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Assessment methodologies and determinants of employability and skills level among Technical and Vocational Education Training (TVET) graduates in Central Uganda

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Globally, unemployment persists because skill levels and learner capabilities are not in tandem with job market requirements. Using logistic analysis, the present study probed determinants of employability of 150 graduates of Technical and Vocational Education Training (TVET) in Central Uganda and further predicted factors influencing their skills level by applying Tobit regression. On a 1 to 5 scale, skills averaged at 3.3. Employability depended on the skills level, age, gender, possessing a national award and disability status whereby the disabled had less likelihood of being employed. Class size, the training period, age and gender of the graduate significantly explained skill level of graduates. It was reported that the main methodology used to assess the graduates was class-based written testing. The paper argues that administrators of training institutions originate a special training and assessment methodology for the disabled. Class sizes should also be small and manageable for learners to be adequately trained and assessed. The study further proposes that the training period be longer and learners attend for the entire period to acquaint themselves with work-world demanded capabilities.

Key words: Employability, skill level, assessment, Logit model, Tobi model.

INTRODUCTION

In many world economies, education systems restructuring tends towards Technical-Vocational Education and Training (TVET) for generation of employable skills (Kasozi, 2001). Robinson (2000) also asserted that the real problem is to find workers with employability or job readiness skills. For Africa, TVET delivery systems are characterized by low quality training which emphasizes theory rather than skills acquisition and proficiency testing. In Uganda's case, the system is also overly academic, theoretical and examination-oriented. Thus, many who graduate do not possess employable skills required to initiate livelihood ventures (Kanyandago, 2010; Openjuru, 2010). Therefore, to ameliorate the TVET requires promotion of vital indigenous technology and objective assessment of those who graduate through the system (Jjuuko, 2012). TVET should prepare learners to be appropriate and relevant in the world of work (Astrid and Naing, 2009)

because gaining skills does not only improve life chances, but also their respect, self-confidence and personal pride (Cuthbert et al., 2015). It is a means to empower individuals sustain their livelihoods. In Africa, it is envisioned a s a me a n s to help in achieving a prosperous Africa by the Africans themselves (AU, 2007). Vocational and Technical Education is vital in the acquisition of marketable business skills but also enhances decision making and generates knowledge to make informed decisions (Moses, 2007). Elsewhere, TVET is synonymous with occupational education, workforce education and workplace education. It also likened to human resource and skills development and the ultimate goal is to avail skills and knowledge requisite for the work workplace. It is the training for a specific skill or particular work; and is aimed primarily to make a trainee (self-) employable (Akande, 2011).

Even then, for TVET to bear positively on employability and poverty, it requires streamlining in many dimensions including assessment (MoES, 2012). The skilling Uganda strategy 2012/2013 - 2021/2022 strongly recognizes that an assessment component will play a critically crucial role to produce a whole trainee adequate in skill, knowledge and attitude desired at the workplace (MOEs, 2012). As such a national TVET assessing body - Uganda Business Technical Examination Board (UBTEB) was born in Uganda, purposely to streamline assessment and give credible awards to TVET graduates. But much as effective assessment should ensure that competencies associated with specific occupations are developed and are actually present within a graduate (Ward et al., 2006), UBTEB is young and national assessment is a relatively new phenomenon. Some institutions are just beginning to adopt national assessment.

Therefore to enhance graduates'quality and ultimately augment their self-worth, productivity a n d social mobility, this study attempted to answer questions about the level of skills among recent graduates, their employability and approaches that were used in assessment. It was undertaken to determine predictors of employability and skills level and describe assessment approaches.

Skill abundance in Uganda

Uganda's education system according to Cuthbert et al. (2015) does not deliver required skills for integration in the labour market and other livelihood opportunities, yet they are required to help learners get, keep and even do well on job (Matthew, 2000). This suggests that alternative innovations are required both in training and assessing the learners. The world over, lack of or inappropriate skills, explains poor labour productivity (Okwelle and Deebom, 2017).

Uganda's BTVET Act of 2008 recognizes lack of skills and daunting youth unemployment (MoES, 2012). Bennedy and Oteng (2018) study on youths' empowerment in North Eastern Uganda also found that 94% were lacking skills even after their Vocational Training. The dismal skills level among Ugandans is actually not a new phenomenon because even African Union (2007) has confirmed huge numbers of poorly educated, unskilled and unemployed youth and suggested new strategies to revitalize the TVET. The AU further cites presence of a huge number of educated graduates who remain unemployed due to lack of skill. But whether graduates actually lack required skills, or their assessment has not adequately morphed to realistically and objectively measure them is unclear. This study therefore derives essence as it documents innovations in assessing the Uganda's TVET graduates, their skills level and employability.

The Uganda Government paper (1989) on review of education policy also indicated that industrialists often complained about quality of TVET graduates. It asserts that graduates in vocation education were not performing as required in the world of work, blaming it on the training that offers mediocre skills. Uganda also has been affected by the skills mismatch. Agaphin and Sulaeman (2013) also noted that a large share of current working-age population and most especially the youth do not satisfactory exhibit entrepreneurial skills at the world of work. Thus, inquiring into assessment should not be overemphasized.

TVET assessment methodology

The training outcome assessment should inform methodology and innovations that assessors should pursue. Assessment bodies are urged by African Union (2007) to measure the efficiency and equity of the training the graduate underwent through. Graduates should be assessed on such parameters on a predetermined scale before their release to the market. Equally important is a measure of the trainees' satisfaction of the training and the extent to which they participated in their predestined industry before graduating to the job market. This suggestion should be incorporated in current systems of field outreaches conducted by national TVET assessors.

Bennedy and Oteng (2018) suggest the employment-oriented methodology. It is yet another innovation assessors of TVET graduates should undertake in order to release a complete graduate. It works on the principle of (pre-) determining proportions of trainees to be in gainful employment before and after training. The duration the graduate would take to be (self-) employed, and expected satisfaction to offer to the employer are parameters of relevance both to assessment actual employment as suggested in this assessment approach.

Another important assessment innovation dimension is the social dimension. Assessors should extend to the

social dimension whereby the citizenship character, sustenance and perception of the citizenry towards them matters. In this approach the graduate ought to be measured through participation in social dynamics and (Maddala, 2008).

The true skill level is unobservable and is a latent variable democratic processes.

y^* Yi $y*$

$$y* = \alpha'X + \mu$$

METHODOLOGY

The study adopted stratified random sampling and obtained data by using questionnaires obtained data from 150 learners who completed their TVET courses. Predictors of employability were determined by a binary response model – the logistic regression since a graduate is either employed or not. Determinants of skills level among the graduates were elucidated by estimating a Tobit model censoring skills level between 0 and 1. Assessment approaches and graduates' demographics were analyzed by descriptive measures.

Modeling employability

The ith graduate is either employed or not. Assuming yi =1, if employed and yi = 0, if not, the probability of yi =1, 0 given the characteristics of the graduate and other factors lies between 0 - 1.

If the occurrence of yi is associated with a probability μ, then:

$$Pr\{Yi = yi\} = \mu^{yi}(1-\mu)^{1-yi} \quad \text{for} \quad yi = 0,1 \quad \text{and}$$
$$Yi = \beta'X + \varepsilon \tag{1}$$

where X is a vector of covariates that predict employment likelihood, β' is the vector of coefficients β1, β2, β2…… βn to be determined in the model, and ε is a stochastic error term. The odds ratio is given by Green (2003) and Gujarati (2008) as:

$$\frac{[Pr(r_i=1/x)]}{[1-Pr(r_i=1/x)]} = e^{x\beta+\alpha}$$

Specification of the model for employability of the TVET graduates

$$D = \beta0 + \beta1 skil + \beta2\,In\,Age^2 + \beta3 nataward + \beta4 gen + \beta5 trainqlty + \beta6 wrkword + \beta7 disability + \varepsilon$$

where β0 is the model constant and β1 … β7 are parameters to be estimated from the binary response model.

Modeling the level of skills

In practice, the level of skill of the graduates is considered a continuous distribution. Censored between 0 and 1, the study customizes that Y = 0 has no skill and Y = 1 excellent skill, conditional on quality and period of training, personal attributes, etc.

Where the level of skills is censored, the Tobit model is appropriate The probability of the ith graduate having a value of was measured:

$$Yi = \begin{cases} 0 & \text{if } y* \le 0 \\ \alpha'X + \mu & \text{if } y* > 0 \end{cases}$$

Specification of the model for the level of skills of the TVET graduates

$Y = \lambda 0 + \lambda 1\,In\,classize + \lambda 2 traingperd + \lambda 3\,In\,Age^2 + \lambda 4\,Gen + \lambda 5$
$Expe + \lambda 6\,satisf + \mu$

where λ 1 …. λ 7 are parameters to be estimated from the censored regression model, given the data and $\lambda 0$ is the model constant.

Respondent characteristics

The respondents were aged 24 years on average and had spent fifteen years in formal schooling (Table 3). Their skill level is above average and had interacted eight times with the world of work before their graduation (Tables 1 and 2). Majority respondents were males, employed and had offered courses at a certificate level (Figures 1 to 4). Automotive mechanics dominated as the field of training, offered by 39 out of 150 respondents.

Although the graduates were assessed by several methods, class-room based written examinations were the dominant methodology used (Table 4).

RESULTS AND DISCUSSION

Determinants of employability among the TVET graduates

Condition on various characteristics, TVET graduate is either employed or not. Therefore, employability was estimated using binary response model - the Logistic regression (Green, 2003; Maddala, 2008). Such estimation has been applied before by Martina et al. (2009) to study employability in Slovakia. Logistic regression was also adopted and included seven variables five of which disability status, age, gender, skills level), significantly explained likelihood of employability of the TVET graduates.

The estimated coefficient of 3.762 on skills level implies that students with higher level of skills are approximately four times more likely to be employed than those with lower skills (Table 5). Jacquelyn (2010) agreeably argued that employability or job readiness skills help graduates fit into and remain in the work environment. It can also be concluded that older TVET graduates are three times more likely to be employed. The finding contradicts thatof Ali et al. (2011) where in their study on Swedish labour market found that younger individuals are more likely to be employed, especially in restaurants and as sales assistants. Their study provided evidence that on average, the younger

Table 1. Definition of the variables used in the employability model.

No.	Variable	Definition and measurement	Expected effect
1	$skil$	Level of skill of the TVET graduate measured on a continuous scale of 0 -5	+
2	Age	Number of years of the graduate	+
3	$nataward$	Possession of a national award. Measured as a dummy, D = 1 if the respondent has a national award, otherwise D = 0	+
4	gen	Gender of the respondent, D = 1 if male, otherwise D= 0	+
5	$trainqlty$	Training quality underwent as rated by the TVET graduate themselves, measured on a continuous scale of 1-5	+
6	$wrkword$	Number of times the graduate interacted with the industry they would serve while still at school	+
7	$disability$	Disability status of the TVET graduate, measured as a dummy where D = 1 if disabled, otherwise D=0	+/-

Source: Author

Table 2. Definition of variables used in the skills level model.

No.	Variable	Definition and measurement	Expected effect
1	Classize	Number of TVET learners in the class attended	+
2	Skilev	Level of skill attained, measured on a 1-5 scale	+
3	Trainprd	Number of years of formal training in TVET	+
4	Age	The age of the graduate given in years	+
5	Gan	Gender of the respondent, D = 1 if male, otherwise D = 0	+
6	Expe	Number of times the graduate interacted with the industry they would serve while still at school	+
7	*Satisf*	The level of satisfaction a graduate obtained from training at their institution, measured on a scale of 1-5	+/-

Source: Author.

applicant received over three times more responses from employers, implying higher employability likelihood.

Results indicate that possessing a national award significantly affects employability. Graduates with a national award were 3.418 times more likely to be employed than those who do not have it. This implies that employers recognize national awards. Thus, students undertaking TVET should enroll only in training centers where national examinations are conducted.

The findings further suggest that male graduates are slightly more likely to be employed than the female counterparts. The estimated coefficient of 1.103, translates into a 101.3% more employment likelihood in favour of male gender. The UN (2004) also noted a continuing disadvantage faced by women in both gaining access to employment and in particular access to quality employment. Therefore, employment policies should restructure to mainstream gender.

The estimated coefficient of 0.056 on the variable disability status means that the likelihood of employment of a disabled graduate is 0.056 times that of one without (those without disabilities are 94.4% more likely to be employed). In agreement Song et al. (2011) in their enquiry into employers'
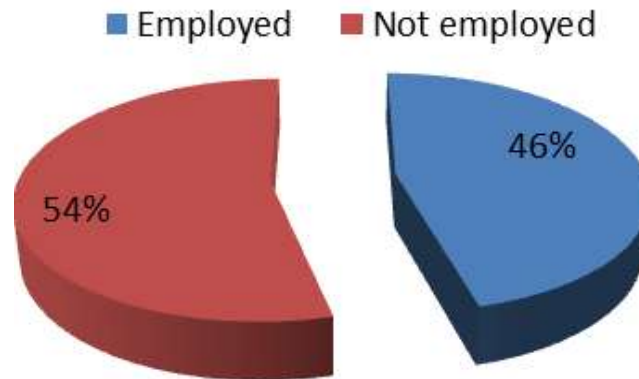
Figure 1. Distribution of respondents by employment status
Source: Author
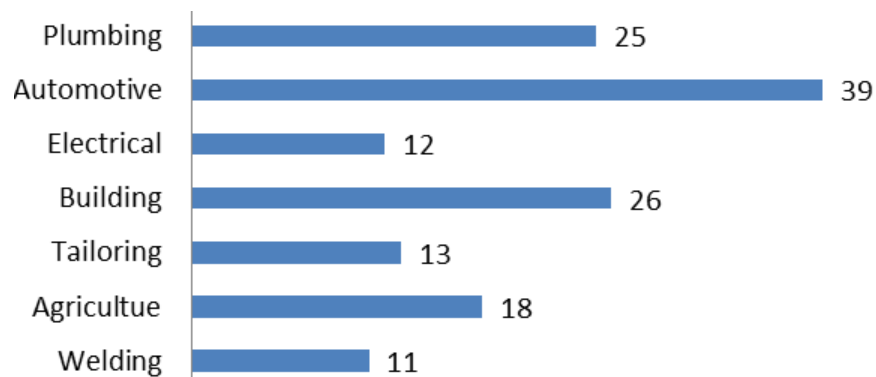
Figure 2. Frequency of respondents by training field.
Source: Author.
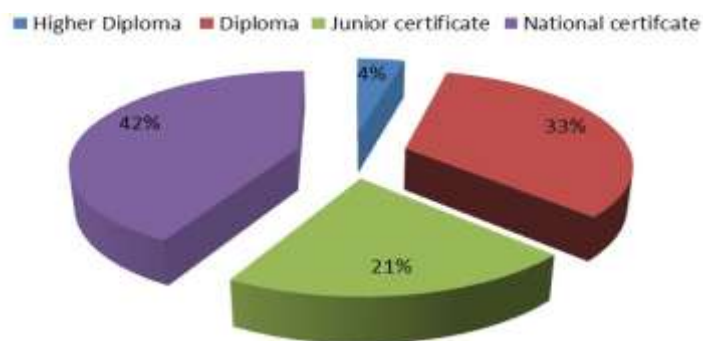
Figure 3. Level of training of the respondents.
Source: Author.

skills expectations also found that individuals with disabilities face persistent challenges in gaining meaningful employment. As such, inclusiveness policy should be strengthened to capture the disadvantaged in the employment opportunities.

Determinants of skills level among the graduates level

The estimated model explains over 75% variation in kill level of graduates (MacFadden's Pseudo R^2 =
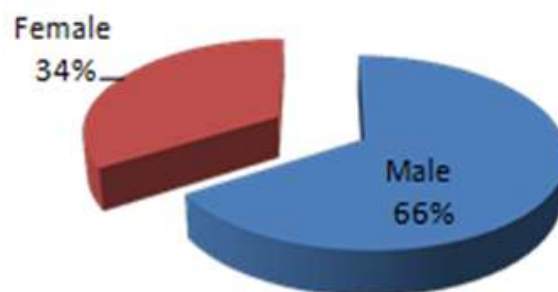
Figure 4. Respondents by gender.

Table 3. The sample characteristics.

Characteristic	Mean
Age of graduates (years)	24.2 (10.4)
Years in of formal schooling	15.4 (3.2)
Skills level (1- Lowest, 5 - Highest)	3.3 (2.1)
Frequency of interacting with the world of work	7.8 (4.5)

Figures in parentheses are the standard deviation.
Source: Field Survey Data (2018).

Table 4. Assessment methods applied on the graduate.

Characteristic	Frequency	Percentage of the respondents	Rank
Class-based written examination	143	95.3	1st
Class - based practical examination	117	78.0	3rd
World of work practical	78	52.0	5th
Real - life projects	138	92.0	2nd
Industrial training / apprenticeship	104	69.3	4th

Rank 1 is of the greatest importance.
Source: Field Survey Data (2018).

19.6%) and the penalty is low for the variables included therein (Log likelihood ratio: -193.031). According to the model estimates, four factors which had significant influence on the graduates' skills level were: the class size, training period, age and gender (Table 6). While graduates' prior experience and their perceived satisfaction of the training they underwent never had a significant influence at 5% significance, the variables had positive coefficients as expected.

Class size is associated with a negative coefficient, therefore, when class size increase, the skill level attained decreases. The marginal effect of - 0.2909 suggests a 29.1% increase in the likelihood of being skilled if class size declined by one student. Such result is consistent with previous findings such as Thomas and Martin (2011). Also, to revitalize

the African TVET, the African Union (2007) recommended a maximum class size of thirty trainees.

The training period which the graduate underwent significantly determined their skill given a positive co-efficient and associated p-value. Results indicate that the likelihood of being skilled would increase by 6.5% for an additional year of training a TVET graduate underwent ($β = 0.6651$, $δy/δx = 0.0254$). Moses (2007 inquiry into issues and trends in African TVET noted the need to increase TVET content in general programs and proposed adequate training period. Age had a significant positive influence on employability. The likelihood of being skilled would be quadrupled for a unit increase in the log of square of age (Table 6). Mature graduates would therefore be more skilled. Agreeably, Kahyarara and Teal F (2008), in their study

Table 5. Logistic regression model estimating the employability of the TVET graduates

Variable	Estimated coefficient	z-value	Resulting coefficient
Skills level	1.325***	12.378	3.762
ln Age^2	1.009*	8.456	3.941
Possession of a national award	1.229**	5.182	3.418
Gender	0.098*	3.222	1.103
Training quality	2.734	3.334	15.394
Prior working experience	0.908	2.783	2.479
Disability status	-2.881**	-1.247	0.056

***,**, * Significant at 1, 5 and 10%. MacFadden's Pseudo R^2 = 0.167.
Source: Author

Table 6. Model estimates on the graduates' skills level

Variable	Coefficient (β)	t-value	Marginal effect ($\delta y/\delta x$)	p-value
Constant	-2.3674	-1.88	- 0.1204	0.063
Class size x1	- 0.2901***	3.02	- 0.2909	0.003
Training Period x2	0.6651***	3.25	0.0254	0.001
ln Age^2 (x3)	0.8091**	2.46	0.0091	0.015
Gender (x4)	1.6298*	1.04	0.6298	0.299
Experience (X5)	0.0813	2.15	1.345	0.206
Traingsatisf (X6)	0.3249	3.245	1.008	0.123
MacFadden Pseudo R^2			19.6%	
Prob> chi^2			0.000	

Log likelihood ratio: -193.031. ***Significant at 1%, **at 5%, *at 1%.
Source: Author.

about returns to vocational training and academic education in Tanzania, also indicated that returns to vocational school or technical college can differ depending on the stage the student enters the college. Skills level among TVET graduates also significantly and positively depended on gender of respondent. In Table 2, results report that males are 62.9% more likely to be skilled than females thus suggesting gender stereotyping initiatives in the TVET. Gender inequalities have persisted in the general TVET programmes (Moses, 2007).

RECOMMENDATIONS

Since graduates with disabilities were associated with a lower likelihood of employability, the paper argues that administrators of training institutions originate a special training and assessment methodology for the disabled to enhance their skills and self-employability. Employers are also urged to consider the disabled in the recruitment. The study found that class sizes negatively and significantly influence skill level, therefore small and

manageable class rooms should be ensured during training such that learner's skills increase. The paper further proposes that the training period be longer and learners attend for the entire period to acquaint themselves with work-world demanded capabilities. It is also crucial that TVET training considers recruitment of female learners to address the gender gap in enrollment.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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