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THE MEDIATING ROLE OF UNIVERSITY INDUSTRY COLLABORATION ON THE RELATIONSHIP BETWEEN HUMAN RESOURCE DEVELOPMENT, INFRASTRUCTURE AND PERFORMANCE OF UNIVERSITIES IN KENYA.

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Abstract

There have been calls to universities in developing countries to strengthen their linkages with the industry. These calls have based their premise on enhancing the performance of the universities. Empirical evidence to support the calls has been minimal given that little research has been done in Africa on this phenomenon. This paper adopted a human resource development perspective to explain the role of the phenomenon of University-Industry – Collaboration (U-I-C) in the performance of universities. The study was done in Kenya drawing its respondents from 16 universities both government and private sponsored. Data was obtained from 130 respondents from a broad range of managers in various units of the universities. The results indicate that the Human Resource Development (HRD) Infrastructure for the universities in Kenya is at the level of importance (Mean=3.7;s.d=0.99), U-I-C is at a high level (Mean=3.7; s.d=1.04) and performance is rated at a moderate level (Mean=3.5;s.d=0.99). The results on the test of the two hypotheses of the study indicate that HRD Infrastructure is positively related with university performance and that it explains % of the variation in the university performance. Further, U-I-C partially mediates the relationship between University HRD Infrastructure and Performance. The study concludes that U-I-C is relevant to universities in Kenya since the strength of the relationship between University HRD Infrastructure and performance depends on the phenomenon of U-I-C. While the findings are considered to provide the needed empirical support for the adoption of U-I-C among universities, they raise implications both to the management of universities in Kenya and the multidisciplinary theory supporting HRD practices in organizations.

Keywords: HRD, Infrastructure, Performance, SHRD, SHRM, U-I-C and Universities.

1. INTRODUCTION

University education systems have been established in most parts of the world to contribute towards attainment of national human resource development goals of supplying manpower to support industrial development by providing well trained and capable science and technical human resources (Rao, 1995; Chituis, 1999; Sohn, 2005). An important aspect of these goals is to ensure that the universities serve as innovation actors that can drive national competitiveness by not only developing suitable human capital but also providing the base for engineering and scientific skills that are needed to make a country's products and services competitive (Mulholland & Shakespeare, 2005). In addition, the universities provide researchers who have the capacity to generate, adapt and apply new knowledge and technologies that is considered to be vital in driving industrial activities if shared with the productive sector of the economy (Xiao & Tsang, 2004; Sohn, 2005; Al-Dosary, Rahman & Aina, 2006). The need to share and access this knowledge, generated by universities, calls for close links between institutions of higher learning and the industry. There has been a growing concern for universities in developing countries to reform and strategically re-orient themselves so as to generate and share knowledge that will promote university-based entrepreneurialism in their respective nations' economies so as to drive industrial development (Kiamba, 2005; Lapina & Slaidins, 2005; Summerville, 2005; Chang, Yang & Chen, 2006) based on the nature of their work which is connected with knowledge (Leiponnen, 2008). This knowledge is managed within contexts that nurture learning. The universities are recognized as learning entities that generate knowledge and technology that can become the basis for collaboration with the productive sector.

Some proponents of this knowledge management stream have linked the process with human factors and thus, pointed at the role of an organization's human resources in its generation and utilization. Thus, the move towards undertaking university-industry collaborations (U-I-C) by universities needs to be anchored on the support of the institutions Human resources. The major point of argument advanced in persuading universities to initiate links with the industry is based on improving performance using both quantitative and objective indicators as they respond to and satisfy diverse stakeholder requirements in rapidly changing environments. A relevant stream of knowledge from Human Resource Management (HRM) suitable for integrating the research in this area is that of Human Resource Development (HRD) which is regarded as an important base for building inter-organizational networks that link universities with the industry (Kilika, 2009; Kilika et al., 2012).

HRD is considered relevant in this situation for a number of considerations. First, it is strategic in nature and is practiced to help an organization align its strategic intents with their human resource capabilities. One of the capabilities is that associated with driving competitiveness through knowledge management which is a hall mark of the nature of the work of universities. Secondly, HRD is recommended for adoption by organizations as they experience higher levels of turbulence, as most universities are reported to be experiencing varying changes in both macro and micro settings of their operations. Thirdly, through its philosophy, it is practiced at several levels of analysis so as to address individual, organizational and national concerns and thus become a basis for informing National HRD policies that will affect entire national

economies through the university education systems. As part of the philosophy, performance is driven by learning systems, which opens room for universities to create and share knowledge both internally and externally. Externally, this opens room for universities to pursue HRD based inter-organizational networks.

2. THE RESEARCH PROBLEM

A number of empirical studies focusing on HRD and inter-organizational networks point at possible gaps with regard to the relationship between HRD practices and U-I-C, the impact of the U-I-C on the existing relationship between HRD Systems and organizational performance as well as the indicators used to assess the performance. The Strategic HRD approach advocates adoption of a stakeholder orientation as the basis for inter-organizational networks, an aspect yet to be integrated in HRD Research and leads to unanswered questions regarding how HRD is associated with inter-organizational networks of the form of U-I-C (Hawley & Taylor, 2006; Worasinchai, Ribiere & Arntzen, 2008). Even though some of the studies have implied a possible relationship, they have been criticized for using a relatively low level of statistical rigor that has limited the scope of the generalization of the findings (Martin, 2000; Pelagidis, 2008). There is also a missing explanation with regard to the role of the inter-organizational networks in relating the HRD systems of organizations and their performance (Chang, Yang & Chen, 2006). In order to provide a justification for the adoption of U-I-C by universities, there is need for studies to demonstrate clearly the process through which U-I-C influences performance of universities. And while providing this justification, there is a need to explain the process using the relevant set of performance indicators suited to the higher education sector. Even though some previous attempts have been made towards this direction, the studies seem to be disintegrated (Kotler, 1997; Song, Joo & Chemarck, 2009) and in addition the specific performance measures for the outcomes of the work of universities reflecting the defining nature of HRD have also been largely ignored by most studies due to their focus on performance indicators drawn from the industrial and commercial sectors that may not be entirely applicable in the case of universities (Nakamura & Ueda, 2006; Koka & Prescot, 2008; Pelagidis, 2008).

This study was therefore undertaken to establish the role of the phenomenon of U-I-C on the relationship between university HRD Infrastructure and performance. Two objectives were identified. The first was to assess the relationship between the university HRD Infrastructure and corresponding performance while the second was to measure the influence of U-I-C on the strength of the relationship between the HRD Infrastructure and University Performance. The findings of this research were considered to be of significance in a number of ways. First, the experiences of inter-organizational networks on the direction of U-I-C largely remain undocumented in most developing countries, a situation which is also applicable in Kenya. The existing research done on the area of University-Industry collaboration has mostly been done in Asia, Europe and America. Only one case reflects one university in an African country (Martin, 2000). The findings of this study contribute to the growing concern for U-I-C by extending the already existing HRD knowledge into the area of inter-organizational networks. HRD scholars are interested in understanding the exact role played by HRD in these settings as well as the HRD related outcomes arising from the networks. Secondly, the findings of this study provide knowledge that is crucial in advancing the stream of scholarship supporting the adoption of both SHRM and SHRD in organizations in which a major concern is justification

of investments in HRD and the real links to both tangible and intangible performance of organizations.

3. LITERATURE REVIEW

Human Resource Development Infrastructure

Human Resource Development is an essential component of HRM systems of organizations. HRD as an integral part of an organization's HRM System is set against a background of turbulence and change in organizational life which arises from developments in business environments, work processes and organizational cultures, which drive the need for successful change management strategies (Joy-Matthews, Megginson & Surtees, 2004). HRM has been associated with change management initiatives in organizations in which case, it serves as an agent for change (Jackson & Schuler, 2000; Joy-Matthews, Megginson & Surtees, 2004; Lopez, Peon & Ordas, 2005; Tomkinson, 2005). Some scholars are of the view that change programs in organizations largely depend on an organization's human resources (Prasad, 1996; Jackson & Schuler, 2000; Weigl et al., 2008) Prasad (1996) has indeed postulated Organizational Development and change programs as part of an organization's HRM system. Thus, HRD is anchored on the aspect of change since the change affects individuals, groups and entire organizations.

HRD practices need to be strategically designed to support an organization to cope with the changing environment out of which there arises a need to develop a relevant firm HRD Infrastructure. This study relied on the work of Menger (2001) in proposing the construct of HRD Infrastructure. Thus the construct of HRD Infrastructure was adopted in this study in the context of organizational development and change to refer to the set of processes and organizational practices that derive from the identified organizational development needs on the development of workforce to create a flexible organization capable of coping with the forces of environmental change. The process emphasizes the role of learning that supports continuous innovation and thus puts the learning orientation at the centre of the HRD Philosophy upon which the infrastructure is established (Kilika et al., 2012). Thus the pillars of the HRD infrastructure adopted for this study were based on organizational development needs, organizational learning culture, HRD values and practices which are considered to be at the heart of the HRD philosophy (Kilika et al., 2012).

The HRD Infrastructure embraces a stakeholder orientation as informed by the considerations of the SHRD framework (Garavan & McCarthy, 2008) which advocates a stakeholder orientation to workforce development. The need for the adoption of the stakeholder approach in HRD has been connected with shifts from training to learning and from HRD to SHRD (Watson, 2007) which have brought about an increased role of stakeholders in the HRD process. The stakeholder approach adopted in HRD is of the view that the stakeholders are diverse both within and without an organization and present different stakes that will vary across contexts (Dowling, 2001). A cross section of both the HRM and HRD Literatures point at a growing concern for the stakeholder approach in theory and practice (Jackson & Schuler, 2000; Armstrong, 2006; Clark & Beardwell, 2007; Garavan, 2007; Watson, 2007). The stakeholder orientation in HRD leads organizations to consider establishment of inter-organizational networks for enhancing workforce development. The learning orientation

underpinned in one of the paradigms of HRD paves the way for organizations to pursue HRD based interfirm networks. Inter-organizational networks have previously been considered essential elements of SHRM models especially among multinational organizations (Dowling, Festing & Engle, 2008). The case for these inter firm networks has been established along considerations that arise from several observations connected with the changed perspective to competition embracing collaboration, the need to build social networks and capital, the transition to a learning society, the need to establish competence based HRD Practices and consideration of the environment in building competencies (Porter, 1990; Mintzberg et al., 2003; Park & Kwon, 2004; Ardichvilli & Dirani, 2005; Ozcelik & Ferman, 2006; Cullen & Parboteeah, 2008). In identifying the HRD Infrastructure for supporting U-I-C, the study considered the context for universities in Kenya. Universities by their nature of origin and design are human capital development institutions that in the context of organizational learning have been classified in the category of knowledge intensive business service organizations (Leiponnen, 2008). They will, therefore be expected to cultivate organizational learning cultures through which knowledge is continuously generated and disseminated (Watkins, 2005) by the largely predominant knowledge workers forming a significant part of their workforce and develop appropriate systems for best managing human resources, bearing the characteristics of the knowledge worker (Awad & Ghaziri, 2004). Thus, an appropriate set of HRD Infrastructure, suitable for the knowledge based entities will embrace the organizational development concerns, relevant HRD values and a culture oriented towards learning which if put in place will inform the particular set of HRD practices for the universities in line with the need to align the HRM function of each university with its strategic intents (Armstrong, 2006).

4. University Performance

HRM is presented in theory and practice as a core function in an organization accounting for the performance of organizations. Performance is understood in terms of the output of work that is undertaken in organizations quantified into objectives an organization wants to achieve (Armstrong, 2006). The achievement of the objectives is ensured through the people factor in organizations. The HRM perspective to performance leans towards the behavioral science approach that links organizational performance with human behavior. One approach employed by the behavioral scientists considers organizational behavior as what people do in the place of work (Robbins, 2005). Thus, the behaviors resulting from the performer lead into actions that transform from an abstract to action state. The behavioral science perspective is of the view that performance of organizations is attained through various levels starting at the individual employee level through the departmental to the organizational. The Organizational Behavior (OB) approach observes that under the performance orientation, the concern is the productivity of an individual within the organization and how it can be improved. Individual performance contributes to group performance, which in turn contributes to organizational performance. It is this performance that results in the effectiveness of an organization. The cited performance indicators of performance at this level are job satisfaction, psychological growth, physical health, and security. In turn, these contribute to performance at group and organizational levels that is indicated by efficiency, productivity, profitability, innovation, quality of life, contribution to culture and adaptation to change.

The behavioral science approach is relevant in an HRD situation in that one of the major concerns is that touching on the way in which HRD influences performance in organizations. Some stream of research has attempted to identify the paths and links that lead from HRD to organizational performance (Kanter, 1992). The analysis provided by the behavioral science perspective based on the three levels and the respective indicators of performance at each level highlights the set of employee inputs that lead to the attainment of organizational performance. The SHRD perspective is more focused on the human factors that will account for competitiveness and sustainable levels of competitive advantage and the organizational conditions suitable to condition employees towards attainment of distinctive competence. The role of organization culture in this process has been identified and in HRD scholarship is addressed by the learning orientation. Learning has long been acknowledged as a major determinant of organizational success as it is responsible for enhancing organizational capability to respond to the rapidly changing and competitive environment and thus, leads to survival brought about by flexibility leading to new product and technology development.

The University Performance is assessed within the context of the nature of human capital development institutions. The study by Kontoghiorghes and colleagues (Kontoghiorghes, Awbrey & Feurig, 2005) categorized the performance of institutions into two perspectives namely objective performance and HR related subjective performance. Jackson and Schuler (Jackson & Schuler, 2000) considered the same in the context of organizational development and change and referred to those subjective indicators as relating to organizational readiness for change. The objective measures of performance considered in this study reflect financial aspects of revenue, student enrolment levels, number of academic programs and the amounts of research grants won. The subjective performance indicators reflecting the work of human capital development institutions considered were innovation, knowledge creation, adaptation to change, market and public rating, corporate reputation and quality. From an organizational point of analysis, HRM addresses these areas of concern for performance of universities in order to make them effective, productive, efficient and competitive. In view of emerging developments facing organizations, the kind of performance expected is one that creates sustainable levels of competitive advantage. The study adopted the above listed measures of performance based on a comparison with the findings of previous researches that have pointed at the need to identify performance measures suitable to a diversity of sectors in non-manufacturing activities and particularly in human capital development undertakings, such as those of the institutions of higher learning and provide an empirical explanation on how they may result from relevant HRD based practices (Kontoghiorghes, Awbrey & Feurig, 2005; Lopez, Peon & Ordas, 2005; Davis & Daley, 2008; Song, Joo & Chemarck, 2009).

5. University-Industry Collaboration

The construct of University-Industry-Collaboration was approached in this study as an aspect of Inter-organizational networks which are discussed along the strategic considerations for Inter-organization collaboration (Mintzberg et al., 2003). The collaboration is considered as a condition of learning in the work place in which workers learn how to think, learn and apply information to tasks since workers need to engage in activities that allow them to approach problems from different vantage points, testing out assumptions, and redefining meanings. From an HRD standpoint, workers need to engage in the social, collaborative exchange of ideas as they solve business problems so that they can acquire individually and collectively the

rapidly changing knowledge required in the high-tech workplace. The collaboration across organizations is considered as part of the mechanisms for attaining a fit between internal and external conditions. The justification for these pursuits towards inter-organizational networks has received varying explanations. Beer (1980) offered an explanation that leaned more towards the need for an internal alignment aimed at establishing congruence between internal resources and the external environment since this congruence determines an organization's capacity to achieve its goals as judged from the contingency perspective of management (Beer, 1980). Other perspectives to collaboration are based on the views held by organizational theorists on organizations as social inventions and those that rely on resource dependence perspective to the study of organizations which considers organizations as entities that are designed to achieve economic or other purposes while at the same time fulfilling stakeholder needs and thus will lead to survival (Hicks & Gullet, 1975; Jones, 2010). Those leaning towards resource dependence perspectives to the pursuit of inter-organizational collaboration raise the need for access to and control of economic resources as the basis for inter-organizational collaboration as a driving consideration for relevant strategic choices (Daft, 2007; Jones, 2010).

These diverse perspectives towards inter-organizational collaboration and inter-organization relationships signify the potential opportunities that exist for the human resources of the organization. There are inherent learning opportunities, intensive use of human intellect, knowledge transfer and constant updating, management development and career development through which the organizations are able to adapt aggressively to changing external conditions and particularly to innovations that obsolesce their earlier skills. Den Berg, Meijers and Spengers (2006) call for adoption of appropriate HRD practices in the areas of strategic knowledge development, investment in education, retraining and professional development as part of organization's HRD practices that meet the prerequisite for surviving in the knowledge economy which can be combined with the needs for survival so as to provide the motivating factors for an HRD based inter-organization network so that the decisions for collaborations are considered within the context of strategic choices. Thus, sustainable U-I-C programs require a strategic response by the collaborating institutions based on either or a combination of two alternative approaches, namely clusters and strategic alliance building (Porter, 1990; OECD, 1999). This study explored the broad literature on U-I-C and established that even though it has already identified the concepts at play in U-I-C and the various types of influences both from within and the external contexts of firms, there still remains some unexplained knowledge gaps regarding how the U-I-C accounts for the performance of organizations. The empirical attempts as well have not accounted for differences in collaboration patterns and how they may explain variations in performance outcomes of organizations in the alliance partnerships.

6. CONCEPTUALIZATION AND HYPOTHESES

In order to address the main problem of this study, a conceptual framework relating the main constructs in the study was developed using several pieces of theoretical literature. The framework is presented in figure 1.

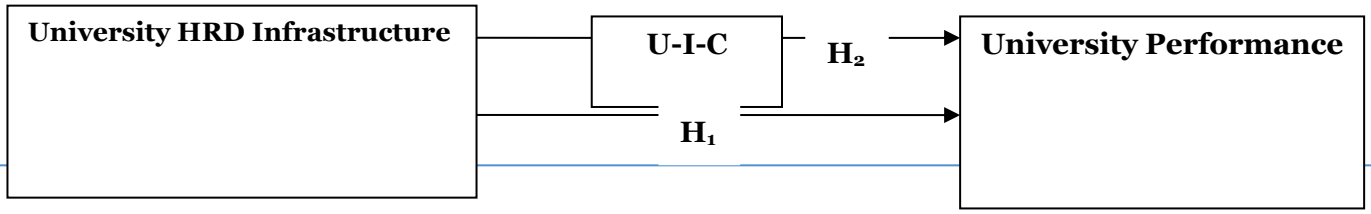

Figure1: Conceptual Model relating HRD Infrastructure, U-I-C and Performance

The University HRD Infrastructure is the independent variable. It comprises four dimensions: the university Organizational Development Needs, Organizational Learning Orientation, HRD Values and Practices. Performance of the Universities is the dependent variable. The study uses both objective performance indicators and HRM related indicators of readiness for change. The University-Industry collaboration is the mediating variable and is studied on the basis of three aspects, motivation for, the type and the level of collaboration. The HRD Infrastructure is based on the strategic nature of HRD which embraces a stakeholder orientation to ensure congruence between organizational systems and the external environmental conditions. In the case of universities, the stakeholder orientation will lead to the phenomenon of U-I-C. In view of observations of several theoretical works on both HRD and entrepreneurship, it is expected that the University HRD Infrastructure will influence several intermediate and ultimate outcomes of U-I-C and performance respectively (Hicks & Gullet, 1975; Kohli & Jaworski, 1990; Quinn, Anderson & Finkelstein, 1996; Beardwell & Holden, 1997; Xiao & Tsang, 2004; Chang, Yang & Chen, 2006; Hawley & Taylor, 2006; Hafer & Gresham, 2008; Weigl et al., 2008). Based on these arguments, the study proposed the following two hypotheses:

Hypothesis H_1: There is a Positive Relationship between University HRD Infrastructure and University-Performance.

Hypothesis H_2: The Strength of the Relationship between the University HRD Infrastructure and the University Performance depends on University-Industry Collaboration.

7. RESEARCH METHODOLOGY

Research Design, Population and Sampling

The study used a descriptive survey design which relied on a structured questionnaire to obtain information from respondents (Malhotra, 1996; Kerlinger & Lee, 2000). The study sought to obtain data that was gathered from a population sample of organizational units in Public and Private Universities in Kenya through the use of a predetermined questionnaire.

The population of the study comprised all Public and Private Universities operating in Kenya. At the time of the survey, there were 26 Universities in Kenya: 7 Public Universities, 13 Chartered Private Universities and 9 Universities operating with a Letter of Interim Authority (Commission for Higher Education, 2011). Due to the nature of the independent variable connected with organizational aspects that takes time to form, the study selected universities that had operated in Kenya at least five years before the date of the study. This criterion provided 19 universities: 7 Public and 12 Private universities from which data was collected for the study. All the 7 public universities collaborated while only 9 in the private category collaborated providing an 84% success rate on the part of the institutions from which respondents were drawn.

The primary data for answering the research objectives was obtained from representatives of administrative units at several levels in each university. To obtain the respective respondents from each university, a multi stage technique (Zikmund, 2003; Joy & Kolb, 2009) was applied at three stages to select the respondents from whom primary data was collected. In the first stage, 19 universities were selected, while in the second, respondent units were identified from the academic units (schools, faculties, directorates) and administrative units (support units, central administration, boundary units) of the various universities whose entire population was estimated at 300. The third stage involved use of stratified random sampling to obtain at least 60% of the respondents from the universities. The various strata were identified from the areas of academic specialization of schools/faculties and the basic orientation for decision making by the administrative units. Overall, 130 respondents participated representing a 72% success in response rate. The responses were comprised of: Senior Administrators (n=29;22.3%); Deans/Directors (n=67; 51.5%); Boundary Span Managers(n=34;26.2%).

8. Research Instrument

The primary data was obtained using a questionnaire structured on a 5-point Interval Likert scale to measure the three variables shown in the conceptual model. The contents of the questionnaire were pretested through officers in the offices for coordination of postgraduate programs and heads of departments and some registered doctoral students from various universities in Kenya that were not participating in the main survey. Editorial issues were addressed and the structure of questions as well as the overall design of the questionnaire. Two methods were used to administer the questionnaire: personal interviews and drop and pick. The drop and pick method was used for respondents other than the senior administrators. The personal interviews were used in the case of administrators in the level of deputy vice chancellors and registrars through which their responses were coded directly in the research instrument. Internal consistency of the research instrument was measured through the Coefficient Alpha score since it was structured on a 5-point likert scale (Nachmias & Nachmias, 2004). The results of the reliability test are shown in table 2 and indicate that the instrument used has a relatively high reliability of 0.9617 according to the interpretation offered by Malhotra (1996).

9. Data Analysis

Descriptive statistics were calculated to describe the main characteristics of the population under study using the mean and the standard deviation for each item in the questionnaire. A

series of Regression analyses were employed to test hypothesis 2. To facilitate the test of the two hypotheses, an index for each variable was constructed for all the universities participating in the study based on the Harmonic Mean (Gupta, 2008). The study relied on the approach proposed by MacKinnon and Colleagues (1995) to test hypothesis two through a simple linear regression model. The approach requires the formulation of two regression models at two stages to measure the direct effect and the mediated effect. Two regression models were, therefore, constructed at two stages. In the first stage, the regression analysis was performed using the composite index for University HRD Infrastructure as the independent variable and the composite index for University Performance as the dependent variable. Accordingly, two regression analyses models were used as:

Model 1: $Y = \beta_{01} + \square X + \varepsilon_{1,}$
Model 2: $Y = \beta_{02} + \square' X + \beta M + \varepsilon_{2,}$

Where: Y is the dependent variable in the study, Performance; X is the independent variable (HRD Infrastructure); M is the mediator; $\square$ codes the relationship between HRD and Performance in the first equation before the mediator is introduced; $\square$ ' is the coefficient relating the HRD to the Performance adjusted for the effects of the mediator, ε_1 and ε_2 code unexplained variability, and the intercepts are β_{01} and β_{02}.

The results were interpreted such that ($\square$) is the non-mediated or direct effect,($\square$ - $\square$') is the mediated or indirect effect. McKinnon, Warsi and Dwyer (1995) observes that if the treatment coefficient ($\square$') is zero when the mediator is included in the model, then the relationship is entirely mediated by the mediating variable. If, however, the absolute size of the direct effect between the independent variable and the dependent variable is reduced after controlling for the mediator variable, but the direct effect is still significantly different from zero, the mediation effect is said to be partial. The results of the regression analyses were subjected to multicollinearity test using the criteria provided by Field (2005), Levine et al. (2008) through measure of the Variance Inflation Factor (VIF).

10. FINDINGS

Respondents' profile and Descriptive Findings

The study targeted 180 respondents from 19 universities in Kenya. The field data presented was obtained from 16 universities representing 84 % success rate from the participating universities and 130 respondents representing 72% success rate on the part of the respondents which satisfied the criteria that a response rate for a survey of 50% and above is satisfactory for data analysis (Nachmias & Nachmias, 2004). The research instrument had four main variables whose characteristics are summarized through measures of central tendency and dispersion as shown in table 1.

Table 1: Variable Characteristics

Variable	α	No. of Items	Mean	Standard deviation

HRD Infrastructure	0.9396	55	3.7706	0.9989
U-I-C	0.7970	68	3.74552	1.0409
University performance	0.9819	26	3.5634	0.99189
Overall Reliability	0.9617	149		

The descriptive scores show that HRD infrastructure was at the level of importance, together with two constituent components of organizational learning, HRD values and OD needs whose mean scores measure close to 4. HRD practices elements in the instrument however are practiced at a moderate level. Organizational learning registered the highest level of variation with a standard deviation above 1. Even though the university industry collaboration received a relatively high mean score, only two of its components were rated high, the motivation and level of collaboration. The type of collaboration registered a low mean score and a high standard deviation just as was the type of collaboration. The overall mean for performance shows that it is at the moderate level. The universities performed higher in readiness for change areas as compared to the bottom line areas.

11. Test of Hypotheses

The first hypothesis was designed to test the relationship between the HRD Infrastructure for universities and the performance of universities. The hypothesis was tested using the composite indices for HRD Infrastructure and that of University-Industry collaboration. The regression analysis results showed the R^2 value was 0.773. The coefficient of the variable was positive (β=0.879) and significant at $p<0.001$ as well as the regression model ($F=47.744$; $P<0.001$). Both the D and VIF values were within the acceptable levels within which multicollinearity and autocorrelation do not invalidate the regression results. Thus hypothesis one is supported and the study concludes that there is a positive relationship between the coefficient of HRD Infrastructure and performance of Universities in Kenya. The second hypothesis sought to understand the role of the phenomenon of University-Industry Collaboration in the performance of universities in view of the growing concerns for universities to intensify links with the productive sectors of the economy. The study tested the possibility of a mediating effect of this variable on the relationship between the HRD Infrastructure and the University Performance. The summary of the statistical output of the computation is presented in table 2.

According to the rule stated by McKinnon , the direct effect is 0.676 while the mediated effect is 0.258 and is significant at $t=2.066$, $p<0.05$. Thus, the study concludes that University-Industry Collaboration has a significant partial mediating influence on the relationship between the University HRD Infrastructure and University Performance. Considering the R^2 value in the two models, in the

Table 2: Summary of Regression Results for the Mediating Effect

Regression	Model 1	Model2	Change in	Significance

Parameter	(BeforeMediation)	(After Mediation)	statistics	of change
βHRDInfrastructure	0.857*	0.599**	(☐-☐') = 0.258	Change is significant at t=2.066, p<0.05
R^2	0.734*	0.754**	0.02	
t	0.857*	2.066**	1.509	
F	38.653***	19.871***	18.782	Change is significant at p<0.001

**p<0.000 ** p<0.05 ***p<0.01*

non-mediated relationship between HRD Infrastructure and the University Performance, the R^2 value is 0.734 while under the mediated relationship, the R^2 value increases to 0.754. This indicates a stronger empirical explanatory power on the relationship between University HRD Infrastructure and University Performance when the mediating variable of University – Industry Collaboration is introduced. The regression models in the two models are significant at F=38.653, p<0.001 and F=19.871, p<0.001 for the non-mediated and mediated scenarios respectively. The D and VIF values show that the results are not invalidated by autocorrelation and multicollinearity effects. Thus on the basis of these statistics, hypothesis 2 is supported. The study concludes that the phenomenon of University-Industry Collaboration enhances the strength of the relationship between University HRD Infrastructure and the Performance of Universities.

12. DISCUSSIONS AND CONCLUSIONS

The results of the first hypothesis showed a relatively strong relationship between the Universities HRD Infrastructure and performance. The study had leaned towards the stream of scholarship in HRD based on building inter-organizational networks at organizational level (Weigl et al., 2008). In addition, the study used the postulates of the HRD philosophy based on the learning paradigm to postulate that the learning orientation would provide a strong basis for pursuit of inter-organizational networks. The support of this hypothesis raises three implications for theory, practice and research. First, there are important concerns for managers to take note, in terms of how the knowledge is generated, how it is shared and the needed atmosphere for this knowledge to be successfully transferred. The study used the input of the organizational studies and the configuration of organizations to show that the alliances are initiated at functional levels based on professional synergies among managers at that level (Daft, 2007; Jones, 2010). At the university level, this functional level is represented by the school. This study relied on the deans, directors of institutes and schools as the key respondents. In discussing inter-organizational networks at university level, the schools and the departments working under each are critical to establishing and sustaining alliances with the productive sector based on the area of knowledge. Secondly, in terms of the orientation HRD takes, this finding is consistent with some stream of scholarship that has considered entrepreneurship as the main component around which U-I-C revolves (Chang, Yang & Chen, 2006). The main argument from the theory behind the pursuit of the inter-organizational networks was based on the learning paradigm as the basis that would lead to the linkages, an aspect that seems to be supported by the results of this hypothesis. The scores reported in the descriptive findings had shown relatively high mean score values on areas that derived from the learning orientation to HRD. Thirdly, the results of this hypothesis may also be interpreted

as being indicative of the path through which HRD influences performance. In addition to Katou's (2009) research that had made some attempts that were inconclusive, the current study using the theoretical literature from the organization theory stream is of the view that the support of the hypothesis may be taken as an indicator of the level of effectiveness on the part of the universities arising from the impact of HRD as an intervention in the path to the performance of the institutions. The organizational theory stream is of the view that the essence of initiating the organizational development interventions is to increase organizational health that ultimately improves the organizational performance and effectiveness. This study extends and strengthens the theoretical conclusions earlier made by the stream of scholarship on inte-rorganizational networks and U-I-C (Martin, 2000; Fontana, Guena & Matt, 2003; Hawley & Taylor, 2006; Worasinchai, Ribiere & Arntzen, 2008).

Hypothesis two was based on the need to understand the role of the phenomenon of inter-organizational networks in influencing organizational performance. The theoretical argument held the position that inter-organizational networks are strategic choices for managers that require justification due to the implied effects on the current and future prosperity of organizations. Under this concern, the hypothesis was formulated to enhance the current agitation that calls universities to intensify links with the productive sector. The score showed that the U-I-C partially mediates the relationship between HRD Infrastructure and University performance and that that the strength of the relationship is enhanced when the mediator variable is introduced. The study makes three implications from this finding. The first is based on the postulates of the various SHRM models. The study relied on the SHRD Framework that advocates a stakeholder based approach to management of employees for enhanced performance of organizations (Freeman & McVea, 2001; Garavan, 2007). The stakeholder approach is grounded on the organization theory stream of organizational studies seeking to attain congruence between organization's internal systems and their external environments. However, while in theory the arguments have been convincing for this move, the theory needs empirical support to justify decisions towards this move. The finding on this hypothesis provides a needed empirical support on the role of HRD based U-I-C programs on the performance of universities and justifies investments for this strategic move in that there is a stronger explanatory power on the relationship between the HRD Infrastructure and the level of performance when the phenomenon of U-I-C is introduced as a mediating factor. Secondly, this finding is important in reinforcing the strongly growing calls for U-I-C especially given the type of performance indicators used here and those used to measure the mediating variable. The study used performance indicators that are specific to the work of the HE sector of two types. The bottom line performance indicators were on the areas of national and international rating, academic programs developed, scientific conferences participated and sponsored, research grants won, research spending by academic staff and the number of curriculum changes effected. The organizational readiness for change performance indicators used were considered as part of the learning environment suitable to support the bottom line performance touching on aspects of cultures for continuous learning, strategy of long-term customer service, collaboration among administrators and the faculty, constant environmental scanning and benchmarking practices. Considering these findings and implications, a strong case emerges for universities to consider pursuits for U-I-C due to its contribution to the performance of the institutions.

Thirdly, the study observes that this finding is an important move with implications on theory and practice in this industry. In practice, the beginning point is at the consideration that the U-I-C approach is based on HRD. The HRD Infrastructure for each organizations aims at enhancing value creation activities that enhance organizational performance in its markets. One school that fits in this explanation was advanced by Beer (1980) that supported the HRD approach for the development and sustainability of inter-organizational networks by universities. This approach based support for this phenomenon on the need for organizations to attain some degree of congruence between internal systems and the external environment. The congruence requires organizations to focus both internally and externally. Internally, the organization seeks to develop a capacity to achieve its goals by fulfilling its members needs which leads to the need to focus on building a congruence between its people, processes and structures and its environment (Beer, 1980; Daft, 2007; Jones, 2010). The support of this hypothesis is thus interpreted in terms of the role of the degree of congruence attained by universities with their external stakeholders towards enhancing performance. Murillo-Luna, Garces-Ayerbe and Riverra-Torres (2008) identified the role of stakeholders as a critical factor when studying environmental response patterns by firms. Given the nature of data relied upon and the set of indicators used, the study builds a strong case for universities to pursue U-I linkages based on the types of knowledge that they generate.

13. Conclusion and recommendation

The purpose of the study was to establish the role of the concept of university industry collaboration on the relationship between HRD infrastructure and performance of universities. The results presented and discussed show that the HRD Infrastructure has a strong positive relationship with university performance. This relationship improves when the construct of university industry collaboration is introduced. Thus, it is concluded that the university HRD Infrastructure is relevant in considering organizational strategies for U-I-C among universities since the collaboration enhances the strength of the relationship between the HRD infrastructures and university performance. This conclusion, however,needs to be adopted with caution owing to the limitations of the study. Even though the study relied on a multidisciplinary based theoretical framework to derive the constructs used in the study, the research did not measure the influence of the external context of the universities. Given the limitations of some of theoretical models that fail to consider the external environment in their attempt to explain strategic decisions, the findings of the study are limited in the extent to which they explain the relationship among the constructs used in the study. Future research may therefore be undertaken to investigate the same phenomenon using these constructs alongside the external contexts of the universities as a moderating factor.

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