	(0.610)	(0.358)
Parents' living standard during high school					
Low (Ref.)					
Medium	-0.526***	-0.486	-0.414**	-0.985***	-0.163
	(0.184)	(0.338)	(0.191)	(0.358)	(0.240)
High	-0.368**	-1.063***	-0.214	-0.928**	0.096
	(0.180)	(0.379)	(0.185)	(0.384)	(0.225)
1 if parents owned car during high school	-0.336	0.142	-0.334	-0.251	-0.263
	(0.218)	(0.473)	(0.224)	(0.473)	(0.271)
Number of siblings during high school	0.147***	0.044	0.135***	-0.049	0.207***
	(0.042)	(0.065)	(0.043)	(0.079)	(0.055)
Constant	2.400***	2.986***	1.319*	1.743	0.650
	(0.633)	(0.953)	(0.679)	(1.256)	(0.923)
The balancing property	Satisfied	Satisfied	Satisfied	Satisfied	Satisfied
Observations	1,114	663	956	338	618
Pseudo R2	0.0773	0.2456	0.0427	0.0879	0.0444

Source: Author's preparation.

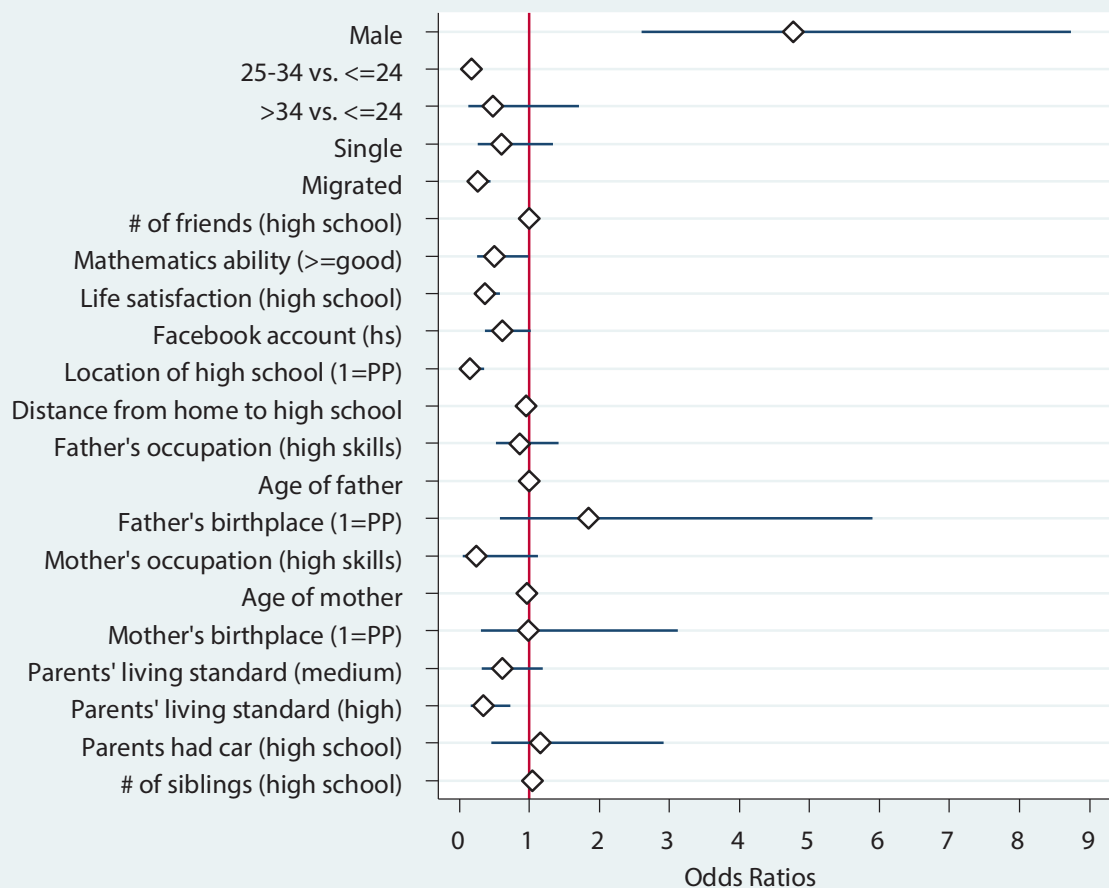
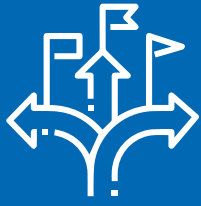
ANNEX A4:

FACTORS AFFECTING TVET EDUCATION (WHOLE SAMPLE)



ANNEX A5:

FACTORS AFFECTING CHOICE IN TVET EDUCATION (C1&C2 VS. AD&BA)



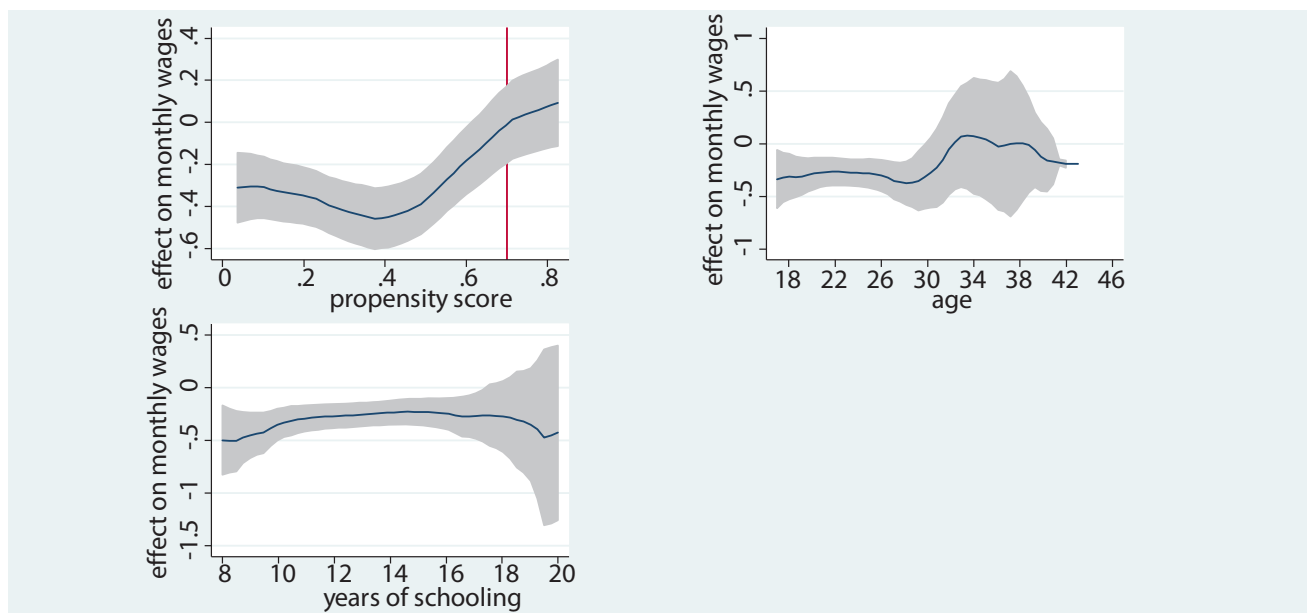
Source: Author's calculations.

ANNEX A6:

HETEROGENEITY EFFECTS: PROPENSITY SCORE MATCHING



Panel A: C1&C2 versus AD&BA (TVET)

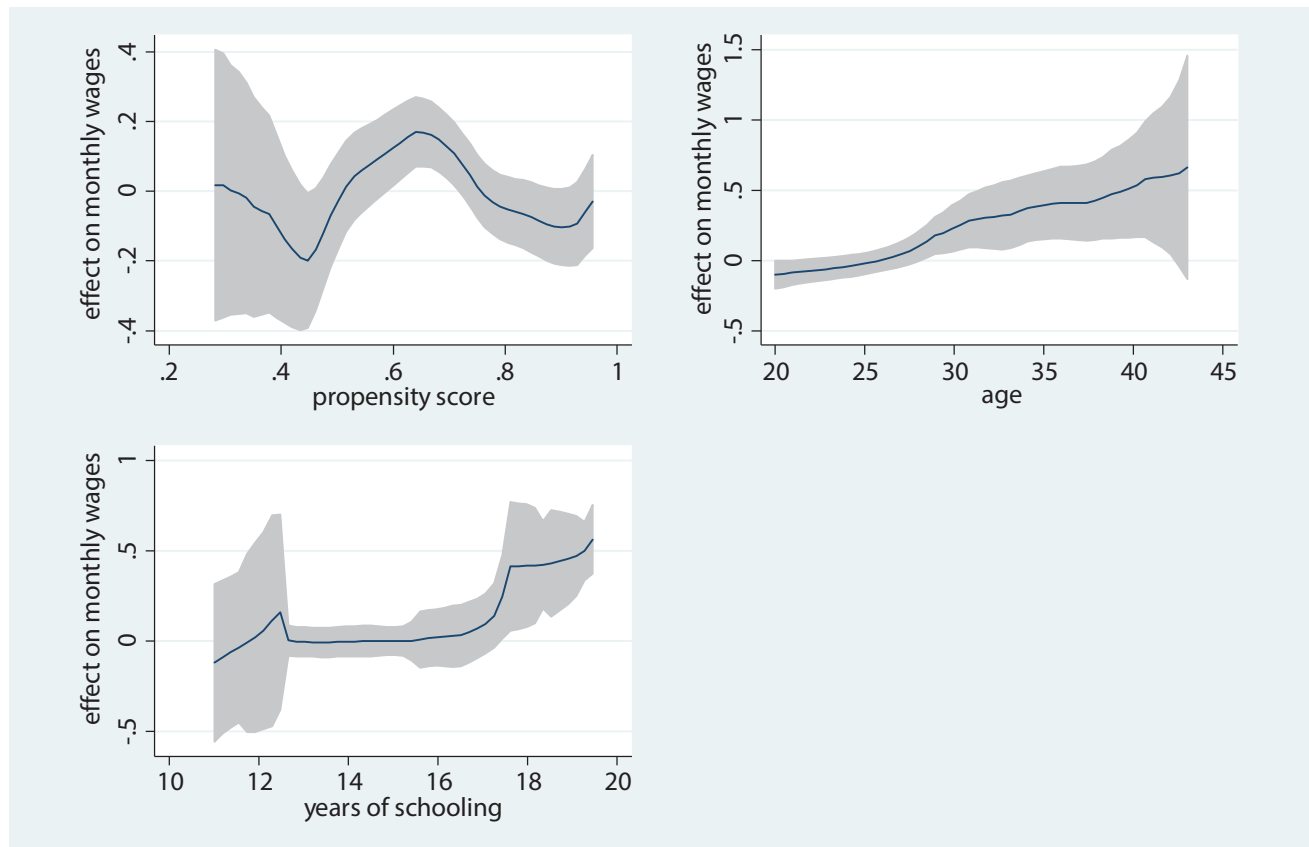


Panel B: TVET versus GHE (BA)

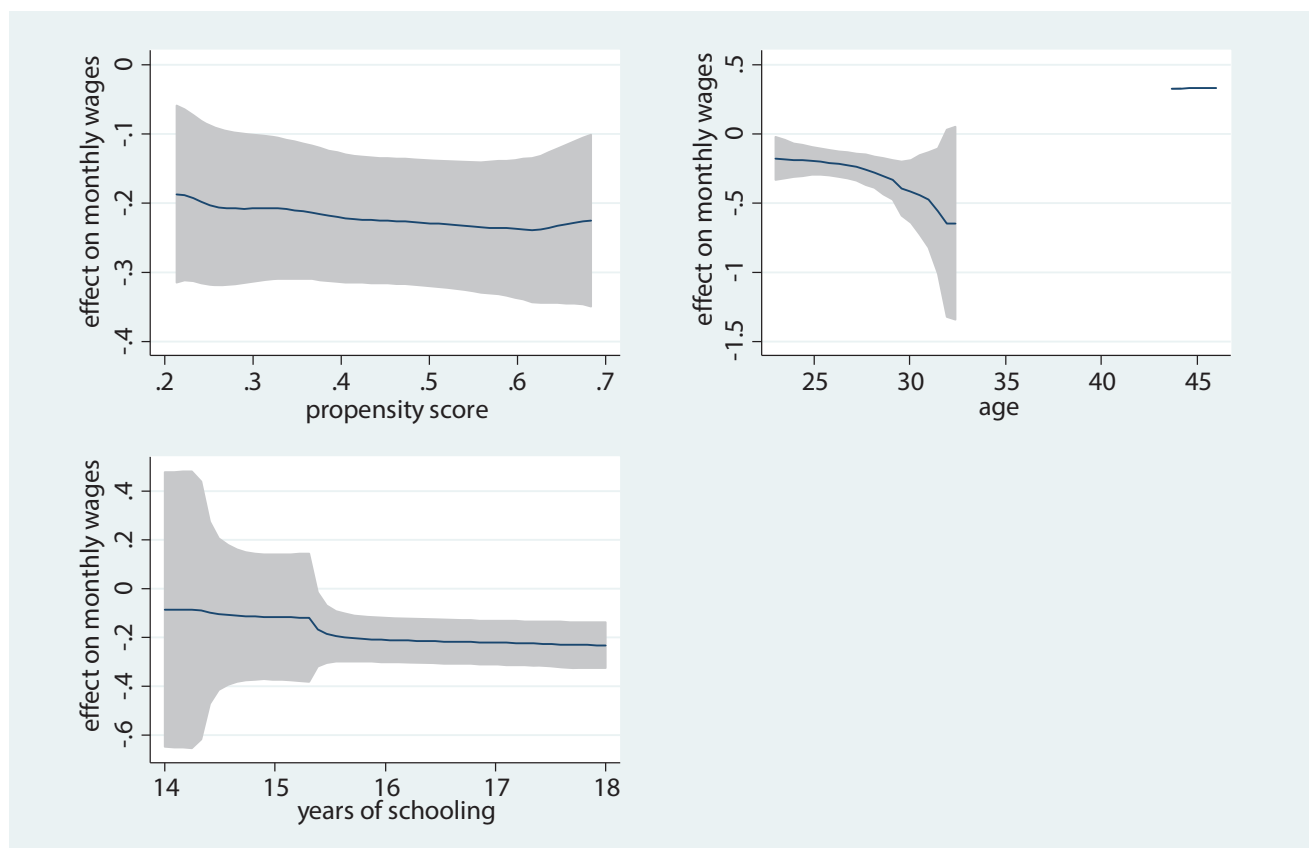


Source: Author's calculations.

Panel B: TVET versus GHE (AD)



Panel D: TVET versus GHE (BA in civil engineering)

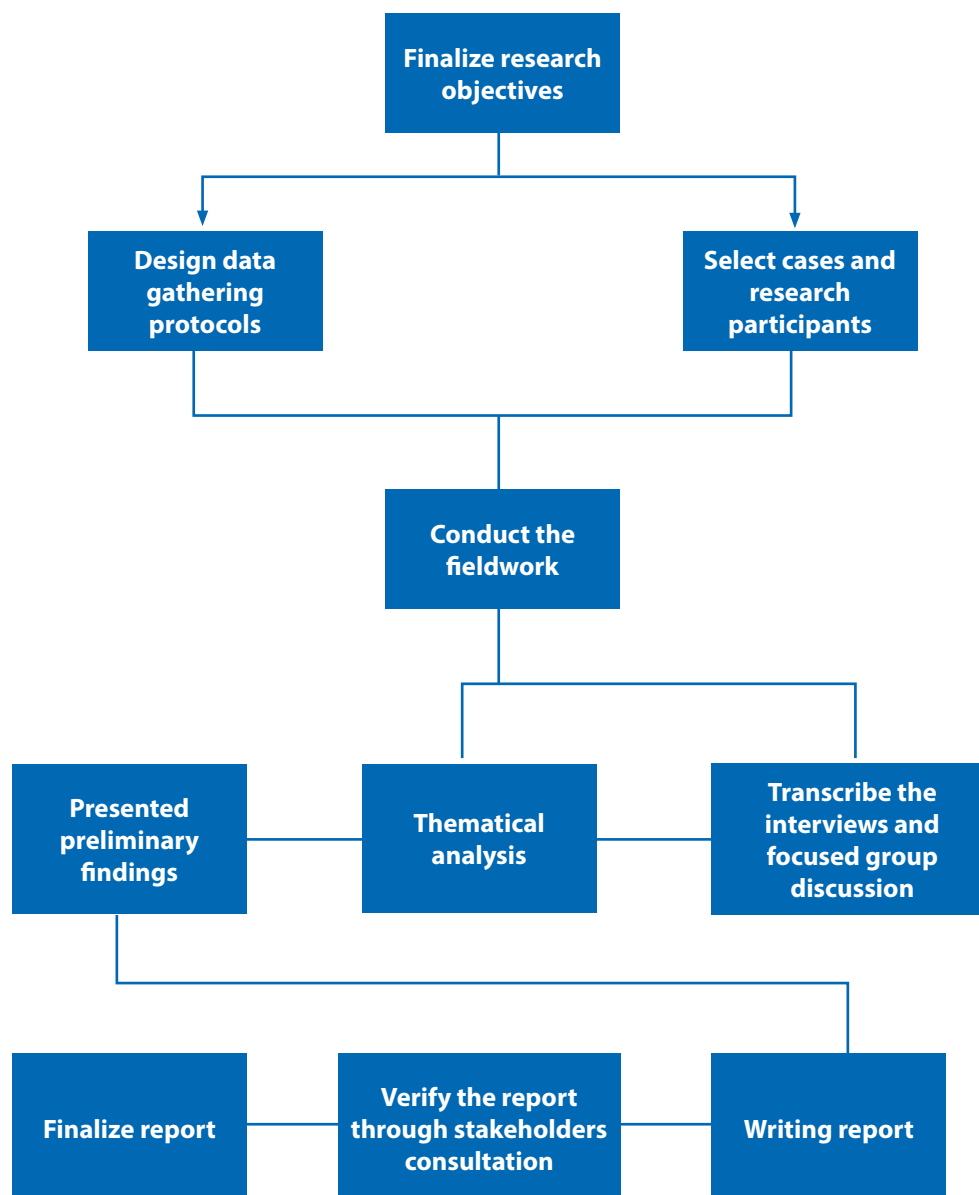


Source: Author's calculations.



ANNEX B1:

QUALITATIVE STUDY PLAN



Source: Author, 2019



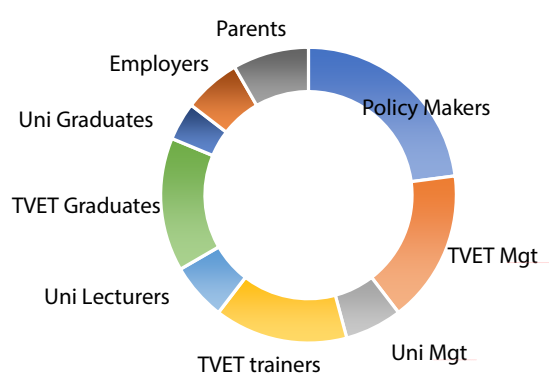
ANNEX B2:

LIST OF RESEARCH PARTICIPANTS

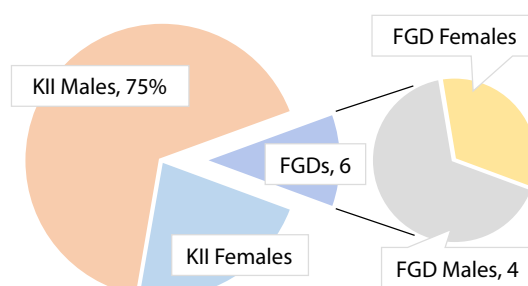
No	Participants	Method	No	Participants	Method
1.	Male TVET Graduates in Battambang Province	FGD	28.	A Female TVET Graduate in Phnom Penh	KII
2.	An Employer in Battambang Province	KII	29.	A Male TVET Graduate in Phnom Penh	KII
3.	A Parent of a TVET Graduate in Battambang Province	KII	30.	A TVET Rector in Phnom Penh	KII
4.	A Parent of a TVET Graduate in Battambang Province	KII	31.	A TVET Trainer in Phnom Penh	KII
5.	Female TVET Graduates in Battambang Province	FGD	32.	A TVET Rector in Phnom Penh	KII
6.	A Vice-rector of a TVET in Battambang Province	KII	33.	A TVET Trainer in Phnom Penh	KII
7.	A Female TVET Trainer in Battambang Province	KII	34.	A TVET Rector in Phnom Penh	KII
8.	Director of Battambang Provincial Department of Labour	KII	35.	A TVET Trainer in Phnom Penh	KII
9.	Rector of a University in Battambang Province	KII	36.	A Director at MoLVT	KII
10.	A Lecturer of a University in Battambang Province	KII	37.	A Director at MoLVT	KII
11.	Female University Graduates in Battambang Province	FGD	38.	A Director at MoLVT	KII
12.	A Deputy Director of Siem Reap Provincial Department of Labour	KII	39.	A Director at MoEYS	KII
13.	A Trainer of TVET1 in Siem Reap Province	KII	40.	A Deputy Director at MEF	KII
14.	Male University Graduates in Siem Reap Province	FGD	41.	A Program Coordinator at ILO	KII
15.	An Employer in Siem Reap Province	KII	42.	A Director at MoLVT	KII
16.	Male TVET Graduates in Siem Reap Province	FGD	43.	A Deputy Director at MoIH	KII

17.	A Parent of a TVET Graduate in Siem Reap Province	KII	44.	A Director of Svay Rieng Provincial Labour Department	KII
18.	A Female University Graduate in Siem Reap Province	KII	45.	A Rector of Svay Rieng TVET	KII
19.	A Vice-rector of a University in Siem Reap Province	KII	46.	A Trainer of Svay Rieng TVET	KII
20.	A Lecturer of a University in Siem Reap Province	KII	47.	An Employer at Special Economic Zone in Svay Rieng	KII
21.	Rector of TVET1 in Siem Reap Province	KII	48.	A Vice-Rector of Svay Rieng University	KII
22.	Rector of TVET2 in Siem Reap Province	KII	49.	A Lecturer at Svay Rieng University	KII
23.	A Trainer of TVET2 in Siem Reap Province	KII	50.	A Rector of a High School in Svay Rieng	KII
24.	A Female TVET Graduate in Phnom Penh	KII	51.	A Male TVET Graduate in Svay Rieng	KII
25.	Male TVET Graduates in Phnom Penh	FGD	52.	A Female TVET Graduate in Svay Rieng	KII
26.	An Employer of a TVET Graduate in Phnom Penh	KII	53.	A Female University Graduate in Svay Rieng	KII
27.	A Male TVET Graduate in Phnom Penh	KII	54.	A Male TVET Graduate in Svay Rieng	KII

KII Participants by Categories



FGD Participants by Gender



ANNEX C1:

AGGREGATED ACTIVITIES, LABOUR AND HOUSEHOLD



N	Previous Activities	Aggregated Activities
1	Agriculture, Hunting, Forestry, and Related Service Activities	Agriculture, except Cassava, Livestock and Poultry, Forestry, and Fishing
2	Cassava	Cassava
3	Livestock and poultry	Livestock and poultry
4	Forestry	Forestry
5	Fishing, Aquaculture, and Service Activities Incidental to Fishing	Fishing, Aquaculture, and Service Activities Incidental to Fishing
6	Mining and Quarrying	Mining and Quarrying
7	Manufacture of Food Products, Beverages, and Tobacco	Manufacturing
8	Manufacture of Textiles, Wearing Apparel, and Footwear	
9	Manufacturing of Wood, Wood Products, Paper, and Paper Products	
10	Manufacture of Rubber and Plastic Products	
11	Manufacture of Basic Metals	
12	Manufacture of Fabricated Metal Products; and Office and Computing Machinery	
13	Manufacture of Motor Vehicles and Other Transport Equipment	
14	Other Manufacturing	
15	Electricity, Gas, and Water Supply	Electricity, Gas, and Water Supply
16	Construction	Construction
17	Wholesale, Retail Trade, and Transport Service	Wholesale and Retail Trade; and Repair of Motor Vehicles
17	Hotels and Restaurants	Hotels and Restaurants
19	Transportation services	Transport, Storage and Communications
20	Post and Telecommunications	
21	Financial Intermediation and Insurance	Financial intermediation
22	Real Estate, Renting, and Business Services	Real estate, renting and business activities
23	Public Administration and Defense	Public Administration and Defence
24	Education	Education
25	Health and Social Work	Health and Social Work
26	Other Community Service Activities	Other Community Service Activities

Source: Author's calculation from SAM (2014)



ANNEX C2:

AGGREGATED COMMODITY

No	Previous Commodities	Aggregated Commodities
1	Agriculture, Forestry, and Logging Products	Agriculture
2	Cassava	Cassava
3	Livestock and poultry	Livestock
4	Forestry	Forestry
5	Fish and Other Fishing Products	Fisheries
6	Coal and Lignite; Peat, Crude Petroleum, and Natural Gas	Ores and minerals; electricity, gas and water
7	Other Minerals, n.e.c.	
8	Electricity, Gas, and Water	Food products, beverages and tobacco
9	Food, Beverages, and Tobacco	Textiles, apparel and leather products
10	Clothing and Wearing Apparel; and Leather and Leather Products	Other transportable goods, except metal products, machinery and equipment
11	Products of Wood, Paper, and Paper Products	
12	Basic Chemicals and Other Chemicals	
13	Rubber and Plastics Products	Metal products, machinery and equipment
14	Furniture and Other Transportable Goods, n.e.c.	
15	Basic Metals	
16	Fabricated Metal Products, Except Machinery and Equipment	

17	General and Special Purpose Machinery	
18	Office, Accounting, and Computing Machinery	
19	Transport Equipment	
20	Other Manufacturing	
21	Construction Services	Constructions and construction services
22	Wholesale, Retail Trade, and Transport Service	Distributive trade services; accommodation, food and beverage serving services; transport services; and electricity, gas and water services; and electricity, gas and water distribution services
23	Lodging, Food, and Beverage Serving Services	
24	Transportation services	
25	Postal, and Courier and Telecommunications Services	
26	Financial Intermediation, Insurance, and Auxiliary Services	Financial and related services; real estate services; and rental and leasing services
27	Real Estate, Leasing Services, and Other Business Services	
28	Public Administration and Compulsory Social Security Services	Public Administration and Compulsory Social Security Services
29	Education Services	Education Services
30	Health and Social Services	Health and Social Services
31	Other Services, n.e.c.	Other Services, n.e.c.

Source: Author's calculation from SAM (2011)

ANNEX C3:

LABOUR INCOME FROM EACH ACTIVITY BASED ON THEIR EDUCATION LEVEL (MILLIONS USD)



Activities	Activities	LEL	FEL	HEL	TVET-PRE	TVET-POST
	Agriculture, except cassava, Livestock, Forestry, and Fish	1315.91	153.96	23.55	0.82	0.30
	Cassava	232.81	23.58	7.19	0.00	0.00
	Livestock and poultry	219.43	27.31	3.80	0.00	0.03
	Forestry	144.05	17.03	1.13	0.00	0.00
	Fishing, Aquaculture, and Service Activities Incidental to Fishing	551.90	30.98	6.44	1.14	0.00
	Mining and Quarrying	53.11	2.59	1.25	0.00	0.00
	Manufacturing	1082.14	339.44	71.08	2.50	0.94
	Electricity, Gas, and Water Supply	18.17	6.20	4.60	0.00	0.36
	Construction	331.31	69.98	9.91	0.00	0.00
	Wholesale and Retail Trade; and Repair of Motor Vehicles	478.59	171.42	77.97	1.78	2.09
	Hotels and Restaurants	196.19	78.06	41.48	0.00	0.00
	Transport, Storage and Communications	312.37	129.34	45.39	1.04	0.64
	Financial intermediation	13.58	16.61	93.86	0.02	2.56
	Real estate, renting and business activities	120.35	69.88	141.70	0.43	3.02
	Public Administration and Defense	36.39	29.75	40.23	0.70	0.99
	Technical and Vocational Education and Training	0.16	0.61	2.95	0.23	0.25
	Non-Technical and Vocational Education and Training	12.15	30.97	73.58	11.19	11.28
	Health and Social Work	66.15	36.36	100.99	18.38	27.62
	Other Community Service Activities	152.58	86.26	60.54	0.83	1.04
	Total	5337.34	1320.33	807.63	39.05	51.11

Source: Author's calculation from CESES 20014 and SAM (2014)



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