
Mediating Effect of Dynamic Capabilities on Human Capital as a Driver of Research Productivity of Academic Staff in Kenyan Universities

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Abstract

Research productivity is increasingly being recognised as a key measure of achievement and is therefore a basis for promotion and tenure for academic staff as well as an important component in the global ranking of universities. However, research productivity of academic staff in Kenyan universities is characterised by limited publications, resulting in the low positioning of Kenyan universities in global rankings. The purpose of this study was to investigate the influence of human capital and dynamic capabilities on research productivity of academic staff in Kenyan universities. This study adopted a correlational research design and sampled 392 academic staff members. Both regression and bootstrap analyses were used to test the hypotheses. The findings revealed that human capital has a significant influence on research productivity of academic staff in Kenyan universities; however, the influence of human capital is not direct, but is partially mediated by dynamic capabilities. The outcomes of the study provide insight to academic staff to invest heavily in both human capital and dynamic capabilities to foster research productivity. Additionally, the results of the study provide an understanding to the university management on possible strategic choices that can boost the research productivity of academic staff.

Keywords: Human Capital; Dynamic Capabilities; Research Productivity; Academic Staff; Universities; Kenya.

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1. Introduction

Research productivity is a combination of two terms: research and productivity (Iqbal & Mahmood, 2011). While research refers to careful, observant and vigilant investigation of a phenomenon to find solutions to problems and to gain new knowledge [1], productivity is the output produced over a period of time [2]. Research productivity refers to the research output over a period of time. Research productivity of a university is the totality of research performed by the university's academics within a period of time [1, 3, 4]. Therefore, an increase in academic staff's research productivity results in an overall increase in the research productivity of universities. Research productivity is often evaluated through the number of publications [5, 2, 4], whereby publications comprise papers or articles in refereed journals, books, book chapters, presentation of research papers in conference proceedings and publication of monographs. This suggests that scholarly publications are key to the evaluation of higher education academics. Research productivity of academic staff is the crux for advancing Kenya's research agenda. Kenya's research agenda is aimed at the realisation of Vision 2030. Kenya Vision 2030 is a development blue print that aims to transform Kenya into a globally competitive, middle-income country by 2030 [6]. To achieve this transformation, the government recognises research as a critical component. As such, the realisation of vision 2030 is underpinned by the generation of new knowledge through research. In the medium-term period 2018-2022, the government set four research priorities dubbed the 'Big 4 Agenda' on food and nutrition security, affordable housing, manufacturing and universal health care coverage to address the most immediate needs of the nation [7]. In this regard, universities are recognised as key players in conducting research on the generation and dissemination of new knowledge. The government of Kenya has developed policies to boost the research functions of these institutions. According to the Commission for University Education (CUE) [8], all Kenyan universities are expected to show evidence of promoting quality research and innovation and allocate a minimum of 2% of its operational budget for research. Moreover, in 2014, the government of Kenya established the National Research Fund to fortify the creation of required knowledge and innovations through research in universities to accelerate the growing economy. Despite the government's recognition of universities as primary institutions in accelerating research, the myriad challenges facing most Kenyan universities deter these institutions from effectively attaining their research objectives. Universities have strained budgets that are mainly focused on physical expansion, with little attention being paid to staff development programs [9]. Further, a study by [10] revealed that Kenyan universities are unable to effectively stimulate research publications by academic staff because of challenges such as inadequate research funds, poorly funded libraries, lack of professional equipment, poor university industry linkages, lack of incentives, and brain drain. Moreover, in most universities, human capital is generally low in terms of quality and quantity, which further affects research activities within universities. Majority of the academic staff are lecturers (40%), tutorial fellows (33 %), senior lecturers (12%) and only 8% are professors [11, 10] note that the problem of few professors in Kenyan universities has led to a lack of nurturing of young researchers, resulting in few experts in particular academic fields. Most lecturers take additional part-time teaching in several universities devoting very little time to research [12]. This suggests that Kenyan universities are struggling with a shortage of qualified human resources to engage in meaningful research. These challenges have the potential to affect the quality and quantity of research outputs emanating from universities. The quality and quantity of research publications by the academic staff play a major role in determining the performance of Kenyan

universities. In addition, the research output is expected to provide solutions to challenges facing the society at large. Therefore, motivated by the necessity to increase the level of research productivity in Kenyan universities, and to benefit from the results of academic research, this study aimed at determining the influence of human capital and dynamic capabilities on research productivity of academic staff in Kenyan universities.

1.1 Human Capital

A review of existing literature suggests that there are two schools of thought concerning the definition of human capital. One school of thought defines human capital as activities such as training, education and other professional interventions that result in an increase in employees' knowledge and skills, resulting in increased performance [13, 14]. According to this school of thought, knowledge and skills result from the training and education of individuals. Hence, educated and trained individuals are more knowledgeable and skilled; therefore, they are expected to achieve higher performance for the organisation. Another school of thought views human capital as the innate knowledge, skills and abilities possessed by the individual [15, 16]. In the same vein, [17] assert that human capital is the skills, attitudes, and intellectual agility of employees and their ability to make good decisions and solve problems while maintaining good interpersonal relationships. Other elements of human capital include: experience; business knowledge; creativity; teamwork capacity; loyalty; motivation of employees; ability to learn; share information and commitment to organizational objectives [18]. Thus, according to these authors, human capital is embodied in individuals; it is a trait crystallised in human resources. Together, these two streams of thought provide important insights into the understanding of human capital. This discussion supposes that although human capital is intrinsic, it can be enhanced through human resource management practices, such as training. Hence, the two streams of thought complement each other. In the context of academic research, different authors have considered human capital as the knowledge skills and abilities necessary for the performance of research activities. Human capital is a research skill owned by academic staff and is considered important in their academic careers [19, 20] suggest that human capital is the researcher's general knowledge, knowledge of aspects in a specific topic of research, and the researcher's ability to process, analyse and communicate research data. According to [21], human capital is the tacit and explicit knowledge acquired through education and training and embedded in professors, researchers, managers, administration and students of a university. Human capital refers to researcher's attributes that facilitate research activities, including research knowledge, ability to work in a team, management skills, creativity, internal motivation and interpersonal skills [22, 21] describe human capital as a set of individual attributes, such as scientific competencies, management skills and creativity, which are essential for research. Hence, drawing on these definitions, human capital can be categorised into knowledge, skills and abilities. Knowledge refers to the understanding employees have about things that enable them to carry out tasks [23]. It is achieved through formal education and training [15]. In relation to research, [24] point out that a deep understanding of the topic under study coupled with methodological and statistical knowledge of the area being investigated is essential in ensuring that the research generated is significant and valid. Research knowledge involves understanding the principles, facts and processes related to research activities [25]. Skills refer to knowledge of doing things [23] They are capabilities developed through training or experience that enable an individual to perform specific tasks efficiently [26]. Skills are not generic in nature; hence, they are specific to a profession [27]. As such, research skills are the proficiencies essential for any researcher to perform research tasks efficiently. Abilities

are innate traits that lead individuals to perform their tasks in a certain manner [23]. Abilities are generic in nature; that is, they are not specific to any profession [27]. Abilities such as creativity and the ability to organise and manage allow researchers to better perform their research tasks [28]. Similarly, [29] point out that the planning and organisation abilities of a researcher are key to designing and coordinating the various stages of research. Likewise, [30] note that creativity is an important attribute that influences research output. Strategic human resource management literature states that regardless of industry, it is important for employees to leverage their knowledge, skills and abilities to boost performance. [31] notes that knowledge creation begins with individuals. In the same vein, [32] posits that all learning takes place in an individual's head and organizations only learn through the learning of its members or by engaging individuals with new knowledge. Human capital is an intrinsic talent; it cannot be separated from the individual; however, it can be shared and can change or moderate itself.

1.2 Dynamic Capabilities

Globalisation and rapid social and technological changes have caused today's business environment to undergo fierce competition and continuous change [33, 34]. To survive in this era, organisations must constantly align and realign themselves in a dynamic environment [35]. A growing body of literature proposes that dynamic capabilities provide insight into an organisation's ability to respond to changing environments [36, 37]. The dynamic capabilities approach emphasises how organisations' internal capabilities transform resources into superior performance [38]. Four components of dynamic capabilities are identified: sensing capabilities, learning capabilities, integrating capabilities and coordinating capabilities [39, 40, 41, 37]. These capabilities are responsible for sensing opportunities in the environment, seizing opportunities and recombining the resource base to address changes and opportunities in the environment [35, 26]. In light of this, [42] state that the role of dynamic capabilities is to impact on a firm's extant resource base, transforming it to a new configuration of resources so that the firm can sustain its competitive advantage. Thus, it has been recognized that dynamic capabilities are the transformational process by which intangible resources are leveraged to create sustainable performance. A large and growing body of literature has investigated dynamic capabilities in the context of various industries such as technology [43], manufacturing [44], pharmaceuticals [45], and commercial banks [46]. The evidence presented in these studies is that the dynamic capabilities approach is valuable and appropriate in dynamic environments. Similar to organisations in other industries, the university sector is becoming increasingly complex and subject to global changes [47]. The University of the 21st century is in a period of continuous transition [48]. Universities face challenges such as high operational costs, intense competition, increased government regulations, reduced financial resources, and rapid changes in the economy [48]. Reference [49] notes that universities are service-oriented firms that operate in a dynamic environment. Moreover, the evolution of science, combined with changes in the needs of society, is calling for a paradigm shift in the way universities handle knowledge [50]. Previous studies have revealed that in response to these changes, it is necessary for universities to deploy dynamic capabilities [47]. Similarly, as the level of dynamics within and outside the university increases, employees within these universities will also be required to respond to these changes. Employees will require not only knowledge-based resources but also dynamic capabilities to deploy these resources during situations of change. Most studies on dynamic capabilities focus on dynamic capabilities at the organisational level; however, employees can also sense and seize opportunities emanating

from the environment. The increasing dynamics in organisations necessitates employees to be compatible with prevailing and potential changes [51]. Employees must also be aligned with environmental changes [52]. Hence, just as organizations achieve a competitive advantage from dynamic capabilities, likewise, employees can apply the same principles to maintain superior performance [53]. Organisational dynamic capabilities are defined as the stable behaviour of firms to renew, integrate, recreate and reconfigure their capabilities and resources, and reconstruct and upgrade their core capabilities in response to the dynamic market to sustain competitive advantage [54]. Human dynamic capabilities can be captured in a similar definition as the ability of employees to integrate, build, and reconfigure resources to address rapidly changing environments to sustain superior performance. This indicates that the adoption of a dynamic capabilities approach by academic staff might enhance research productivity. Reference [39] note that dynamic capabilities are strong predictors of research productivity, given that dynamic capabilities directly affect the ability to deal with change and turbulent environments. Reference [39] maintain that research productivity is a factor in strategic capabilities and competencies.

1.3 Empirical Literature Review

Previous studies have provided empirical evidence demonstrating the influence of various dimensions of human capital on research productivity. In a study to describe outcomes of a structured research training program that aimed to increase the research productivity among hospital pharmacists, Reference [55] found out that training increased the level of research productivity of the pharmacists. The impact study involved training of 13 pharmacists over a five-year period. The pharmacists were trained and mentored on how to conduct and publish a research project. The number of research projects and publications for the pharmacy department were evaluated before and after the implementation of the program. The number of publications by the pharmacists increased significantly after implementation of the training program. Hence, through enhancing the pharmacists' knowledge, the training enhanced capacity for increased research productivity. Reference [29] did a study to explain the reasons for growth in research productivity in Norwegian research universities. The data for this study was drawn from five mail surveys to all academic staff of the rank of full professor, associate professor and assistant professor at Norway's four research universities. The surveys were undertaken in 1982 (n = 1585), 1992 (n = 1815), 2001 (n = 1967), 2007/2008 (n = 612) and in 2013 (n = 1743). The response rates were 78%, 69%, 60%, 42% and 50%, respectively. The academic staff were sampled from five fields of study: the humanities, the social sciences, the natural sciences, medicine and technology. The findings of this study revealed that a general change in norms for appropriate academic behaviour contributed to the increase in research productivity. This implies that research productivity is not only a function of knowledge and skills but also a change in an individual's attitude towards research. In addition, the study by [29] also found out that academic staff holding doctorate degrees published on average, 23% more articles than those without a doctorate degree. This implies that the higher the level of qualification of the academic staff, the higher was their research productivity. Similarly, in a study to determine research outputs of accounting academics in South Africa, Australia and New Zealand, Reference [56] found out that the academic staff at the rank of professors published more research articles, followed by senior lecturers, lecturers and junior lecturers. Also, academics holding a doctoral qualification or equivalent were more productive than those that did not. In this study, research productivity was measured by number of articles published in peer-reviewed journals. A study

by [57] assessed Knowledge Sharing (KS) behaviour determinants that can contribute to an academic's research productivity. The study sampled 542 academic staff in three academic ranks: senior lecturer, associate professor and professor in 20 public and 5 private universities in Malaysia. Using partial least square structural equation modelling to analyse data, the study found out that academic staff with positive attitude exhibited knowledge sharing behaviour which facilitated an increase in research productivity. These studies have demonstrated that the components of human capital can be employed to improve research productivity. The findings of these studies suggest that a high level of skill and competence are antecedents of success. However, these studies focused on isolated attributes of human capital with the aim of studying their influence on research productivity. Focusing on all three attributes of human capital, the knowledge, skills and abilities of a researcher provides a more holistic understanding of the influence of human capital on research productivity. In addition, there is very little scientific understanding of how dynamic capabilities influence the relationship between human capital and research productivity of academic staff in Kenyan universities. Therefore, the purpose of this study was to determine the influence of human capital on the research productivity of academic staff in Kenyan universities and the role of dynamic capabilities in this relationship.

1.4 Research Questions

The study was guided by the following research questions;

- i. What is the level of human capital of academic staff in Kenyan universities?
- ii. What is the level of dynamic capabilities of academic staff in Kenyan universities?
- iii. What is the level of research productivity of academic staff in Kenyan universities?
- iv. What is the relationship between human capital and research productivity of academic staff in Kenyan universities?
- v. What is the role of dynamic capabilities on the relationship of human capital and research productivity of academic staff in Kenyan universities?

2. Methods and Materials

2.1 Research Design

This study was based on correlational research design. Correlational research design was deemed appropriate because it enables a researcher to estimate the relationship between the variables under study.

2.2 Study Population and Sample

The study's target population was the academic staff (on a permanent employment basis) in chartered private and public universities in Kenya. There are approximately 19,020 academic staff in both private and public chartered universities in Kenya [11]. This study included academic staff at four levels: professors, associate professors, senior lecturer/senior research fellows and lecturer/research fellows. By 2019, Kenya's university education sector comprised 49 chartered universities. This included 31 public chartered universities and 18 private chartered universities. In this study, mixed sampling techniques were applied. First, universities were

selected using stratified random sampling techniques. universities were stratified into private and public universities. From the two strata, 13 universities were randomly selected, eight from public universities and five from private universities. Thereafter, the faculties were selected using systematic random sampling. Finally, respondents were selected from faculty members using stratified random sampling. The academic staff were stratified into four ranks: professors, associate professors, senior lecturer/senior research fellows and lecturer/research fellows. A sample of 392 academic staff members was selected from the study population. A structured questionnaire was used to collect the data. The questionnaire was preferred because it is considered the best tool for collecting primary data from a large sample [58].

2.3 Measurements

[59] define human capital as the knowledge, skills and abilities embedded in employees. Based on this definition, this study conceptualised human capital as the knowledge, skills and abilities of academic staff. Human capital was measured using a 14 item five-point scale. Based on the definition of dynamic capabilities by [54], this study defined dynamic capabilities as the ability of academic staff to constantly integrate, reconfigure, renew and recreate resources to adapt to changing research environments. Dynamic capabilities were measured using a nine-item five-point dynamic capabilities scale. Research productivity was operationalized as the number of self-reported scholarly publications within four categories: (a) number of articles in refereed journals; (b) chapters in books and conference proceedings; (c) consultancy/project reports; and (d) university/tertiary-level scholarly books. The study focused on publications within a three-year period (2016, 2017, 2018) prior to the study. Publication counts were converted into article equivalents. Based on previous studies, a chapter in a book and a consultancy/research project report was given the value of one article equivalent and a book the value of four article-equivalents [60, 29, 61, 62]. To enable the aggregation of the research outputs, the article equivalents were converted into publication points. An article, a chapter and a consultancy/ research project were each allocated 1 point; hence, a book was equivalent to four points. The operational definitions of these variables are summarised in Table 1

Table 1: Operational definition of variables

Variables	Operational Definition	Constructs/Indicators	Measurement Scale /Questionnaire Item	Adapted from
Independent Variable				
Human Capital				
Human Capital	Knowledge	<ul style="list-style-type: none"> • I know the most relevant publications in my field • I have the required capacity to obtain information necessary for research • I have the necessary training on research methodology and techniques • I often attend research workshops/seminars to improve my research knowledge • I have mastered the language usually used in journals/books in my academic field 	5-point scale	[63, 27, 59]
	Skills	<ul style="list-style-type: none"> • I can communicate my research results • I can autonomously develop research projects • I can relate the observed facts to the results obtained and draw conclusions • I am able to identify research topics in my academic field 		
	Abilities	<ul style="list-style-type: none"> • I know how to conduct research (thesis, research projects etc) • I consider myself a creative person • I consider myself a person motivated by research • I consider myself an organized person • I consider myself a self-critical person 		
Dynamic Capabilities	Sensing Capability	<ul style="list-style-type: none"> • I frequently scan the environment to identify new research opportunities • I often review my research activities to ensure they are in line with emerging issues in the society • I periodically review the likely effect of changes in the industry on my research activities 	5-point scale	[39;40;45;37]

Learning Capability	<ul style="list-style-type: none"> • I am effective at transforming existing information into new knowledge • I am effective at developing new knowledge that has the potential to influence my research activities
Integrating Capabilities	<ul style="list-style-type: none"> • I am forthcoming in contributing my individual input to a research group • I carefully interrelate my actions with the actions of others to meet changing conditions
Coordinating Capabilities	<ul style="list-style-type: none"> • I always ensure appropriate allocation of resources between my various tasks • Overall, I have good coordination of all my responsibilities

• **Dependent Variable**

Research Productivity	Articles in refereed journals Book chapters published Consultancy and research project reports University/ Tertiary level scholarly Books	<ul style="list-style-type: none"> • Number of articles published in referred journals, • Number of book chapters published, • Number of consultancy/ research reports published • Number of university/tertiary level scholarly books published 	Publication points [60];[29];[61];[62] developed from the aggregate of points based on article equivalents.
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2.4 Validity of Research Instrument

This study assessed content validity of the questionnaire used to collect data. Content validity measures whether the research instrument adequately covers all the important aspects of the domain being measured [64]. To determine content validity, [65] recommend the use of three methods: literature, representatives of the relevant population and use of experts. Past theory and literature were used to develop the scales for the study variables. Additionally, experts who included academic staff and practitioners in human resource management and strategic management fields were requested to give their views on the research instrument due to their expertise in the areas of human capital and dynamic capabilities respectively. Their views were considered in determining how well the items in each scale in the questionnaire covered all the content they were expected to cover, that is the comprehensiveness and representativeness of the content of a scale.

2.5 Reliability of Research Instrument

Test-retest reliability test was used to determine reliability of the research instrument. Test-retest reliability involves administering the same research instrument to the same subjects under the same conditions at two different times and correlating the scores [66]. Using Pearson correlation, a reliability coefficient between the scores on the first and the second testing were used to estimate the reliability of the questionnaire items. The reliability statistics ranged from 0.84-0.87. These values were all > 0.70, indicating good reliability.

3. Results

3.1 Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) confirms that a certain subset of observed variables defines a particular factor [67]. Based on the suggestion by [68], principal component and varimax rotation methods were used to extract the factor loadings which expressed the relationship of each variable to the underlying factor. The results of exploratory factor analysis in Table 2 show that the factor loadings for human capital ranged between and 0.612-0.834, while those of dynamic capabilities ranged between 0.673-0.894. In addition, the results illustrated that none of the items loaded at 0.32 or higher on two or more factors. This implies that the various constructs were distinct from each other.

Table 2: Results of Exploratory Factor Analysis

Constructs	Factor Loadings			
HCK1	.796	.169	.103	
HCK2	.785	.298	.056	
HCK3	.812	.107	.187	
HCK4	.834	.189	.112	
HCK5	.728	.280	.086	
HCS1	.127	.761	.134	
HCS2	.274	.708	.124	
HCS3	.226	.749	.090	
HCS4	.213	.669	.144	
HCS5	.109	.612	.286	
HCB1	.219	.085	.709	
HCB2	.325	.076	.701	
HCB3	.031	.215	.697	
HCB4	.041	.266	.812	
Dynamic Capabilities				
DCSEN1	.198	.673	.215	.183
DCSEN2	.177	.846	.015	.260
DCSEN3	.218	.787	.263	.164
DCSLEAR1	.272	.195	.894	.142
DCLEAR2	.258	.141	.719	.196
DCINTER1	.697	.441	.145	.114
DCINTER2	.677	.224	.386	.064
DCCORD1	.056	.187	.017	.828
DCCORD2	.179	.117	.127	.940

3.2 Research Questions

The first research question aimed at examining the level of human capital of academic staff in Kenyan

universities. Human capital was measured by use of a 14 item, five-point human capital scale. The summated score on the human capital scale constituted the level of human capital. The scores were categorized into three levels: 14-32 meaning that the respondents have a low level of human capital. Scores 33-51 meant that the respondents have a moderate level of human capital while scores 52-70 indicated that the respondents have a high level of human capital. Figure 1. reveals that majority of the respondents had a high level of human capital while none of the respondents had low levels of human capital. This implies that academic staff in Kenyan universities have knowledge, skills and abilities that enable them to perform various research activities.

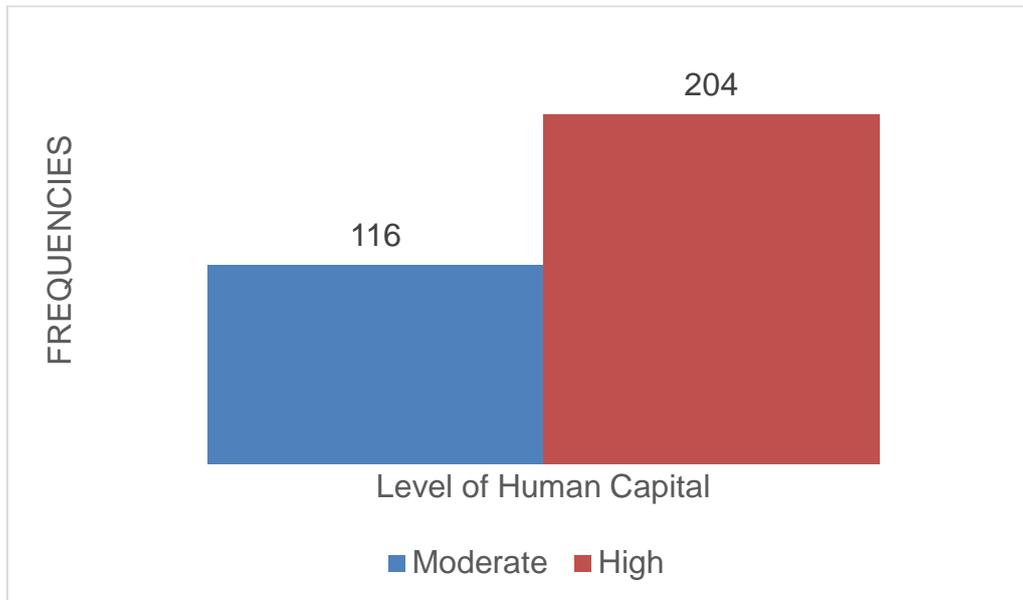


Figure 1: Level of human capital

The second research question focused on the level of dynamic capabilities of academic staff in Kenyan universities. Dynamic capabilities were measured by use of a nine item, five-point dynamic capabilities scale. The summated score on the dynamic capabilities scale constituted the level of dynamic capabilities. Results on figure 2 reveal that majority of the respondents had a high level of dynamic capabilities. This implies that academic staff in Kenyan universities have dynamic capabilities that can be deployed to reconfigure the resource base enabling them to sustain high research productivity during rapid changes in the research environment.

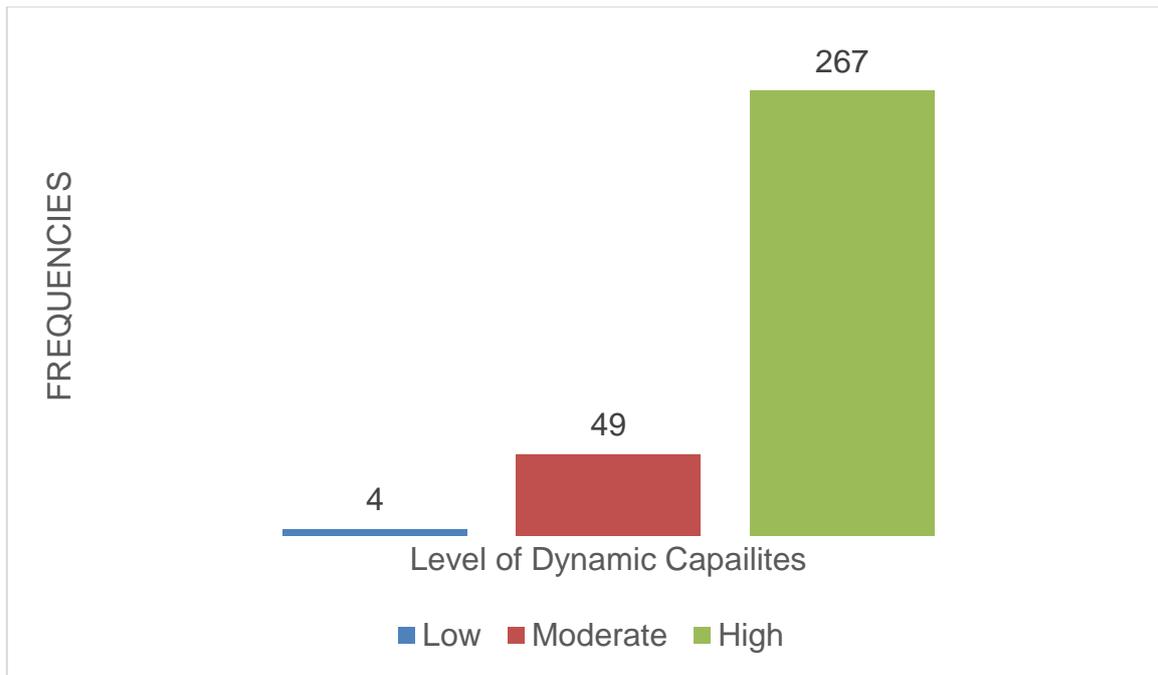


Figure 2: Level of dynamic capabilities

The third question assessed the level of research productivity of the academic staff in Kenyan universities. The results in Table 3 show that, on average, the respondents published four articles, one book chapter and two consultancy/research reports within the three years of study. Moreover, within the same period of time, on average the respondents did not publish even one book. The range shows that within the three years, the minimum response on number of articles published is 2 and the maximum is 5 meaning that none of the respondents published less than two articles and none published more than 5 articles. The maximum response on number of book chapters published is 4, the minimum is zero meaning that some of the respondents did not publish any book chapter. This is the same with consultancies which has a maximum response of 5 and a minimum of zero. This implies that while some respondents published upto 5 reports, others did not publish any. As for the books, the findings show that while some respondents reported to have published upto three books (12 publication points) within the three years, others had published none. These results suggest that, on average, research productivity of academic staff in Kenyan universities is characterised by low publication of all the four research outputs examined in this study. These findings mirror those of [69] who reported that on average, each academic member at the University of Nairobi published one article in refereed journal per annum.

Table 3: Mean and standard deviation on measures of research productivity

	Articles	Book chapters	Consultancy/Research Report	Books
Mean	4.33	1.70	2.21	3.01
Std. Deviation	.792	1.301	1.771	3.099
Minimum	2	0	0	0
Maximum	5	4	5	12

The fourth question in this study investigated the relationship between human capital and research productivity. Pearson correlation was used to analyse the data. The study findings were $r = 0.325$ $p < 0.05$. These findings indicate that there is a positive correlation between human capital and research productivity of academic staff in Kenyan universities. This outcome implies that an increase in the level of human capital results to an increase in the level of research productivity of academic staff. Human capital exists when academic staff develop and utilize their knowledge, skills and abilities. This means that that knowledge, skills and abilities are key drivers of research productivity. The fifth research questions focused on the relationship between human capital, dynamic capabilities and research productivity. To answer this question, the causal step approach by [70] was employed. The causal step approach was used to determine whether dynamic capabilities mediate the influence of human capital on research productivity and to determine the type of mediation. Four regression analyses were conducted. The results of the regression analyses reveal that the total influence (path c) of human capital on research productivity is significant ($\beta = 0.115$, $p < 0.05$). The second regression equation (Path a) assesses the influence of human capital on dynamic capabilities (DC). The results show that human capital has a positive and significant influence on dynamic capabilities ($\beta = 0.425$, $p < 0.05$). The third regression equation (path b) represents the influence of dynamic capabilities on research productivity while controlling for human capital. The results showed a significant positive influence ($\beta = 0.155$, $p < 0.05$). The fourth equation (path c') represents the direct influence of human capital on research productivity. The results also showed a positive influence ($\beta = 0.049$, $p < 0.05$). The R^2 increased from 0.106 in the first regression model to 0.163 in the fourth regression model ($\Delta R^2 = 0.057$). Moreover, the F statistics for steps 1, 2, 3 and 4 were all statistically significant. Thus, following Baron and Kenny's criteria for determining mediation, these findings imply that dynamic capabilities mediate the influence of human capital on research productivity. The results also indicate that the direct influence (c') ($\beta = 0.049$) of human capital on research productivity is less than the total influence (c) ($\beta = 0.115$). These findings, as shown in Table 4, suggest that partial mediation exists. This implies that dynamic capabilities have a partial mediation influence on the relationship of human capital to research productivity. These results would seem to suggest that beyond dynamic capabilities there are other variables that explain the relationship between human capital and research productivity of academic staff in Kenyan universities.

Table 4: Regression results for the influence of human capital (HC) on research productivity (RP) through dynamic capabilities (DC)

Steps	Tested Path	Regression Equation	Coefficients	R^2	F value
Step 1	Path c Total Influence of HC on RP	$\gamma = \alpha + \beta HC + \varepsilon$	0.115**	0.106	37.548**
Step 2	Path a Influence of HC on DC	$M = \alpha + \beta HC + \varepsilon$	0.425**	0.379	193.721**
Step 3	Path b Influence of DC on RP	$\gamma = \alpha + \beta_1 HC + \beta_2 DC + \varepsilon$	0.155**	0.163	30.798**
Step 4	Path c' Direct Influence of HC on RP	$\gamma = \alpha + \beta_1 HC + \beta_2 DC + \varepsilon$	0.049**	0.163	30.798**

** $p < 0.05$

Note: Bolded terms represent the tested parameters

3.3 Hypothesis Testing

This study tested two null hypotheses. The first null hypothesis stated that;

H₀. Human capital has no relationship to research productivity of academic staff in Kenyan universities.

The decision rule applied was reject H₀ if $p < 0.05$

To test this hypothesis, simple regression analysis was used. The regression analysis revealed that human capital influences research productivity ($\beta=0.115$, $p<0.05$), hence the null hypothesis was rejected. These results suggest that human capital has a positive and significant influence on research productivity. The results imply that a one-unit increase in human capital results in a 0.115 increase in research productivity. The r^2 value (0.106, $F=37.548$, $p<0.05$) implies that 10.6 per cent of the variance in research productivity is explained by human capital, with a p-value < 0.05 , indicating that this model was significant. Table 4.0 presents the regression results for the influence of human capital on research productivity.

Table 4: Regression results for the influence of human capital on research productivity

Model	Standardized Coefficients	T-Value	Sig.	F-Value	Sig.	R-Square	Resulting Model
(Constant)	10.627	10.564	0.000	37.548	0.000	.106	$\gamma = 10.627 + 0.115HC$
Human Capital	0.115	0.019	0.000				

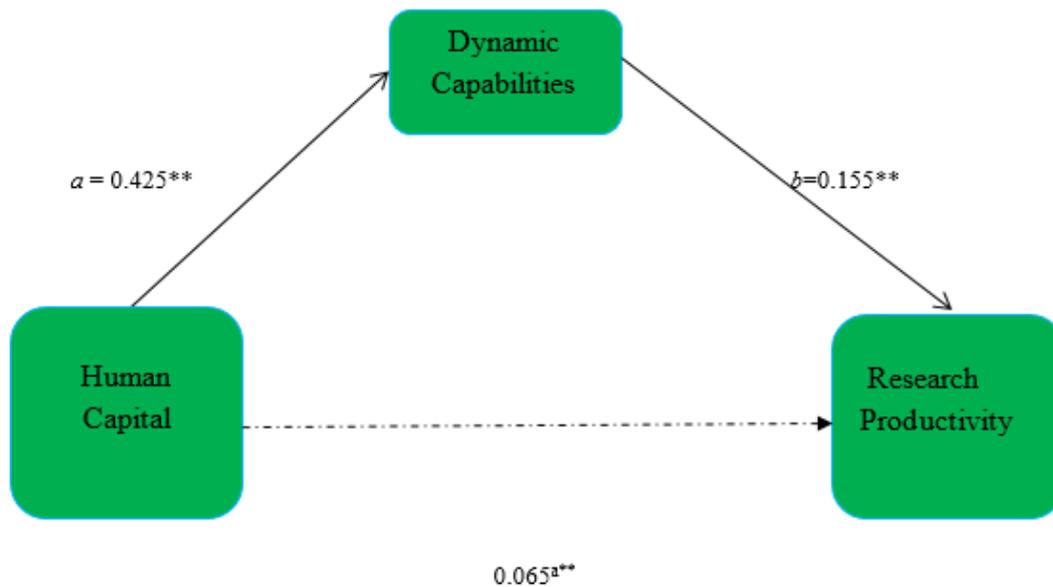
Dependent Variable: Research Productivity

The findings confirmed that human capital exerts a positive significant influence on research productivity. Human capital exists when academic staff develop and utilize their knowledge, skills and abilities. These results suggest that human capital is an antecedent of success for academic staff in their research. This implies that an individual's competence is key to establishing whether an academic staff is able to publish. The development of knowledge, skills and abilities improves the efficiency of academic staff in research. These results support the view that knowledge is a new source of competitive advantage in current and future environments [14]. Furthermore, Reference [71] note that the skills of employees coupled with the efficiency to leverage and utilise these skills successfully is the key to high performance. The findings collaborate with the opinions of [31] on the proposition of knowledge-based theory that superior human capital augments resource utilisation and production efficiencies. Overall, the results infer that academic staff who effectively develop and utilise knowledge, skills and abilities will be able to create value that positively impacts their research productivity. These findings are consistent with those of previous studies. Reference [55] found that training enhanced knowledge, skills and abilities, which in turn increased the number of publications by hospital pharmacists in Jordan. Similarly, a study by [29] revealed that academic staff holding doctorate degrees and those with norms

for appropriate academic behaviour published more articles. Likewise, Reference [72] supported the proposition that human capital explains research productivity. In the same vein, Reference [73] reported that human capital has a significant effect on faculty research productivity of manufacturing enterprises in Colombia.

The second null hypothesis proposed that;

H₀: Dynamic capabilities do not have a significant mediation effect on the influence of human capital on research productivity of academic staff in Kenyan universities. Decision rule was to reject the null hypothesis if the 95% confidence level does not include zero. To test these hypotheses, the bootstrap analysis by [74] was applied. Bootstrap analysis was used to determine the magnitude of the indirect influence of human capital on research productivity through dynamic capabilities and to test the significance of the indirect influence. Bootstrap analysis revealed that the indirect influence was $\beta = 0.065$, while the bootstrap confidence intervals were 0.039 and 0.095, respectively. Since the 95% confidence level does not include zero, it was inferred that the influence of human capital on research productivity is significantly mediated by dynamic capabilities at $p < 0.05$. This posits that human capital has an indirect and significant influence on the research productivity of academic staff through dynamic capabilities. Hence, the null hypothesis was rejected. These findings are summarised in figure 3.



**P<0.05 ^a: Indirect influence

Figure 3: Path diagram representing the indirect influence of human capital on research productivity

The findings of this study provide sufficient evidence to support the mediating effect of dynamic capabilities on the relationship between human capital and research productivity. The statistical analysis of this study established that human capital influences research productivity indirectly through dynamic capabilities: human capital ($\beta = 0.065$, 0.039-0.095). These results confirm the role of dynamic capabilities in the deployment of the

resource base to enhance research productivity. The results endorse the view that the relationship between human capital and research productivity is not direct; rather it is indirect through the intervention of dynamic capabilities. The study findings identify dynamic capabilities as a critical factor linking human capital to research productivity. These findings suggest that possession of high levels of human capital is not enough to improve research productivity. Rather, understanding the mediating role of dynamic capabilities (sensing, learning, integrating and coordination) of academic staff goes a long way to explain the extent to which human capital influences the research productivity of the academic staff. This suggests that academic staff in universities should consider the role of dynamic capabilities in the deployment of human capital in the ever-changing research environment in which they operate. These results mirror those of [63] who reported that dynamic capabilities mediate the relationship between the components of intellectual capital and financial performance of manufacturing firms in Nigeria. The results also concur with the findings of [45] whose study revealed that the components of intellectual capital did not affect financial performance of pharmaceutical firms in Pakistan directly, but rather through business capabilities.

4. Conclusion

Empirical results show that human capital significantly influences research productivity; thus, the study concluded that academic staff's research productivity is attributable to the level of knowledge, skills and abilities they possess and utilise. Moreover, the study concluded that the ability of academic staff to sense changes in the environment, learn new knowledge or revamp already learned knowledge to respond to the changes; the ability to integrate new knowledge with existing knowledge and also the ability to coordinate resources and tasks are critical in enhancing the deployment of human capital. In addition, the study findings revealed that dynamic capabilities have a partial mediation influence on human capital as a driver of research productivity. Therefore, this study concluded that although dynamic capabilities explain the relationship between human capital and research productivity of academic staff in Kenyan universities, they do not fully explain this relationship. These results suggest that beyond dynamic capabilities, there are other variables that explain the relationship between human capital and research productivity of academic staff in Kenyan universities. These results are relevant to top management in understanding the importance of human capital in the context of academic research. This may require them to strategically realign their human capital management towards attracting, retaining and motivating academic staff with valuable human capital and ensure the continuous development of human capital. Therefore, this study recommends that university management should pay considerable attention to the training of academic staff on research knowledge and skills. Management should also consider engaging more professors to nurture younger researchers and scholars. The findings of the study indicate a partial mediation effect. The implication of these results is that dynamic capabilities do not completely mediate the relationship between human capital and research productivity, rather, there is a possibility of other alternative mediator(s) that also influence this relationship. Besides implying possibility of an omitted mediator, these results may also suggest that an important moderator was not taken into account in this study, Hence, future studies should consider multiple mediation models to enable researchers to probe other mediators that explain the relationship between human capital and research productivity. Moreover, a moderated mediation analysis should be considered in future research. Moderated mediation offers insight into whether the mediation is dependent on another variable, or if the mediation exists for one subgroup of the

sample but not for another or if the mediation is conditional on different contexts. In addition, the current study was a quantitative research, as such the study's problem was quantified by generating numerical data which was used to quantify the opinions of the respondents and to generalize results from the sample to the population. However, quantitative research does not allow the researcher to dive deeper into the problem thus it fails to give insight into the underlying reasons, opinions, and motivations of the respondents. Future studies should also consider the use of mixed methods research. Mixed methods research would allow the researchers to integrate quantitative and qualitative research, hence providing a better understanding of the research problem than this study was able to gain by the use of only quantitative research methods.

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5. Disclosure Statement

No potential conflict of interest was reported by the authors.

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