Internal efficiency of public vocational training centres in Kenya

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ABSTRACT

The efficiency of educational institutions is critical in the justification of resource allocation and use. However, some developing countries like Kenya face efficiency challenges regarding resource utilisation and the flow of students through the school system at various levels of education and programs. Past research in Kenya has focused more on resource utilisation in public schools. Very few studies have looked at the internal efficiency of public vocational training centres (VTCs). This paper assesses the level of internal efficiency in Kenya's public vocational training institutions through a mixed research design. The findings reveal low levels of internal efficiency as indicated by low enrolment, high dropout and low completion rates in the VTC institutions. The result also shows a low level of tutor utilisation. These results provide vital insights into improving the internal efficiency of public vocational training institutions in developing countries. The study recommends, among other things, subsidisation of examination fees to enhance students' completion rates.

Keywords: Vocational education, tutor utilisation, graduation rate.

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INTRODUCTION

The term efficiency is widely used in economics as the optimum use of resources in a production process (Wilson et al., 2018). Besides its extensive use in economics, Kosor (2013) linked efficiency to education by considering education institutions as multi-product enterprises that have multiple inputs and produce various outputs, which are, however, difficult to measure as they do not have market prices, for example, enrolment of students. According to the International Institute for Educational Planning (IIEP) (2010), education institutions' efficiency is assessed through internal and external efficiency. The assessment involves studying the dynamics of students' flow from enrolment to graduation. It also includes time and resources needed to produce graduates leaving the education system at different levels and the relevance of graduates in society (IIEP, 2010). The assessment can be approached in two trajectories, either through internal efficiency or external efficiency. External efficiency of education assesses graduates' relevance in relation to the needs of the economy and

society. In contrast, internal efficiency is concerned with the relationship between inputs and outputs in the school system (IIEP, 2010). Awuor, Wanjala and Muriithi (2016), on their part, describe internal efficiency as a measure for institutional effectiveness that is seen in terms of the flow of students in an education system following their enrolment and their performance at the end of an educational cycle.

UNESCO, IIEP and World Bank recommended wastage ratio and coefficient of efficiency as indicators for measuring internal efficiency level of education systems (UNESCO et al., 2014). According to UNESCO and IIEP (2016), wastage ratio refers to 'the number of pupil-years required to produce a number of graduates from a given school-cohort for a cycle or level of education in the absence of repetition or dropout' while coefficient of efficiency is the reciprocal of wastage ratio. Moreover, UNESCO Institute of Statistics (UIS) (2017) noted that internal efficiency coefficient above 0.7 reflect a high overall level of internal efficiency of education

system. Further, UNESCO (2015) reported that repetition and dropout are associated with loss in terms of years of education with varying extent across countries. More, UNESCO (2015) indicated that the loss in terms of years of education due to repetition and dropout reflects inefficient public and private spending on education as the government pays double or more what it would cost if there were no repetition, while a learner dropping out of school before learning the basics will have used finite government resources with a sub-optimal return.

Every educational system's internal efficiency depends on the availability of resources, human resources, and the execution of its internal programmes (IIEP, 2010). According to Fika et al. (2016), the staff is an essential resource in any educational institution. Without them, quality of education, expansion of educational facilities, and educational institutions' general success are jeopardised. Amedorme and Fiagbe (2013) correspondingly indicated that internal efficiency is dependent on human, physical and monetary resources. Amedorme, Fiagbe and Olatoum (2012) also found that the level of utilisation of human resources dictates the dropout, repetition and completion rates in schools. Human resources can be used as a single indicator of internal efficiency input, therefore, if physical and monetary resources are kept constant. On the same note, Pitan (2012) asserts that, without the teaching staff, attainment of institutions' goals and objectives would prove abortive, regardless of the programmes and assets' nature. This is because the control of other resources depends on human resources. It is thus worth noting that teaching staff is the most vital resource in any education setup.

Measurement of educational output and outcome is another vital aspect of internal efficiency. While studying the internal efficiency of primary education, Padmanabhan (2001) clarifies that the education system is internally efficient if the flow process does not waste any student-year, and all the enrolled students go through the process successfully. Chapman and Windham (2005), on their part, evaluated efficiency in educational, developmental activities and established that analysis of internal efficiency asks whether more outputs could be achieved given the available inputs or whether fewer inputs could be used in providing the same level and mix of output. Ithuta (2014) highlighted graduates as the outputs of an education system. In this case, it is worth noting that if inputs are the teaching staff who provide learners with necessary basic knowledge, then the output will be the number of students who will survive to graduation. Evidence by the Department of Basic Education of the Republic of South Africa indicates that all education systems the world over have some level of inefficiency (Department of basic education Republic of South Africa, 2013). On the same note, a report by the World Bank confirms that most education institutions in developing countries face the challenge of low levels of internal efficiency (World Bank, 2013). All these studies, however, fail to indicate the status of internal inefficiencies. Therefore, the attainment of better educational outputs characterises an efficient education system without additional placement of resources.

This paper discusses the internal efficiency of public Vocational Training Centres (VTCs), focusing on enrolment, dropout, completion rate, and human resources (tutor utilisation), including learner-teacher ratio, teacher workload, and utilisation of tutors in relation to their instruction time. Effective use of human resources is required to establish a functional and quality education system. Moreover, Athmandu (2001) observed that human resources utilisation within an educational institution guarantees its success or failure. This is because human resources are necessary to achieve the set objectives in any educational institution effectively. Crucial human resources in an educational institution are the teaching staff. This is because tutors are responsible for the management and proper utilisation of other resources to ensure that an educational institutional mission is realised.

Technical and vocational education and training (TVET) in Kenya

Economic growth, employment, and standards of living of any nation depend on recognised skills both nationally and internationally (Aring, 2011). In Kenya, policy papers have acknowledged the provision of manageable, quality and relevant education as a critical foundation for inspiring development and social cohesion. The Kenya Vision 2030 emphasises the need to provide essential skills needed to drive the various sectors of the economy (Republic of Kenya, 2007). Kenya's Vision 2030 places demands on Technical and Vocational Education and Training (TVET) to be the leading engine that the economy relies upon to produce adequate middle-level professionals to drive the economy towards industrialisation (Republic of Kenya, 2012b). In this regard, the Government created the TVET act in 2013 to rebrand TVET in Kenya. During one of the presidential nation addresses in 2017, the Republic of Kenya announced a plan to expand TVET institutions (Nganga, 2017). The Technical Vocational Education and Training (TVET) institutions are therefore targeted to provide and impart technical and vocational skills expected to impact employment, reduce poverty, and promote social cohesion.

The Government of Kenya has given attention to the provision of TVET through institutional reforms and increased resource allocation (Republic of Kenya, 2012a). During the first and second medium-term periods (2008 to 2017) of the Vision 2030, the Government included TVET in the central admission system, revised the TVET curriculum to Competency-Based Education

and Training (CBET) and provided students with loans and bursaries as a strategy to improve skills development in the country (Republic of Kenya, 2012a). This revision follows the recommendation of the African Union's education action plan 2006-2015, for African Nations to embrace TVET to empower their people economically (Africa Union, 2015). Before the rolling out of Competency-Based Education and Training (CBET) in Kenya, the TVET system has primarily been based on theoretical training that gave less attention to assessing competence as required in the workplace (Republic of Kenya, 2018b). On the same note, Tirus (2019) admitted that the new rolled out TVET curriculum (CBET) involves the industry sector in identifying industrial needs and skills required. According to Nganga (2018a), Kenya's Government has kicked off a series of reforms to drive up TVET institutions' growth to hit a target of 3.1 million over the next five years, beginning in 2018. The reform aimed to boost the quality of learning as well as increase access to post-basic school education. A press conference delivered by the education Cabinet secretary in 2018 also highlighted that the Government intends to make TVET the preferable and rewarding choice for Kenyans. The cabinet secretary further noted that the Government intended to revitalise the national workforce's competencies to build a competitive economy (Mohammed, 2018). Policymakers, therefore, are expected to ensure that the available resources for skills training are allocated in the most efficient way possible to achieve the desired objective.

To attain this, the Government has been supporting the growth and development of the TVET sector by increasing resource allocation and providing incentives for investments and participation in skills training (Republic of Kenya, 2018a). For the 2018/2019 financial year, the National Treasury allocated US$160 million for TVET institutions, which was over 30% higher than the previous year (Republic of Kenya, 2018a). The expectation was that the allocated funds would help recruit additional 2000 technical training instructors and capitation grants for students. The Government announced a reduction in the annual cost of technical training from US$920 to US$564 per student (Nganga, 2018a). Under this arrangement, the National Treasury provided capitation worth US$300 per trainee per annum. In comparison, the Higher Education Loans Board (HELB) provided supplement training costs to a maximum of US$400 per trainee annually. Therefore, the expectation is that more students will enrol in TVET institutions, which may translate to most students graduating from TVET institutions.

To increase enrolment in TVET programs, the Kenyan Government embarked on a plan to change the stigma in the country surrounding careers in technical and vocational fields and encourage youths to choose career paths in these industries. This plan started when the Government intended to elevate some technical institutions to national polytechnics (Nganga, 2017). The Government also wanted to ensure that each of the eight regions has at least a national polytechnic to replace those upgraded to university colleges. By upgrading technical colleges and developing vocational training centres, the Government intended to improve access to training among youth and improve their chances of securing jobs. The 2018 economic survey report noted that the total enrolment in TVET institutions increased by about 36% between 2016 and 2017, mainly due to the registration of more TVET institutions. During the same period, enrolment in Vocational Training Centres (VTCs) rose by 29%, below the national average in TVET enrolment. These figures show that, compared to Technical Training Centres, the Vocational Training Centres (VTCs) have a low increase in enrolment (Republic of Kenya, 2018c). According to Cohen (2020), the Government's attempt to rebrand TVET is working as over 2500 students chose to enrol in TVET in 2018 despite academically qualifying to attend college. Cohen's analysis, however, fails to relate the number of student enrolments in these TVET institutions to the total number of TVET institutions in the country. When analysing lessons learnt from youth educational training reform in Kenya, Mugo (2018) found that TVET enrolment has remained low despite all these governments efforts. According to Mugo (2018), there were only 275000 youth enrolled in around 1900 TVET institutions in 2017 compared to the enrolment of over 520000 youth in less than 40 universities.

In response to the Government's effort to increase enrolment in TVET institutions, the Government of Kenya (at the national level) has committed human resources through recruitment and replacement of tutors to provide relevant and adequate skills and competencies in strategic disciplines by the year 2020 (Republic of Kenya, 2006). Apart from recruiting teaching staff, the Government has also expanded her training of TVET teachers as an essential aspect of improving the quality of teaching skills and responding to trained teacher demand in Kenya (Republic of Kenya, 2007). According to Nganga (2017), the principal secretary in charge of TVET noted in a press conference that the Government trained 570 TVET trainers in the 2017/2018 financial year to ensure the uptake of TVET courses across the country. Besides, the Kenyan Government planned to have at least one vocational training centre (VTC) in each of the 290 constituencies by 2020 as a strategy to increase access to VTCs (Nganga, 2018b). This is a clear indication of the Government's elaborate process of improving both technical and vocational education.

Study justification

The literature above shows the national Government's effort towards both technical and vocational education,

even though only technical education is fully under the national Government. Focusing on vocational education, which started as low-cost post-primary training centres in rural areas, county governments have equally made local efforts towards VTCs education. There is evidence of increased county governments budget allocation towards vocational education as reflected in the 2018/2019 financial year budget statement indicating governments effort towards Vocational Training Centres (VTCs) (Republic of Kenya, 2018a). Moreover, by increasing the county governments resource allocation and providing incentives for investment and participation in skills training in the country, the Government affirms its focus on vocational education (Republic of Kenya, 2018a). According to Nganga (2018b), the Government has reduced fees for students in VTCs as a financial intervention to woo more students into these institutions. However, these financial interventions by the Government do not account for the final examination fees charged. The final examination fees have an impact on VTC student's course completion rates.

Despite the Government's effort in teaching staff recruitment, subsidising students' fees, and admitting individuals who are qualified and interested in vocational training, there are still problems of inability to accommodate vocational training centres' demands. Some of the issues that remain include low enrolment, graduation rates and suboptimal utilisation of human resources. Focusing on Nairobi City County, the total enrolment in all the 12 vocational training centres was 471 learners in 2017 (Nairobi City County Government, 2017). These enrolments translate to approximately 40 students per institution. Given the county government's increased investments through an increase in budget allocation by about 43%, recruitment of tutors, fee subsidisation, and improving these institutions to encourage student's enrolment, the current enrolment can only point to low internal efficiency. Based on Khamala (2012) suggestion that the enrolled students should optimally and adequately utilise the available resources to yield maximum output, the VTC resources in Nairobi City County are not optimally used. But the empirical nature and key facets of this apparent utilisation are not known. More pertinently, there is a shortage of knowledge regarding the student's progression through the system, completion rates, and tutor utilisation, all of which indicate the internal efficiency of the VTCs in Kenya. This information is vital in ensuring that the vocational training institutions deliver optimum outcomes from the available human resources. Hence the need for this study.

Study limitation

This study is limited in terms of location as it was carried out in one county. However, this limitation is not expected to limit the results' soundness because Nairobi City County is cosmopolitan and, therefore, a true reflection of the country. Additionally, the sampling design followed a census approach where all the VTCs in the county that met the threshold were included to promote the results representativeness.

Research questions

The study sought to answer the following questions:

1. What is the dropout rate of students in the public vocational training centres?
2. What is the completion rate of students in the public vocational training centres?
3. What is the level of tutor utilisation in the public vocational training centres?

METHODOLOGY

This study adopted a mixed research design. Some similar studies have also utilised the method, for instance, both Pitan (2012) study, which analysed the relationship between human resource utilisation and internal efficiency; and Ibukun et al. (2011) study on the relationship between resource utilisation and students learning outcome utilised descriptive survey design. Data collection was done using a document analysis guide and a survey with close-ended and open-ended questions. Open-ended questions yielded qualitative data while close-ended questions yielded quantitative data. Qualitative data was used to provide supplementary information to support quantitative data collected through the survey. Combining quantitative and qualitative data helps reduce the researcher's personal biases, making the result more appealing to a wider audience (Creswell, 2012).

The study targeted tutors from the public vocational training centres in Nairobi City County. Tutors were the most appropriate category of respondents for this study. The reason for this is twofold—first regards internal efficiency, which requires trainee's data. The tutors are the custodians of information regarding enrolment, progression and graduation. Second deals with tutor utilisation where only the tutors could provide details of their qualification, workload and other responsibilities within the VTCs.

Researchers purposely selected Nairobi City County from among 47 counties in Kenya. Compared to other counties, Nairobi has very low enrolment and graduation rates of the VTCs. The County was also selected because the courses offered are diverse, reflecting the workforce requirements of a capital city. Further, Nairobi City County, being a capital city, is endowed economically and infrastructure-wise. Besides, vocational

training centres are devolved. Nairobi City County may give a more informative result that can be used to improve the internal efficiency of VTCs across the country.

All the 12 VTCs in the county were considered. However, only six met the required threshold for inclusion. They were in operation by 2015, the base year for the study cohort. The population of all VTCs tutors in Nairobi County was about 60 tutors at the time of study. A total of 45 (53.3% males and 46.7% females) tutors from the six selected VTC institutions participated in the survey. The sample represents about 75% of total tutor population and 100% of the selected institutions.

The variables of interest in the study were indicators of internal efficiency and tutor utilisation. To measure internal efficiency, a cohort analysis was done. According to IIEP (2010), cohort analysis shows the history of a particular level of education when the group of students left the class. It can show to what extent the educational system can use its raw materials (students) in the production of output (graduates). In this regard, internal efficiency was measured using graduation rate, wastage ratio, survival rate and level of coefficient of efficiency. Tutor utilisation was measured using teacher workload (determined by combining the number of subjects and other responsibilities other than teaching), tutor-time utilisation and student-teacher ratio. To score the level of tutor utilisation, a product of the average number of

subjects taught by a teacher per institution, average hours taught by a teacher per week, average student-teacher ratio and other responsibilities were computed.

Excel spreadsheet was used to analyse flow rates (i.e., promotion, repetition, dropout and graduation rates). SPSS was used to perform descriptive statistics analyses for demographic information and linear regression between tutor utilisation and internal efficiency.

RESULTS

Characteristics of VTC tutors

The data on the VTC tutors' demographic characteristics, including age, gender, level of education, teaching experience, and nature of employment, were collected, and the findings are presented in Table 1.

45 (53% male and 46.7% female) tutors participated in the study, with the dominant age group (60%) of the tutors lying between 30 and 39 years. Regarding the tutors teaching experience, most of them, 64.4%, had taught for over seven years, indicating sufficient expertise. About trainers' education level, 66.7% of them held diploma qualification, 11.1% possessed a higher national diploma certificate (HNDC), and 4.4 had a degree. However, only 4.4% of the tutors had attained university degree qualification.

Table 1. Description of the main characteristics of the tutors.

Variables	Whole sample	Male	Female
Age group			
29 years and below	2 (4.4%)	0	2
Between 30-39 years	27 (60%)	9	18
Between 40-49 years	11 (24.4%)	11	0
50 years and over	5 (11.2%)	4	1
Teaching experience			
0-3 years	3 (6.7%)	1	2
4-6 years	13 (28.9%)	3	10
7-10 years	15 (33.3%)	7	8
Above 10 years	14 (31.1%)	13	1
Level of education			
Certificate	8 (17.8%)	3	5
Diploma	30 (66.7%)	14	16
HNDC	5 (11.1%)	5	0
Degree	2 (4.4%)	2	0
Tenure of employment			
Part-time	2 (4.4%)	1	1
Contract	8 (17.8%)	3	5
Permanent	35 (77.8%)	20	15

Enrolment, dropout and completion rates of students in the public vocational training centres

This section presents cohort analysis results for VTC students from the year 2015 and 2016. To determine and compute the enrolment, dropout rate and completion rates of students, data on the actual number of students who were enrolled in level one in 2015 and survived to level two in 2016 was used, and results are presented in Table 2.

The results in Table 2 shows that institution D recorded the highest enrolment in 2015 and the highest number of dropouts, but only 19.3% completed and graduated after two years of study. On the other hand, Institution B registered the least enrolment in 2015 but reported the highest internal efficiency, 47%. Institution F recorded the least internal efficiency, that is, 12%.

Table 2 also shows that the number of students who survived to level 2 in the following year in the selected VTCs institutions was 77%. Even though 596 students started in 2015, the number reduced to 459 students in 2016. This means that a total of 137 students dropped out. The school administrators reported that students do not repeat classes, which aimed to keep the students in school. Out of the 459 students promoted to level two, which is the final level, 27 dropped out. This dropout is equivalent to 4.5% of the total number of enrolments in 2015. Four hundred and thirty-two students stayed until the end of the year, but only 161 students sat the end of course examination and graduated.

Qualitative data collected from VTC administrators and tutors indicated that dropouts were primarily due to lack of fees as most students could not afford the high examination fees. They further clarified that most students preferred to attend coursework, acquire the necessary skills and leave without taking examinations.

One of the administrators reported that 'The final examinations are organised either by the Kenya National Examination Council (KNEC) or the National Industrial Training Authority (NITA) depending on the student's course. Each student was expected to pay Kshs. 7000 (about US$70) to sit for examinations which most students could not afford. The fact that 271 students survived in level 2 but failed to graduate confirms that they were unable to pay the examination fees.

The promotion rate increased from 77% in the first to 92% in the final year. A lot of dropouts take place during the first year as compared to the second year. Even though the promotion rate is high, 77% in the first year and 92% in the second year, the graduation rate is low, at 27%. This implies that a lot of wastage occurs in the first year than in the second year and that most students complete their study but do not register for examinations and graduate. This result mirrors those of Hicks et al. (2011), who noted that the average dropout completes over a third of their course, which may be equated to approximately two terms or roughly two-thirds of a year of vocational education before dropping out.

Regardless of the year of study, the survival rates will be equal to the ratio between the sum of the learners admitted – through promotion – to the relevant year of study in successive years and the initial numbers in the cohort (IIEP, 2010b). Table 2 shows that the final grade survival rate is 72.5%, indicating that the system achieved to retain about 72% of the learners up to the final grade. However, this does not mean that they all graduated. Those who succeeded and graduated are 161(27%) learners for the initial cohort of 596 learners. From the findings, a graduate takes an average of 4.12 years to complete a 2-year course, and the coefficient of efficiency of public VTCs is 24.3%. These findings imply internal inefficiency in Kenya's public VTCs.

Table 2. 2015 to 20216 cohort analysis of students in the VTCs.

School	Enrolment in 2015 (level 1)	Survivors in level 1	Enrolment in 2016 (level 2)	Survivors in level 2	Level 2 graduates
A	89	75	73	34	39 (43.8%)
B	51	34	24	0	24 (47%)
C	62	41	40	11	29 (46.8%)
D	244	198	197	150	47 (19.3%)
E	58	47	39	28	11 (19%)
F	92	64	59	48	11 (12%)
Total number of students	596 (100%)	459	432	271	161
Completion rate		77%		45.5%	27%
Promotion rate					
Dropout rate		77%		92.6%	
Wastage ratio		137 (23%)		27 (4.5%)	4.12
Coefficient of efficiency					24.3%

Source: Survey data.

The level of tutor utilisation in the public vocational training centres

Table 3 presents the average level of tutor utilisation in the public vocational training centres in Kenya. It shows the average number of subjects taught by tutors, the average number of hours taught by tutors, the average learner tutor ratio, the average number of other responsibilities apart from teaching and the average tutor utilization rate.

Table 3. Level of tutor utilisation in the public vocation training centres.

Indicator	Minimum	Maximum	Average	Utilization
No. of subjects	1	3	1.52	0.76
No. of hours taught	2	25	18.17	0.73
Learner-tutor ratio	5.1	34.9	13.20	0.88
Other responsibilities	0	2	1.65	0.49
Average tutor workload				49.83%
Utilisation rate				0.24 (23.7%)

This study established tutor workload by combining the number of subjects taught by each tutor and the number of other responsibilities they are charged with. On average, tutors were teaching a minimum of one subject and a maximum of 3 as presented in Table 3. Qualitative data indicated that some VTC institutions outsource tutors from other institutions to teach common/support subjects like entrepreneurship, communication skills and life skills. Tutor utilisation rate in terms of the number of subjects taught was 1.52 subjects out of the recommended two subjects (i.e., one trade subject and one support subject). There were other responsibilities assigned to tutors within their respective institutions other than teaching. These include extra-curricular activities like games, clubs' patronage, administration, and guidance and counselling. The number of other responsibilities was quantified through the use of three items. The respondents were asked to give the number of other duties, and the scale range and weighting was used as follows: 1 to those with zero responsibilities other than teaching; 2 to those with one responsibility other than teaching; and 3 to those with more than two responsibilities other than teaching. The values (either 1, 2 or 3) were divided by the maximum value (3) to get the utilisation in terms of other responsibilities. The findings showed that the institution with the highest utilisation rate recorded about 67 per cent while the institution that recorded the least utilisation rate recorded approximately 48 per cent. The average utilisation rate in terms of other responsibilities was about 49 per cent, slightly below the average. The average tutor workload was 49.83% as indicated by Table 3.

Tutor time utilisation was based on tutors' actual time in teaching theoretical lessons, practical lessons, time for examination, and extra-curricular activities divided by the time indicated on the time table, which was constant to all tutors. Thus, the ratio of the hours a teacher is teaching in a week to the expected number of hours a teacher is expected to teach. For example, in the VTCs, a tutor is expected to teach for 25 hours per week. To get the tutor-time utilisation, we computed the number of hours a tutor teaches per week and divided by the recommended number a tutor is expected to teach per week, i.e., 25. Research findings revealed that tutors taught for at least two hours a week and a maximum of 25 hours per week, implying that some tutors teach for more hours than others. Generally, the tutor-time utilisation rate was 18.17 hours per week. This represents 72.7% of the expected hours tutors are expected to teach.

$$Tutor - Workload\ ratio = \frac{Actual\ periods\ taught}{Approved\ number\ of\ periods}\ \text{(IIEP, 2010)}$$

$$Tutor - Workload\ ratio = \frac{18.17\ hours\ per\ week}{25\ hours} = 0.727\ (72.7\%)$$

The Learner-tutor ratio, which is the average number of learners per tutor, was then established. Results show that most classes had less than 15 learners, with some courses like masonry having no student in some schools. The indication here is that some tutors are utilised more than others in terms of the number of learners they teach. Similarly, most of

them do not meet the minimum benchmark of at least 15 learners per class. The student-teacher ratio was computed in the study by getting the average number of learners a teacher has per institution. The information on tutor utilisation in terms of student-tutor ratio indicated that only 20% of the institutions reach the minimum requirement of at least 15 students per tutor with the average STR being 13.24.

$$Student - Tutor\ ratio\ (STR) = \frac{Total\ number\ of\ pupils}{Total\ number\ of\ tutors}\ \text{(IIEP, 2010)}$$

$$Student - Tutor\ ratio\ (STR) = \frac{596\ learners}{45\ tutors} = 13.24$$

The study established the total tutor utilisation rate by getting the product of the utilisation rate of the average number of subjects taught by a teacher per institution, the utilisation rate of the average hours taught by a teacher per week, and the average student-tutor ratio and utilisation rate of other responsibilities.

$$\frac{Average\ No.\ of\ Subjects}{2}\ X\ \frac{Average\ No.\ of\ Hours}{25}\ X\ \frac{Learner - Teacher\ Ratio}{15}\ X\ \frac{Average\ No.\ of\ Other\ Responsibilities}{3}$$

$$= \frac{1.52}{2}\ X\ \frac{18.17}{25}\ X\ \frac{13.24}{15}\ X\ \frac{1.65}{3}$$

$$= 0.76\ X\ 0.727\ X\ 0.883\ X\ 0.487 = 0.237\ (23.7\%)$$

The average tutor utilisation rate for all the institutions visited was 0.237(23.7%) which apparently, is very low. This is an indication that the tutors are underutilised to a greater extent. This result is relatively lower than those reported in previous studies. For example, the study, Olatoun (2012), which investigated resource utilisation and internal efficiency in Nigerian secondary schools, found a higher mean of human resource utilisation of 72.45%.

DISCUSSION

The VTCs reported graduation rates of between 12 and 47%, with an average of 27%. The wastage ratio was 4.12 while the level of the coefficient of efficiency was 24.3%. These rates are much lower than the ones recommended by UNESCO and reported in developing countries literature. The reported values of wastage ratio, survival rate, coefficient of efficiency and graduation rate indicated lower internal efficiency in the VTCs. For an education system to have a high internal efficiency, UNESCO Institute of Statistics (UIS) (2017) recommends coefficient of efficiency above 70%, which the VTCs failed to meet. These findings are also relatively lower than those reported in the literature. For instance, Nyangia (2010) determined internal efficiency in public secondary schools in Kisumu county (Kenya) and reported a coefficient of efficiency of about 91%. Akinwumiju (1995), in a study on teachers' quality and internal efficiency in primary schools in Ekiti State, Nigeria, reported a coefficient of efficiency of about 88%. Babalola (2005), investigating the internal efficiency of Ekiti state secondary schools, found a coefficient of

efficiency of about 87%. The discrepancy between the results of the current study and those reported in the literature may be due to the differences in the type and level of education. That is, the current study focused on vocational training centres (VTCs) that are still not well structured and coordinated. The discrepancies may also be attributed to the numerous dropouts within the VTCs which were primarily due to lack of examination fees by most students and their preference for coursework to examinations as indicated by the qualitative data. However, UNESCO (2008) recommended a coefficient of efficiency of over 90% for an internally efficient education system in developing countries. It is also lower than the efficiency coefficient of developed countries like the United States, United Kingdom, Canada and Switzerland, which are over 97%, those of Latin America and the Caribbean, which are about 77% on average and those for other Sub-Saharan Africa countries which lies between 48.4% and 57.6% according to (World Bank, 2005). This status indicates that the VTCs in Kenya are highly internally inefficient.

The fact that tutors were teaching a minimum of one subject and a maximum of three subjects indicates that some tutors had more workload than others. Besides, given that the average utilisation rate in terms of other responsibilities was 49 per cent and general tutor workload 49.83%, which is slightly below the average, it is an indication that most tutors were not meeting the required number of responsibilities. The regression analysis between tutor workload and graduation rate revealed R = 0.373, which was statistically significant at 0.012, implying that tutor workload has a significant positive relationship with graduation rate. The presence of a relationship between tutor workload and graduation

rate indicates that increased tutor workload significantly influences graduation rate. This finding contradicts those reported by the Pitan (2012) study on the analysis of internal efficiency in utilising human resources in selected secondary schools in Nigeria, which found a negative relationship between teacher workload and wastage ratio.

The result of tutor time utilisation was relatively lower than the recommended 25 hours per week. Qualitative information also indicated that some tutors arrive in school late and leave early, reducing their teaching and contact hours. Also, some tutors are outsourced from other institutions to train sports and to deliver motivational speeches. These findings corroborate those of Kigwilu and Joyce (2015) study, which investigated teacher-factors influencing effective implementation of artisan and craft curriculum in community colleges in Kenya. Kiwilu and Joyce's study found out that more than 79% of teachers taught less than 20 hours with a mean weekly teaching load of 14.25 hours, albeit high variations for individual teachers.

Similarly, Ngware and Nafukho (2002) report on quality and utilisation of technical education trainers in Kenya established a mean weekly teaching load of 14 hours for teachers in Information Technology related units, with the majority teaching for 11 to 15 hours per week. P = 0.168 is greater than 0.05, indicating an insignificant relationship between tutor time utilisation and graduation rate. This result contradicts Ibukun et al. (2011), who found a significant relationship between time utilisation and perceived students' learning outcomes. The lack of a significant relationship suggests that some extraneous factors make up for time utilisation for tutors, which this analysis did not consider.

On average, this study found the student-tutor ratio to be slightly lower than the recommended number. The study established a learner-tutor ratio of 13.24 with only 20% of the institutions attaining the minimum requirement in terms of number of learners per tutor. This result confirms low enrolment within the VTCs implying low internal efficiency. The ratio is also less than those reported in literature like the study by Ayodele and Adeleke (2015), which investigated public and private junior secondary schools' internal efficiency in Ekiti State, Nigeria. The regression analysis between student-tutor ratio and graduation rate reported significant positive relationships. The presence of a relationship between the two variables indicates that an increase in the student-teacher ratio significantly influences the graduation rate. This result mirrors that of Pitan (2012), who found a significant positive relationship between student-teacher ratio and wastage ratio. Senimetu (2017)'s result also found a high significant relationship between teacher/students' ratio and internal efficiency of public university students. Following the explanation given by Senimetu (2017), Nyiwa et al. (2017) and Waita et al. (2015), the implication is that the number of students per teacher determines the level of teacher-learner contact and attention which in turn influence performance of the student. By extension, the learner-teacher ratio therefore improves internal efficiency.

Results reported on tutor utilisation reveal that tutors in VTCs in Kenya were under-utilised. For instance, the student-tutor ratio was about 13 students per tutor, which appears low. Even though the Government has made significant efforts over the past few years, including devolving the VTCs, offering student loans and bursaries, and subsidising fees, more efforts geared towards promoting VTCs are still encouraged. For example, the Government (both at the National and County level) should design VTCs friendly policies such as subsidising examination fees and encouraging enrolments. Other responsibilities carried out by the tutors also increase internal efficiency. Efforts should, therefore, be made to ensure teachers take on additional duties other than teaching.

Conclusion

In essence, although all education systems the world over have some level of inefficiency, determining the empirical nature and apparent nature of key facets of resource utilisation within education institutions is key. This study investigated the internal efficiency of public VTCs in Kenya. The findings indicate a lower internal efficiency for all the VTCs which participated in this study. VTCs in Kenya are, therefore, generally internally inefficient. Further, the results show that the tutors are underutilised. The study found a significant positive relationship between tutor utilisation and graduation rate in terms of influence on graduation rate. These findings indicate that proper tutor utilisation is a panacea for attaining higher graduation rates, a higher level of coefficient of efficiency, and an internally efficient education system.

REFERENCES

Aring, M. (**2011**). Technical and Vocational Education and Training; A study of promising models in International development. Education Development Center, Inc. (EDC).

Athmandu, T. (**2001**). Research Center study on improvement of internal efficiency of Primary school in Nepal.

Cohen, J. (**2020**). How TVET is Changing the Landscape of Poverty in Kenya. https://www.borgenmagazine.com/tvet-in-kenya/

Department of basic education Republic of South Africa (**2013**). The internal efficiency of the school system.

Fika, I. B., Ibi, M. B., and Abdulrahman, A. (**2016**). Staff utilization and commitment in Borno State colleges of education, Nigeria. Journal of Education and Practice, 7(20): 68-74

Ibukun, W. O., Akinfolarin, C. A., and Alimi, O. S. (**2011**). Correlate of resource utilization and students' learning outcome in colleges of education in South West Nigeria. International Education Studies; Canadian Centre of Science and Education, 4(3): 178–184.

IIEP (**2010**). Education Sector diagnosis. Distance Education Programme on Education Sector Planning Module 3. International Institute for Educational Planning.

Mohammed, A. (**2018**). Kenya's Education Cabinet Secretary press conference.

Mugo, J. (**2018**). Lessons on youth educational training reform in

Kenya.   https://www.brookings.edu/blog/education-plus-develop
ment/2018/11/13/lessons-on-youth-educational-training-reform-in-
kenya/

Nganga, G. (**2017**). New lease of life for Kenya's vocational institutions.
https://www.universityworldnews.com/post.php?story=201702091017
13360.

Nganga, G. (**2018a**). Government promotes TVET sector as 'preferable'
option.

Nganga, G. (**2018b**). Technical colleges – The new hope for economic
growth.
https://www.universityworldnews.com/post.php?story=201807111329
42514.

Nyiwa, K., Maithya, R., and Gathumbi, A. M. (**2017**). Influence of pupil-
teacher ratio on performance in Kenya Certificate of Primary
Education in Makueni County, Kenya. International Journal of
Humanities and Social Science Invention, 6(1): 50–54.

Pitan, O. S. (**2012**). Analysis of internal efficiency in the utilization of
human resources in selected secondary schools of Oyo State,
Nigeria. Journal of Emerging Trends in Educational Research and
Policy Studies, 3(5): 748–752.

Republic of Kenya (**2006**). Ministry of Education Strategic Plan 2006-
2011. Ministry of Education.

Republic of Kenya (**2007**). Kenya Vision 2030. Government Press.

Republic of Kenya (**2012a**). Ministry of Education Strategic Plan 2012-
2017. Ministry of Education.

Republic of Kenya (**2012b**). SESSIONAL PAPER 2012: A Policy
Framework for Education and Training: Reforming Education and
Training Sectors in Kenya. Ministry of Education.

Republic of Kenya (**2018a**). Budget Statement FY 2018/2019: Creating
Jobs, Transforming Lives and Sharing Prosperity. The National
Treasury. www.treasury.go.ke

Republic of Kenya (**2018b**). Competency Based Education and
Training Policy Framework. Ministry of Education.

Republic of Kenya (**2018c**). Economic Survey. Government Printer.

Senimetu, I. (**2017**). School Related Factors as Predictors of Internal
Efficiency of Public University Students in South-West, Nigeria.
African Research Review, 11(2): 251-261.

Tirus, K. (**2019**). Government Rolling Out CBET Program in Tertiary
Institutions.

UNESCO (**2015**). EFA Global Monitoring Report.
http://unesdoc.unesco.org/images/0023/002322/232205e.pd.

UNESCO Institute of Statistics (**2017**). The UNESCO Institute of
Statistics Glossary. http://uis.unesco.org/glossary

UNESCO, and **IIEP** (**2016**). Statistics for educational planning: Module
2. http://www.unesco.org/new/fileadmin/MULTIMEDIA/FIELD/Beirut/
images/T_2_Eng.pdf

UNESCO, World Bank, and UNICEF (**2014**). Education Sector Analysis
Methodological Guidelines, Volume 1. Sector-wide Analysis, with
emphasis   on   primary   and   secondary   education.
http://www.globalpartnership.org/content/methodological-guidelines-
education-sector-analysis-volume_1 p.107.

Waita, K. J., Mulei, K. O., Mueni, K. B., Mutune, M. J., and Kalai, J.
(**2015**). Pupil-teacher ratio and its impact on academic performance
in public primary schools in central division, Machakos county,
Kenya. European Journal of Education Studies.

Wilson, M., Wnuk, K., Silvander, J., and Gorschek, T. (**2018**). A
literature review on the effectiveness and efficiency of business
modeling. E-Informatica Software Engineering Journal, 12(1): 265–
302.