



## Performance Appraisal System and Valorization of Academic Research in Chartered Universities in Kenya

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### ABSTRACT

*The purpose of this study was to establish the influence of performance appraisal system on valorization of academic research in chartered universities in Kenya. We employed an explanatory research design and targeted all 5,138 lecturers. Using statistical formula, a sample size of 372 respondents was obtained. Quantitative data was obtained using self-administered questionnaires while an interview schedule was used to collect data from key informants. Data collected was analyzed with aid of Statistical Package for Social Sciences and the findings presented in tables. It was established that performance appraisal system had a strong and positive correlation with valorization of academic research. The study concluded that performance appraisal system significantly influenced valorization of academic research. The study recommended the need establishment of standard university metrics for valorization so as to stimulate and enhance the valorization agenda.*

**Key Words:** Performance Appraisal System, Quantitative data, Valorization of Academic Research.

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### 1. INTRODUCTION

Universities today have now assumed a third mission of adding value to research for societal benefit (Fonseca, *et al.*, 2021). Value creation or valorization is achieved by implementing specific principles and processes including the contextual alignment of their applications with the organization's strategy. The creation of value is conditioned by the manner in which knowledge resources are deployed and managed through appropriate processes coherent with organization's strategy. The importance of university research in contributing to economic growth is today widely acknowledged world over (Therien, 2017). Universities nowadays are not only expected to function as providers of human capital but also as growth engines to boost economies. However, universities are not equally successful in valorization their academic research. According to the Association of University Technology Managers (AUTM, 2016), universities in the US have shown tremendous success in their valorization activities. Similarly, there have vast increases in patenting, licensing, and spinoff formation observable across Canada, Australia, and Europe. Technologies that have been transferred from research to industry have resulted in some of the most innovative companies. Valorization is therefore recognized as a valuable process, improving economic development, generating innovative products and services, and enhancing the quality of life.

Despite the increasing interest in gaining knowledge about how to support the transfer of university research into the commercial domain there are surprisingly few studies that empirically examine the very early stages of valorization of academic research where the initial ideas for commercial exploitation are first identified (Marques *et al.*, 2019). Instead, studies have examined the formation and growth of spin off companies which is beyond the decision to exploit a certain technology or research result. Academics play a significant role in this third mission as they actively generate ideas, nurture the research process and add value to research outputs by translating their strategic priorities into reality using their expert knowledge for the benefit of society (Marques *et al.*, 2019). They are important in the

generation of business ideas that can be developed and commercially exploited. First, they have a deep understanding of the technology underlying their research which makes them better in absorbing new knowledge. Second, their career has provided them with opportunities to build up a network of relationships. Third, by reaching the highest academic position they have come to a career turning point where they may seek to diversify their career activities. Hence, it is reasonable to suggest that lecturers are key persons in the early stages of the process where research results are transformed into ideas for new or improved products or services.

African universities are however faced with a shortage of highly qualified staff (ECA, 2014). The report noted that a worrying trend is that the number of researchers and lecturers holding doctorate degrees may be far lower at some of the new universities being set up. Research management in many African universities was constrained by lack of developed structures, resources and experienced staff (Kirkland & Ajai-Ajagbe, 2013). Their study also noted that universities lacked capacity to negotiate contracts, identify funding sources, facilitate technology transfer, and disseminate research results. Furthermore, the study noted a lack of staffing for research management functions due to rigid human resource policies. According to Adelowo *et al.*, (2017), with 152 universities in Nigeria, there seems to be little or no results to show for the research engagement of these universities. Furthermore, less than 60% of the academic staff disseminated their research results and that only about 28% of academics developed research products that can be put into use for societal development. Kenya's Vision 2030 strongly advocates for revolutionizing research into value addition. It aims at intensified application of science, technology and innovation to raise productivity and efficiency levels. It recognizes the role played by academic research in accelerating economic. However, all these efforts will only bring significant results if effective valorization mechanisms driven by academics are incorporated in the university performance appraisal system.

## **2. STATEMENT OF THE PROBLEM**

Universities are at the center of the knowledge economy where they are expected to innovate, and use the knowledge they generate for societal benefit. Valorization of academic research plays a significant role in enhancing economic growth of developed countries, with many studies indicating a positive correlation between academic research and economic growth (Therien, 2017; Ross *et al.*, 2017). Despite its current popularity in university policies in developed countries, much is still unknown about valorization of research locally; for example, to what extent knowledge is actually brought to market, how long this process takes, and which factors exert a hampering or stimulating influence on the speed of the process. While universities in developed countries have established metrics of measuring valorization of academic research, there is limited if any evidence on such metrics locally. Local studies are largely focused on knowledge management systems and where knowledge transfer studies have been undertaken, the focal point has been business incubation. Furthermore, there is limited or no quantitative data on university research outputs in Kenya. University research will be beneficial to society if the results can be converted into products and services. However, less than 60% of the academics disseminated their research results and that only about 28% of academics developed research products (CUE, 2016). Some of the reasons cited for low rates of valorization of research include lack of funding, business expertise; low understanding of valorization, lack of appropriate human-capital and lack of mentoring and educational support for new entrepreneurs. Locally, several studies have been carried out on valorization of research outputs (Kendagor, 2018; Muia & Oringo, 2016). These studies however focused on gathering perceptions and views from university top managers on research outputs. Similarly, these studies have generalized constraints to valorization of academic research to include resource, institutional, cultural and human resource constraints. In particular, these studies point out the importance of human resource factors such as performance appraisal in enhancing valorization of academic research (Kendagor, 2018; Muia & Oringo, 2016; Therien, 2017). However, there is little or no evidence of any local studies that have investigated the link between performance appraisal system and valorization of academic research. The present study sought to fill this knowledge gap.

## **3. LITERATURE REVIEW**

The study was anchored on Vroom's Expectancy theory which argues that the strength of a tendency to act in a specific way depends on the strength of an expectation that would be followed by a given outcome and on the attractiveness of that outcome. The theory proposes that an employee can be motivated to perform better when there is a belief that the better performance lead to a good appraisal and shall result into realization of personal goals (Robbins

& Judge, 2013). Motivation is thus seen as a function of two factors: expectancy, which is the perceived link between employee effort and their perceived performance; and valence, which is the expected value of work outcomes. However, when performance goals are beyond the achievement of the employee, the accompanying motivation also declines. According to Parijat and Bagga (2014), the theory is too idealistic and that the attributes for performance measurement are quite difficult to measure. The theory assumes that employees are rational and logical in calculating these variables and it fails to provide specific solution to specific motivational problems. According to Robbins and Judge (2013), the theory is suitable in advanced organizations such as universities which have adequate mechanisms to measure the employee efforts, outcome and rewards. Academics make choices based on estimates of how well the expected valorization results are going to match up with or eventually lead to the desired results. Thus, the theory can explain performance appraisal within the university since academics would adjust their behaviors based on their anticipated satisfaction of the goals that they set.

Performance appraisal system plays a significant role enhancing university performance as it has a direct impact on key organization areas such as expansion, innovation and productivity (Singh & Kassa, 2016). Previous studies (Enyioko, 2016; Mutahi & Busienei, 2015) have reported a positive relationship between performance appraisal and various university performance measures including effective knowledge transfer. Performance appraisal is an integral part of an organization and reflects how organizations manage their human capital. Ineffective appraisal systems may lead to many undesirable problems including low morale, decreased employee productivity and low enthusiasm to support the firm with the ultimate outcome being decreased organizational performance. Therefore, organizations must develop structured systems not manage their intellectual assets in order to remain competitive. According to Chuang *et al.*, (2013), HRM systems are seen as one potential means through which knowledge firms can stimulate effective knowledge behaviors in their employees. They noted that performance appraisal systems are one of the important factors in enhancing research performance though appraisal systems in themselves are not sufficient enhancers of research performance. In relation to academic staff, the study noted that performance appraisal should include a continuous review of motivational aspects of the appraisal process in order to increase research productivity. Similarly, Levy *et al.*, (2015) noted that contextual factors may influence the effectiveness of performance appraisal. Therefore, performance appraisal systems ought to be adjusted and aligned to specific organizational contexts for enhanced effectiveness which in turn would foster higher performance levels.

According to Rabenu and Tziner (2015), performance appraisal systems play an equally important role in a university set-up and that appraisal systems should be customized to fit both employees job needs and their individual characteristics and to be dynamic to the constant changes in the firms' procedures, processes and structures. In this context therefore, it would seem appropriate that performance appraisal systems targeting academics should not only be aligned to the organizational context but rather they should be scaled down to departmental and individual contexts. However, regardless of the specific university context, the appraisal systems are thus expected to influence valorization of academic research. According to AUTM (2016) key indicators of valorization of academic research include number of invention disclosures, patent applications, publications, licenses executed, total income from licenses and start-up companies formed. Ziegele (2013) further refined these indicators to include income from private source such as service contracts, licenses, royalties and trials, joint research publications with industry, the number of patents per academic staff, joint patents with industry per academic staff, number of spin-offs averaged over three years, patent citations to research publications, revenues from continuous professional development, average number of start-up firms established and percentage income from knowledge exchange such as licensing agreements, research contracts and copyrights. In Africa, valorization is still at its infancy and there seems to be no standard metrics applicable and thus customizing these metrics to the local context would seem appropriate.

According to Nasreen and Naz (2019) who analyzed performance appraisal systems in universities, performance appraisal systems significantly influenced employee performance. The authors adopted a descriptive design and data was collected using questionnaires from 10 public universities. The authors established that faculty members were given informal verbal feedback on their performance though universities had written job duties and responsibilities. Furthermore, academic activities, professional commitment, punctuality, knowledge, research and personal behavior related aspects were given more emphasis in their performance appraisals. However, their study was undertaken in a

different context. Sułkowski *et al.*, (2020) investigated performance appraisal in universities and found that the purposefulness of performance appraisal activities may not be fully understood by public higher education institutions (HEI) management and academics. Their study interviewed key informants from three public universities and found that existing tensions between performance appraisal normative aims of motivation and fair evaluation and its descriptive effects of increasing bureaucracy and dissatisfaction might undermine motivation, an essential driving force that motivates academics to work in public HEIs. They further found that the existing forms of performance appraisal were usually introduced in universities for administrative purposes. Though they focused on valorization, their study was carried out in a different context.

Locally, Maloba *et al.*, (2016) investigated performance appraisal systems and employee job productivity in public universities. Their study employed descriptive survey research design and used questionnaires. They found a positive and significant relationship between performance appraisal systems and employee job productivity. Their findings however were limited to four universities and targeted all cadres of employees and did not have elements of valorization of academic research as a performance measure. Muthuri (2019) sought to establish performance appraisal and its influence on the motivation of lecturers in promoting students' learning outcomes in public technical training institutions in Nairobi Region, Kenya, and found a significant relationship between performance appraisals and lecturers' motivation and students' learning outcomes. Their study employed a convergent parallel mixed-method research design and used questionnaires, interviews and observation guides to collect data. They further found that poor target setting, inadequate financial resources, insufficient time, and shortage of teaching and learning resources hindered performance appraisal. The study however did not clarify whether motivation of these lecturers would lead to valorization of academic research. Another study by Mbiti *et al.*, (2019) investigated the influence of performance appraisal on organizational performance in Universities within Machakos and Kitui Counties in Kenya and found that performance appraisal had a positive significant influence on performance of universities. Their study employed a descriptive research design and used both questionnaires and interviews to collect data. They revealed that universities had effective performance appraisal procedures and methods in place that were used by top university managers in appraising employee performance based on their agreed university performance targets. However, in measuring performance of universities, the authors did not use valorization of academic research metrics as has been done in the present study.

#### **4. RESEARCH METHODOLOGY**

In this study, an explanatory design with a cross-sectional approach was employed. Explanatory designs aim at identifying causal factors and outcomes of the target phenomenon. The design was preferred because it goes beyond description of a phenomenon by attempting to explain reasons for a phenomenon that a descriptive study only observes. The study's target population included all lecturers teaching in 31 chartered public universities and 18 chartered private universities who have a total of 5,138 lecturers. Using statistical formulae, a sample of 372 respondents was obtained which was allocated using both proportionate stratified sampling and simple random sampling technique. This study used questionnaires and interview schedules in collecting data. An interview schedule was used to collect data from selected heads of research, deans and heads of departments in each of the targeted universities using convenience sampling. The questionnaire was thus be piloted on 10% of the target population which approximates 38 lecturers in public and private constituent colleges. Before embarking on data collection, the researcher first sought clearance from the relevant agencies. Data analysis was then undertaken with the aid of Statistical Package for Social Sciences (SPSS) and the results were presented in tables.

#### **5. RESEARCH FINDINGS AND DISCUSSION**

From the administered questionnaires, 287 returned questionnaires were properly filled which represented an overall successful response rate of 77.7%. A good response rate is not only an indicator of good sampling design but also enhances that quality of the parameter estimation. A response rate of over 77% was deemed adequate for the study and thus further analysis was also deemed to be appropriate to be undertaken. The study sought the distribution of the respondents based on various demographics shown in Table 1.

**Table 1: Demographic Characteristics**

|             | Description           | Frequency  | Percentage  |
|-------------|-----------------------|------------|-------------|
| Gender      | Male                  | 209        | 72.8%       |
|             | Female                | 78         | 27.2%       |
|             | <b>Total</b>          | <b>287</b> | <b>100%</b> |
| Age Bracket | Between 36 – 45 years | 44         | 15.3%       |
|             | Between 46 – 55 years | 116        | 40.4%       |
|             | Over 55 years         | 127        | 44.3%       |
|             | <b>Total</b>          | <b>287</b> | <b>100%</b> |
| Experience  | Below 2 years         | 4          | 1.4%        |
|             | Between 2 - 5 years   | 27         | 9.4%        |
|             | Between 5 – 10 years  | 110        | 38.3%       |
|             | Over 10 years         | 146        | 50.9%       |
|             | <b>Total</b>          | <b>287</b> | <b>100%</b> |

From the findings, 72.8% of the respondents were male and 27.2% were female implying that the male gender dominates. As reported by Muia and Oringo (2016), after passing the age of about 38 years, women tend to receive, on average reduced funding for research than men, and are generally less productive in terms of research outputs. Furthermore, their study noted that in spite the fact that women in academia have made recent and significant gains, they still main remain underrepresented in many departments. Further, 44.3% were over 55 years, 40.4% were between 46 and 55 years while 15.3% were between 36 and 45 years. This implies that a large percentage of academic staff in these universities are approaching the retirement age which may negatively impact valorization of academic research. Similarly, 50.9% of the respondents had over 10 years working experience, 38.3% of the respondents had between 5- and 10-years working experience, 9.4% of the respondents had between 2- and 5-years working experience while 1.4% of the respondents had less than 2 years working experience. Work experience has a statistically positive relationship with the quality and quantity of academic research outputs (Fukuzawa, 2014) and thus the work experience of academic staff would be a pointer to their valorization abilities.

### 5.1 Diagnostic Test Results

In order to test for presence of heteroscedasticity, Breusch-Pagan Test was used with the following hypotheses:  $H_0$ : Residuals are distributed with equal variance (Homoscedastic) and  $H_1$ : Residuals are not distributed with equal variance (Heteroscedastic). The rule of thumb when undertaking Breusch-Pagan Test is that if p-values > .05 for the predictor variable then we fail to reject the null hypothesis and conclude that the data is homoscedastic. The findings of the test are presented in Table 2.

**Table 2: Heteroscedasticity Test Results**

| Model                        | Unstandardized Coefficients |            |       | t      | Sig. |
|------------------------------|-----------------------------|------------|-------|--------|------|
|                              | B                           | Std. Error | Beta  |        |      |
| 1 (Constant)                 | .524                        | .149       |       | 3.503  | .001 |
| Performance Appraisal System | -.115                       | .605       | -.199 | -1.970 | .055 |

a. Dependent Variable: Squared Residuals

From the regression coefficients obtained by regressing the squared residuals against the predictor variable, performance appraisal system ( $p=.055$ ) had  $p\text{-values}>.05$  and we fail to reject the null hypothesis and conclude there is absence of heteroscedasticity. In order to ascertain any presence of autocorrelation between the dependent and independent variables, the Durbin Watson (DW) test statistic was used. The DW statistic ranges between 0 and 4. A DW value between 1.5 and 2.5 indicates non-autocorrelation; a DW value less than 1.5 indicates positive correlation while a DW value more than 2.5 indicates negative correlation. The autocorrelation test results indicated a DW of 1.595, a value which lies between 1.5 and 2.5 which shows non-autocorrelation between the independent variables and the dependent variable. The data was also subjected to a One-Sample Kolmogorov-Smirnov Test to test its normality. In the test, the following null and alternate hypotheses were used:  $H_0$ : Sample data is normally distributed and  $H_1$ :



**Table 3: One-Sample Kolmogorov-Smirnov Test**

|                                  |                | Valorization of Academic Research |
|----------------------------------|----------------|-----------------------------------|
| N                                |                | 287                               |
| Normal Parameters <sup>a,b</sup> | Mean           | 2.8964                            |
|                                  | Std. Deviation | .69248                            |
|                                  | Absolute       | .169                              |
| Most Extreme Differences         | Positive       | .135                              |
|                                  | Negative       | -.169                             |
| Kolmogorov-Smirnov Z             |                | 2.868                             |
| Asymp. Sig. (2-tailed)           |                | .000                              |
| Exact Sig. (2-tailed)            |                | .000                              |
| Point Probability                |                | .000                              |

a. Test distribution is Normal.

The results obtained in Table 3 indicated that Kolmogorov-Smirnov Z was 2.868 (p-value=.000). Since the p-value was less than 0.05; we fail to reject the null hypothesis and conclude that the data was normally distributed. Variance inflation factor (VIF) was used to diagnose collinearity of the data with concern raised if VIF is 10 and above (Bryman, 2016). The findings on performance appraisal system (VIF= 3.058, Tolerance statistic= 0.327) in Table 12 was within the acceptable range and thus led to the conclusion that there was absence of multi-collinearity.

## 5.2 Sampling Adequacy Test

In order to assess whether collected data was adequate and appropriate for factor analysis, two tests were performed, namely; Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Barlett's Test of Sphericity. The findings of KMO and Bartlett's Test for valorization of academic research are presented in Table 4.

**Table 4: KMO and Bartlett's Test**

| KMO and Bartlett's Test                          |                    |          |
|--------------------------------------------------|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | .804     |
|                                                  | Approx. Chi-Square | 2245.931 |
| Bartlett's Test of Sphericity                    | Df                 | 55       |
|                                                  | Sig.               | .000     |

The KMO measure produced a value of 0.804 which was higher than the cut-off value of 0.6 indicating sampling adequacy. This is further confirmed by the Bartlett's Test of Sphericity (Chi-Square= 2245.931, p=.000) which re-affirms sampling adequacy. For performance appraisal system, the test findings are presented in Table 5.

**Table 5: KMO and Bartlett's Test for Performance Appraisal System**

| KMO and Bartlett's Test                          |                    |          |
|--------------------------------------------------|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | .807     |
|                                                  | Approx. Chi-Square | 1263.923 |
| Bartlett's Test of Sphericity                    | Df                 | 36       |
|                                                  | Sig.               | .000     |

The KMO value of 0.807 while Bartlett's test (Chi-Square= 1263.923, p=.000) confirmed sampling adequacy.

### 5.3 Factor Analysis Results

Further, factor analysis was conducted using Principal Components Method. Factor analysis allows for the simplification of a set of complex variables or items using statistical procedures to explore underlying dimensions that explain the relationship between multiple variables/items (Tavakol & Wetzels, 2020). The findings on the total variance explained for valorization of academic research are presented in Table 6.

**Table 6: Valorization of Academic Research Total Variance Explained**

| Component | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|
|           | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % |
| 1         | 5.783               | 52.574        | 52.574       | 5.783                               | 52.574        | 52.574       |
| 2         | 1.477               | 13.425        | 65.999       |                                     |               |              |
| 3         | 1.101               | 10.007        | 76.006       |                                     |               |              |
| 4         | .649                | 5.899         | 81.905       |                                     |               |              |
| 5         | .533                | 4.849         | 86.753       |                                     |               |              |
| 6         | .440                | 3.998         | 90.752       |                                     |               |              |
| 7         | .331                | 3.013         | 93.765       |                                     |               |              |
| 8         | .255                | 2.320         | 96.085       |                                     |               |              |
| 9         | .168                | 1.529         | 97.614       |                                     |               |              |
| 10        | .151                | 1.371         | 98.985       |                                     |               |              |
| 11        | .112                | 1.015         | 100.000      |                                     |               |              |

The findings indicate that the 11 components can be factored into 1 factor. The total variance explained by the extracted factor is 52.574%. Furthermore, all the 11 factors attracted coefficients of more than 0.4 hence all the statements were retained. Factor analysis findings for performance appraisal system are presented in Table 7.

**Table 7: Performance Appraisal System Total Variance Explained**

| Component | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|
|           | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % |
| 1         | 4.275               | 47.496        | 47.496       | 4.275                               | 47.496        | 47.496       |
| 2         | 1.494               | 16.599        | 64.095       |                                     |               |              |
| 3         | 1.032               | 11.468        | 75.563       |                                     |               |              |
| 4         | .551                | 6.120         | 81.683       |                                     |               |              |
| 5         | .464                | 5.154         | 86.836       |                                     |               |              |
| 6         | .388                | 4.315         | 91.152       |                                     |               |              |
| 7         | .341                | 3.789         | 94.941       |                                     |               |              |
| 8         | .259                | 2.877         | 97.818       |                                     |               |              |
| 9         | .196                | 2.182         | 100.000      |                                     |               |              |

The total variance explained indicates that the 9 components can be factored into 1 factor. The total variance explained was 47.496%. However, one of the components did not meet the threshold of 0.4 and thus was removed.

### 5.4 Descriptive Results

The descriptive findings for performance appraisal system are presented in Table 8.

**Table 8: Descriptive Statistics for Performance Appraisal System**

| Statement                                                                                                                                | Mean | StdDev |
|------------------------------------------------------------------------------------------------------------------------------------------|------|--------|
| In my university, performance appraisal provides the basis for an employee development plan                                              | 3.55 | .910   |
| In my university, performance appraisal is the basis for decisions about promotions and salary increment.                                | 3.44 | 1.198  |
| My university disseminates performance appraisal criteria and results to me thereby enhancing my research work                           | 3.78 | .969   |
| Our university periodically conducts performance appraisals based on mutually agreed performance objectives                              | 4.01 | .755   |
| Our performance appraisal system contains aspects of value addition which encourages increased focus on research activities              | 3.46 | 1.063  |
| In my university, appraisal feedback is provided and discussed on timely basis which enables me to understand my individual shortcomings | 3.79 | .896   |
| My university organizes trainings geared towards addressing performance shortcomings and continuously monitors my performance            | 3.58 | 1.097  |
| Our performance appraisal systems incorporate value addition of research and award more weights to research work that generates income   | 3.34 | 1.076  |

With a mean of 3.6, the respondents agreed to the statements on performance appraisal system. The descriptive findings mirrored those of key informants. For example, a director of research opined “*universities have a structured performance appraisal system which contains some aspects of value addition of research. However, at the departmental and school level, individual lecturer research output is appraised and based on the forwarded recommendations, the university may consider performing individuals for appointments and promotions*”. Furthermore, a dean noted “*most performance appraisals are done in a structured way though value addition goals are developed based on departmental objectives. However, despite the vibrancy of research outputs, they are significantly hampered by low funding, outdated technologies, lack of expertise and limited exposure to value addition opportunities*”. Furthermore, the descriptive findings for valorization of academic research are presented in Table 9.

**Table 9: Descriptive Statistics for Valorization of Academic Research**

| Statement                                                                                                                        | Mean | StdDev |
|----------------------------------------------------------------------------------------------------------------------------------|------|--------|
| There has been an increase in the number of research and developments agreements signed with research partners                   | 3.28 | .836   |
| Licensing income earned from my research activities within the university have increased                                         | 2.59 | .896   |
| The number of spin-outs formed annually arising from my research have increased steadily                                         | 2.89 | .963   |
| The numbers of patents generated from my research work have been increasing significantly.                                       | 2.54 | .922   |
| The number of publications undertaken individually or jointly with others has increased.                                         | 3.55 | 1.029  |
| Research funding awarded to me on the basis of research ideas have been increasing.                                              | 2.80 | .897   |
| The number of collaborative research projects undertaken with other agencies have increased                                      | 3.03 | 1.103  |
| The number of contractual agreements with other entities to undertake economic activity together has also increased.             | 2.87 | 1.057  |
| The value of material and equipment inflows from my research and partners have increased                                         | 2.67 | .979   |
| The number of consultancy firms developed or which am directly involved in as a result of research work undertaken has increased | 2.85 | .876   |
| The number of invention disclosures arising from my research activities have also increased                                      | 2.82 | .981   |

With a grand mean of 2.9, the respondents were unsure on the valorization activities. From the subsequent key informant interviews, a similar trend emerged. For example, one of the Deans pointed out that “*while there is no standard measure of gauging performance of valorization of academic research, we have had enhanced number of publications, university operated enterprises had significantly expanded and patents, licenses and collaborations are equally on the rise*”. Furthermore, a Director of Research opined that “*annual disclosures during our research*



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*conferences ensures we constantly monitor our research outputs while the research outputs are equally deposited in our university repository*". In another interview, a university Deputy Vice Chancellor in charge of academics and research said *"ideally, universities should provide the right structures, HR support, facilities and labs, right type of linkages and greater autonomy for university researchers. However, funding constraints limits our ability to advance the right environment. Further, we are limited by lack of policies on income sharing, strategic alliances and collaborations which greatly hampers the vibrant research capacity"*. The findings mirror those of Singh and Kassa (2016) who suggested that universities need to develop and domesticate research output indicators in order to increase academic staff performance. Furthermore, Kendagor (2018) found that though staff qualifications positively influenced research outputs, universities and other stakeholders should identify other ways of dissemination research outputs other than publications.

## 5.5 Inferential Results

The model summary findings of the univariate regression between valorization of academic research and performance appraisal system are presented in Table 10.

**Table 10: Model Summary**

| Indicator                      | Coefficient |
|--------------------------------|-------------|
| R                              | .662        |
| R Square                       | .439        |
| Adjusted R Square              | .437        |
| Standard Error of the Estimate | .51976      |

The findings indicates that performance appraisal system ( $r=.662$ ,  $p=.000$ ) had a strong and positive correlation with valorization of academic research. This finding implies that an increase in performance appraisal system would lead to an increase in valorization of academic research. From the model summary findings, the R-square value of 0.439 indicates that performance appraisal system explains 43.9% of variation in valorization of academic research. Table 11 shows the analysis of variance (ANOVA) findings.

**Table 11: ANOVA**

| Model |            | Sum of Squares | df  | Mean Square | F       | Sig.              |
|-------|------------|----------------|-----|-------------|---------|-------------------|
| 1     | Regression | 60.151         | 1   | 60.151      | 222.659 | .000 <sup>b</sup> |
|       | Residual   | 76.993         | 285 | .270        |         |                   |
|       | Total      | 137.144        | 286 |             |         |                   |

The ANOVA findings indicated a statistically significant model ( $F= 222.659$ ,  $p=.000$ ). The regression coefficients findings are presented in Table 12.

**Table 12: Regression Coefficients**

| Model | Unstandardized Coefficients  |            | Standardized Coefficients | t     | Sig.   | Collinearity Statistic |            | DW Statistic |
|-------|------------------------------|------------|---------------------------|-------|--------|------------------------|------------|--------------|
|       | B                            | Std. Error | Beta                      |       |        |                        |            |              |
| 1     | (Constant)                   | .605       | .157                      | 3.862 | .000   |                        |            |              |
|       | Performance Appraisal System | .633       | .042                      | .662  | 14.922 | .000                   | 3.058 .327 | 1.595        |

a. Dependent Variable: Valorization of Academic Research

From the findings, it was established that performance appraisal system significantly influenced valorization of academic research ( $B=.633$ ,  $p=.000$ ). This implied that one-unit increase in performance appraisal system would lead to an increase of 0.633 units in valorization of academic research. Further, the following model was developed:

$$\text{Valorization of Academic Research} = 0.605 + 0.633 \text{Performance Appraisal System.}$$

Using the findings in Table 12, the null hypothesis of the study stated that:  $H_0$ : *Performance appraisal system has no significant influence on valorization of academic research in universities in Kenya* was rejected. The study therefore concluded that performance appraisal system had significant influence on valorization of academic research in universities in Kenya.

## 6. CONCLUSIONS

The study concluded that performance appraisal system had a strong and positive correlation with valorization of academic research in universities in Kenya and that performance appraisal system was a significant predictor of valorization of academic research. Based on the findings, the study recommended the need for universities to strengthen their performance appraisal system in line with their valorization needs. Key areas recommended include: enhancing academic staff development plans, enhance their rating mechanisms, setting valorization standards for all academic staff, incorporating valorization appraisals on decisions about promotions and salary increment, continuous and timely dissemination of performance appraisal criteria and results to academic staff, structured trainings geared towards addressing valorization shortcomings, enhanced mentorship programs on valorization processes and enhanced monitoring of academic staff valorization performance. In addition to practical implications of the study findings, this study also contributed to the existing literature on performance appraisal system and valorization of academic research. By anchoring the study on expectancy theory whilst expounding on the strengths and weaknesses of the theory, the study offers significant contributions towards the assumptions of these theories and their potential use in diverse contextual applications. Finally, the study contributed towards policy through the various policy recommendations including the establishment of national valorization metrics; amendments to the existing University Act to allow structured investments from collaborating agencies and amendments to academic staff reward schemes; and enhanced funding schemes geared towards enhanced valorization of research outputs.

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