The influence of university research facilities on timely doctoral studies completion: Empirical evidence from Kenya

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ABSTRACT

Doctoral education shapes the development of human capital as well as national innovation; however, Kenya faces low completion rates, with less than 30% of students graduating within the three-year policy, and in some public universities, the figure is approximately 11%. Although the reviewed studies focus on student factor, institutional management, supervisory practices, and funding models, the nexus between research facilities and timely doctoral studies completion remains underexplored. This paper aims to analyze how university research facilities affect the timely completion of doctoral studies at the University of Nairobi in Kenya. General systems theory and Tinto's integration theory guided the study. The target population was 1,183 supervisors, 646 graduates, and 10 deans. The sample size was 339 respondents (182 supervisors, 147 doctoral graduates, and 10 deans). Stratified random sampling was applied to sample supervisors and students, while purposive sampling was applied to sample deans. Semi-structured questionnaires and interview guides were used in data collection. Descriptive statistics (frequency, percentages, mean, standard deviation) and inferential statistics (simple linear regression) in SPSS v25 were used to analyze quantitative data, and thematic analysis was used for qualitative data. The results reveal that research facilities have a positive and significant relationship with doctoral completion, according to supervisors ($\beta = 0.229$, $p = .004$, $p < .05$, 2-tailed), while research facilities had a positive and non-significant relationship with doctoral completion, according to students ($\beta = 0.267$, $p = .259$, $p > .05$, 2-tailed). The findings suggest that university research facilities influence timely doctoral studies completion. The study concludes that timely doctoral studies completion relies not only on the availability of research facilities but also on their accessibility, usability, and integration into the student's academic environment. The study recommends the need to embark on user-centred and inclusive research infrastructure in higher education, beyond mere availability. Further, the study recommends increased investment in research systems and policy frameworks, and targeted training to support doctoral education.

Keywords: Doctoral Education, Doctoral Studies Completion, Kenya, Research Facilities Availability, Resource Utilization

I. INTRODUCTION

Doctoral education represents the most advanced academic achievement, and it is essential in creating new knowledge and innovation among highly skilled professionals, as well as for national development. Worldwide, universities perceive doctoral training as a strategic investment in strengthening their national research systems, as well as a source of socio-economic development, in addition to academic growth. The doctoral students are supposed to complete their studies within reasonable timeframes and make original contributions to knowledge in well-established research systems (Organisation for Economic Co-operation and Development, OECD, 2022). This is, however, highly dependent on the institutional settings where the doctoral training takes place, such as access to research infrastructure, effective supervision, and access to academic materials (Compagnucci & Spigarelli, 2025).

The General Systems Theory views the university as a social system that consists of subsystems, including teaching, research, administration, and institutional infrastructure (von Bertalanffy, 1968). In this context, inadequacies of a single subsystem, especially the research facilities, may interfere with the entire system performance and adversely impact the doctoral results. On the same note, the Tinto Integration Theory also states that student persistence depends on the level to which individuals are both academically and socially integrated in their institutions (Tinto, 1975). Availability of sufficient research facilities and enabling institutional climates thus contributes to academic assimilation and long-term doctoral interaction.

In spite of these institutional demands, doctoral completion has been a thorn in the flesh of most higher education systems. The completion rates usually fall short of expectations, and the time-to-degree is much longer than the

recommended programme periods, even in well-resourced situations. In highly developed research systems like the United States, Germany and Australia, universities offer very wide research facilities such as laboratories, digital libraries and research support services. Nonetheless, it is demonstrated through empirical sources that less than three-quarters of doctoral students graduate their programmes on time, with some differences in results by institutions, disciplines, and demographic categories (Devos et al., 2017). These trends imply that institutional research contexts remain very instrumental in determining doctoral development.

Recent studies indicate a growing attention to the role of institutional resources in determining doctoral experiences. For example, research in Germany has demonstrated that the quality of research facilities, support systems within organisations, and supervisory systems strongly influence the doctoral progress and completion rates (Meuleners et al., 2023). In Australia, studies suggest that investments in research computing infrastructure such as laboratory facilities and digital scholarly resources improve the productivity and research output of doctors. In Taiwan, Wang et al. (2025) describe three stages of digital transformation research engagement, enablement, and enhancement, which have unique themes. They also recognize 5 research trends, which are reinventing digital innovation affordance, value-creation paths, business practices synergy, disciplinary boundaries, and digital leadership. These findings indicate that research facilities are not mere auxiliary institutional resources but absolutely, important factors that contribute towards successful doctoral training and completion in developed nations.

In Sub-Saharan Africa, the issues of doctoral education are frequently more developed. Though the region is a huge contributor to the world population, its contribution towards global scholarly output in the world is relatively lower and it stands at approximately below 50% completion rates (Semela, 2025). One of the reasons attributed to this gap is the lack of research facilities in most universities. The empirical research in South Africa has shown that institutions with modern laboratories, repositories of re-search data and high-performance computers have a higher rate of postgraduate re-search production and better doctoral throughput. However, infrastructural pressures in most African universities still remain as a result of the lack of funding, governance issues as well as conflicting institutional interests.

In East Africa, there has been progressive growth in postgraduate enrolments, which has compounded these issues. In countries like Uganda and Tanzania, universities have enjoyed high development of doctoral programmes without necessarily in-vesting in research facilities. Consequently, doctoral students tend to experience problems of access to lab rooms, online books, good internet accessibility and other favorable research work conditions. Such limitations slow down the pace of research, undermine academic activity, and play a role in the long doctoral candidature (Omaya et al., 2024). The trend is that the increase in doctoral programmes has not been necessarily accompanied by the requisite institutional capacity to facilitate research-intensive training.

In Kenya, doctoral education is being increasingly acknowledged as the key to enhancing the national research capacity and contributing to the socio-economic development. The National Education Sector Strategic Plan policy frameworks underline the importance of universities in developing highly trained researchers, and the Com-mission for University Education (CUE) demands increased training and research capacity at the postgraduate level (University of Nairobi [UoN], 2023)

1.1 Statement of the Problem

Despite efforts in the global and national policy frameworks mandating doctoral studies completion within a three-year completion time frame. In Africa, the rate of completion of a doctorate is less than 50%, and in Kenya, the completion rate is about 30%, with some public universities reporting a lower completion rate of around 11% (University of Nairobi [UoN], 2023). Moreover, many doctoral students finish their doctoral education in over six years, an indication that the doctoral training systems are inefficient, such as institutional lapses in resource utilization, supervisory gaps, and the overall institutional support structure

Recent studies suggest that student-level funding constraints and supervisory quality are associated with delayed doctoral completion, as highlighted by Momanyi (2022), Ochwangi et al. (2023), and Kigwilu & Nyonje (2024). Although these factors are relevant, this explanation is rather supervision-centered and allocates little focus to research facilities, such as access to laboratories, library systems, digital resources, workspace, and other research infrastructure, as structural factors that can impact doctoral completion outcomes. These infrastructural conditions, however, can have a direct influence on research productivity, persistence, and time-to-degree. Nevertheless, despite this possible impact, the relationship between research facilities support and timely doctoral completion has been understudied, and thus there exist an empirical gap.

This disparity is significant since the lack or unavailability and underutilization of research infrastructure could lead to longer completion time, higher financial cost, psychological trauma, and diminished research output, not only affecting students but also institutional performance and national research capacity. Nevertheless, the relationship between the availability and usability of research facilities and the doctoral completion outcomes in Kenyan higher education institutions is under researched.

The University of Nairobi, being the largest public university in Kenya with a reputable research profile and well-established research facilities, offers a strategic argument to explore this subject matter. Thus, this research fills this Knowledge gap by examining the influence of research facilities availability and usability on timely doctoral studies completion. The paper uses the perspectives of doctoral students, university lecturers, and faculty deans to provide insights and evidence on higher education policy and institutional reform.

1.2 Research Objective

i. To establish the influence of research facilities availability on timely doctoral studies completion at the University of Nairobi.
ii. To evaluate the influence of research facilities utilization on timely doctoral studies completion at the University of Nairobi.

1.3 Research Questions

i. How does research facilities availability influence timely doctoral studies completion at the University of Nairobi?
ii. To what extent does research facilities utilization influence timely doctoral studies completion at the University of Nairobi?

1.4 Research Hypotheses

H_0: There is no relationship between research facilities availability and timely doctoral studies completion at the University of Nairobi.

H_1: There is statistically significant relationship between research facilities utilization and timely doctoral studies completion at the University of Nairobi.

II. LITERATURE REVIEW

2.1 Theoretical Review

This study was grounded on the General Systems Theory (GST) of Ludwig von Bertalanffy (Von Bertalanffy, 1968) and the Student Integration Theory by Vincent Tinto (Tinto, 1975). The two theories were utilized since they explain the doctoral completion in two levels of analytical relationship: institutional systems and student integration processes. General Systems Theory was used to describe the ways in which institutional management support systems, such as the availability of research facilities and their usability, are interdependent subsystems that have a collective effect on doctoral completion. The theory is applicable since doctoral completion is not necessarily a personal performance, but could be a product of the operation, coordination, or failure of the interrelated institutional arrangements. Thus, GST offered a systems-level approach to study the effect of institutional research infrastructure support mechanisms on the outcome of completion (Von Bertalanffy, 1968).

The Student Integration Theory developed by Tinto was used to describe the mediation of the relationship between institutional research facilities' support and doctoral studies completion by academic and social integration. The relevance of the theory is that doctoral persistence and completion might not be limited to the availability of research facilities only, but also to how the facilities allow students to engage, belong, and stay long in the doctoral environment. Thus, the theory offered the student-level explanatory prism to interpret the role of institutional conditions in turning into persistence and timely completion (Tinto, 1975).

The two theories have been complementary in this paper, where GST was utilized to explain the structural and organizational factors that impact on doctoral completion, and Tinto's theory was used to explain the integration and relationship processes by which the conditions impact on student persistence. The combination of the two tools gave a more detailed approach towards the study of doctoral completion as a systemic and student-focused outcome, which accommodated the study variables and helped interpret findings (Von Bertalanffy, 1968; Tinto, 1975).

2.2 Empirical Review

2.2.1 Research Facilities Availability and Timely Doctoral Studies Completion

Availability of research facilities and the timely completion of doctoral studies have been increasingly looked at as an institutional-effectiveness phenomenon rather than a resource-based phenomenon. It is well established in the literature that the success of completing a doctorate is related to the extent to which research facilities are embedded within the broader academic support environment. For example, Mosanya et al. (2022), Ghatak et al. (2021), and Dowle (2023) have all shown that it is not a single issue that causes delays to doctoral completion, but rather a combination of institutional resources, supervision arrangements, systems of progress monitoring, and administrative support. These studies were carried out in different settings, but the two studies share the depiction of research institutions as conditions

that enable the work and for which complementary institutional processes are necessary. This contradicts the notion that growth in infrastructure for its own sake will lead to better completion rates.

The African studies are mainly concerned with institutional capacity but also identify other structural constraints. While the number of doctoral students has increased in African universities, the number of research capacity development programs has not matched the increase in student enrollment, and this leads to high pressure on facilities and support for research programs (Jowi, 2021). In a similar study, Omoya et al. (2024) list insufficient research environments as a recurring problem in the progression of doctoral degrees in Africa. These studies indicate that research institutes can be seen as an integral part of the doctoral training environment. African evidence diverges greatly from much of the global literature, however, in that it places more importance on systemic resource deficits as a basic constraint to completion. Global studies, therefore, tend to emphasize maximizing available resources, whereas African studies often underline the lack of availability of research infrastructure itself.

Evidence from East Africa points to the fact that availability is linked to both personal and institutional capacities, complicating this dynamic. For example, Motanya et al. (2023) noted a strong correlation between the academic readiness and critical-thinking abilities of doctoral students. Likewise, Ronoh and Chang'ach (2025) found that preparedness to complete a dissertation had a significant effect on the progression of doctoral candidates in Kenyan public universities. The findings support that the role of a research facility is related to students' effective interaction in research activities. Completion outcomes are not simply a matter of availability; it is important to assess doctoral candidates' ability to take advantage of the resources.

The Kenyan evidence demonstrates that access to research facilities is one factor associated with doctoral attainment and underscores many of the limitations in current studies. For instance, Momanyi (2022) found that infrastructure is a strategic determinant among the other factors that affect doctorate completion rates in public universities. The study also suggests, however, that a facility does not automatically mean higher completion rates. This is consistent with the other institutional problems identified by Ronoh and Chang'ach (2025) because several interacting factors influence doctoral progression beyond the provision of resources alone. The observed trend in the Kenyan studies is that the availability of research facilities is a factor in timely completion only when institutions are conducive.

While there has been a growing empirical emphasis, three gaps remain in the understanding of research facility availability and doctoral study completion. First, research facilities are frequently perceived as just one of many institutional influences, making their impact even more complex. Second, the evidence is largely descriptive rather than inferential and does not explain the patterns of relationships between facility availability and doctoral completion rates. Finally, the present research mainly reflects the perspectives of doctoral students and fails to consider the viewpoints of supervisors and administrators, whose decisions on resource allocation will strongly influence accessibility. These gaps indicate the need to explore more deeply the extent to which research facility availability can be either a constraint or a facilitator for the completion of doctoral studies in a specific setting such as the University of Nairobi.

2.2.2 Research Facilities Utilization and Timely Doctoral Studies Completion

Research facility utilization is concerned with the availability, access, and utilization of research facilities and the academic value of such utilization by doctoral students. Recent studies largely reveal that utilization can now be more of a predictor of completion of the doctoral degree than availability itself. Globally, it is evident that institutional resource utilization is critical in facilitating doctoral studies completion. For instance, Sutarto et al. (2024) opine that academic services only have a positive impact when they meet students' needs and expectations. Likewise, Zhang and Zhan (2026) highlight supportive institutional environments, easily accessible academic resources, and effective utilization of the available facilities as important factor in helping international students complete their doctorates. The converging point of these studies is that the outcomes of institutional investments are realized when they are actively used by doctoral candidates.

Progress toward doctoral completion often stalls when support structures go unutilized. Where resources exist but remain untapped, setbacks become common. Because guidance mechanisms are designed to assist, their underuse stands out as a key obstacle. When students engage fully with what institutions offer, timelines enhance significantly. For example, Amani et al. (2022) identified that long completion times are often due to challenges in navigating academic resources and institutional support systems. This discovery is an important caveat to the difference between nominal access and functional access. Universities can offer libraries, databases, laboratories, and research support—but doctoral students may still not maximize their use of those resources due to administrative issues, a lack of training, and a lack of guidance. Utilization then becomes a multifaceted phenomenon in which accessibility and competence, institutional responsiveness, and student engagement are all important.

In Africa, discourse about resource scarcity is now increasingly complemented by concerns about resource utilization. Rather than just increasing the infrastructure for doctoral training, Jowi (2021) states that there is a need to improve the institutional mechanisms that enable effective utilization of resources. This view is supported by Deboru and Etomaru (2024), who have shown that institutional arrangements that influence the production of doctoral output

are key factors influencing the success of doctoral students. The convergence of these studies indicates that infrastructure can have an impact on academic outcomes only as a means of utilization. These studies suggest that investment in research facilities can create only a small improvement in the completion of Ph.D. degrees without effective utilization mechanisms.

Recent studies in Kenya, e.g., Momanyi (2022), revealed that universities in Kenya have been investing significantly in research facilities; however, they have very low completion rates. This is contrary to expectations, as it is obvious that the presence of resources is not a guarantee of successful doctoral studies. Similarly, Sawe et al. (2024) emphasize that the satisfaction of doctoral students with research support services has a close relationship with their quality, responsiveness, and accessibility. These studies suggest that the completion of a doctoral degree is more influenced by how well students can access and leverage resources during their doctoral studies than by the number of resources available. Therefore, the effectiveness of an institution is not just reflected in the acquisition of infrastructure; it is also reflected in the systems that allow for continuous interaction with that infrastructure.

Existing research on the utilization of resources has focused more on the importance of utilization, but there are important empirical gaps that prompt urgent exploration. First, most studies do not assess utilization directly but rather satisfaction with or perceptions of utilization. Second, there has been scant research that has quantified the impact of utilization separately from other individual and institutional factors on timely completion. Third, most studies have examined the utilization process of doctoral students only, so there is limited understanding of the impact of supervisors and university administrators on students' utilization processes. Therefore, how the utilization of research facilities leads to the timely completion of doctoral degrees is not fully understood, especially in public universities in Kenya. Thus, the current study will provide evidence-based findings that may increase the completion of doctoral degrees in ways that are more effective with available institutional resources at the University of Nairobi.

III. METHODOLOGY

3.1 Research Design

The study used a convergent parallel mixed-methods design to blend both quantitative and qualitative approaches to examine the phenomenon. This design was a suitable fit because it allows for the systematic collection and analysis of trends, patterns, and behaviors. As Asenahabi (2019) pointed out, a good research design steers methodological choices and data collection processes to ensure reliable outcomes. Additionally, combining the precision of quantitative data with the depth of qualitative insights boosts both validity and explanatory power (Subedi,2023). This design also supports triangulation by merging structured survey data with qualitative insights, leading to a richer understanding of supervisory support practices and the dynamics of doctoral studies.

3.2 Study Area

The research was carried out at the University of Nairobi, which encompasses all ten faculties and their various departments. Being the oldest and largest public university in Kenya as well as the largest universities in Africa, it serves as a vital case to examine supervisory support practices and the dynamics of doctoral completion within the national higher education landscape. The university is pivotal in doctoral training and has introduced several reforms, such as standardized admission processes, organized supervisory assignments, and a move towards digitizing postgraduate administration (UoN, 2023). However, despite these initiatives, the rates of doctoral completion are still quite low, with prolonged time-to-degree remaining a significant issue. This situation makes the university an ideal setting to examine how supervisory practices affect doctoral progress and completion. Current evidence suggests that while doctoral graduates are crucial for driving socioeconomic development, various institutional and supervisory hurdles continue to hinder timely completion and overall doctoral success (Ochwangi et al., 2023).

3.3 Target Population and Sampling

The study targeted doctoral supervisors, doctoral graduates, and faculty deans directly engaged in doctoral education at the University of Nairobi. These participants reflected structural, experiential, and administrative levels of doctoral support. A total of 1,183 supervisors, 646 graduates, and 10 deans constituted the study population. Information about doctoral supervisors and graduates was chosen through stratified random sampling. The stratified random sampling allowed the proportional representation of the faculties based on the differences in specialization and infrastructural support. Whileas, purposive sampling was applied to the deans because of their administrative roles as they offer important perspectives on the institutions systems. The number of respondents sampled was calculated by the formula adopted by Taro Yamane (1967) to calculate finite populations with 5% margin of error which included 339 respondents (182 supervisors, 147 doctoral graduates, and 10 deans).

3.4 Data Collection and Research Instruments

The paper collected primary data from doctoral supervisors and graduate through semi-structured and conducted interviews with deans of faculties. The questionnaires captured perceptions of the research facilities, accessibility, and institutional support whereas interviews were conducted to examine the policy implementation and managerial oversight that affect the doctoral progress.

The instruments were validated by a pilot study on 34 participants (10% of the total sample, 339), which is suggested by Lowe (2019). The pilot study enhanced the clarity and contextual meaning of the items. The drop-and-pick technique was used to gather quantitative data from on-campus respondents and Google Forms was utilized to collect data with remote respondents. The qualitative interviews were held face-to-face and audio-recorded through informed consent. The primary data was augmented by documentary review of institutional reports and doctoral completion statistics to strengthen the triangulation and empirical strength. In addition, the university judge-expert review and empirical evaluation were used to validate instrument validity. The assessment of questionnaire items by academic experts to ensure content validity was achieved.

3.5 Data Analysis

SPSS Version 25 was used to process data. Respondents' characteristics were summarized with descriptive statistics (frequency, percentages, means, and standard deviations). The paper conducted inferential analysis through simple regression analysis to establish an empirical relationship and reject or accept the study hypotheses. Finally, the thematic analysis was applied to analyse qualitative data. Thematic coding was used to interpret qualitative data, and the results were coded repeatedly to deter-mine common themes in institutions, to be combined with quantitative results to enhance interpretive validity.

Principal Component Analysis (PCA) in SPSS was used to test construct validity with a factor loading threshold of 0.50. The Kaiser-Meyer-Olkin (KMO) scores, 0.597 among students and 0.668 among supervisors with Bartletts Test of Sphericity ($p < 0.001$) showed that the data was appropriate to use in a factor analysis. Reliability was determined using Cronbach alpha coefficients, and all constructs attained a value of above 0.70 (Hair et al., 2017). Alpha values of 0.771 and 0.858 were observed by university research facilities among students and supervisors respectively, and 0.845 and 0.778 were recorded by doctoral completion, which indicates good internal consistency and measurement stability.

Parametric assumptions were tested to test the validity of the models. The normality of residuals was checked by looking at histograms and it was observed that the mean is near to zero and the distribution is bell-shaped (SD = 0.962). The assumption of linearity was checked by P-P plots in which the residuals followed the diagonal reference line well, which met the regression criteria. Adequacy of the data was established by the KMO and Bartlett tests, whereas the high internal consistency was established by the Cronbach alpha results. These results confirmed the appropriateness of the data to be used in the inferential analysis and the strength of the regression model.

The study established the relationship between university research facilities and timely doctoral completion was tested with linear and multiple regression analyses. The regression equation had the form: $Y=\beta0+\beta1X1+\varepsilon$

Where Y is a doctoral completion, X_1 is university research facilities, β_0 is the intercept, β_1 is the slope coefficient and ε is the error term. Regression findings revealed that an increase in the facilities of university research had a positive correlation with the doctoral completion rate, meaning that the increased adequacy, accessibility, and institutional support are important factors in ensuring a successful timely completion.

3.6 Ethical Considerations

The study strictly adhered to research ethics and MDPI ethics guidelines. The University of Nairobi approved the study through the university review board, and the National Commission of Science, Technology, and Innovation (NACOSTI) provided a research licence. The study subjects were informed about the purpose of the study, the procedures to be followed and the voluntary nature of the study. The study obtained informed consent from all the participants before data collection. Confidentiality of data and anonymity were guaranteed by the use of secure data management, and the participants were free to withdraw at any point. The citation of all secondary sources was done appropriately, and the originality was confirmed by screening for plagiarism in accordance with the institutional academic integrity standards.

IV. FINDINGS & DISCUSSION

4.1 Response Rate

Out of the 339 research instruments distributed, 260 were successfully returned marking an overall response rate of 78%. The category-specific rates were 73% for doctoral candidates, 80% for supervisors, and 80% for deans of schools, see Table 1.

Table 1

Instruments Response Rate

Respondent Category	Instrument Administered	Instrument Returned	Return Rate (%)
Doctoral graduate	147	107	73%
Doctoral supervisor	182	145	80%
Deans of schools	10	8	80%
Total	339	260	78%

Note. *The return rate calculated as the percentage of instruments returned out of those administered.*

As shown in Table 1, the response rate (78%) is above the accepted academic levels as noted by Sataloff and Vontela (2021), which contributes to the increased reliability of the findings and the possibility of meaningful interpretation of the patterns based on respondent groups.

4.2 Demographic Information of Participants

The profiles of demography were the describe the perspectives how structural and personal factors influence the progression of doctoral studies at the University of Nairobi. The research points out that there is a strong gender imbalance, whereby there is a greater number of men. Among doctoral candidates, the proportion of men was 62.6%, with women occupying 37.4%. The difference in genders in the case of supervisors was a little less manifest, with 54.5% of supervisors being male and 45.5% being female (*See Table 2*). The prevalence of male dominance in doctoral enrolment and successful completion is corroborated by Muasya (2025), even though more women are increasingly joining the lower levels of education. This shows that there is a structural bottleneck in the master-doctoral transition, which aligns with larger patterns in the world, with women facing institutional and social restrictions related to gender that hinder their advancement (Fisher et al., 2020). Although the fact that the gap between supervisors is narrowing indicates slow inclusivity, the fact that inequalities are still present indicates that more specific institutional interventions are necessary. The age trends show that the University of Nairobi's doctoral programs are primarily filled with early to mid-career professionals. The demographic of the study is that of a young doctoral group, with the majority of students being between the ages of 23 and 40 years, which is in line with Mugendi and Githae (2021), but the supervisors are older and more experienced. This generation framework is a system in which young researchers in their early careers rely heavily on institutional and supervisory guidance to negotiate through the doctoral process.

Table 2

Distribution of Doctoral Students and Supervisors by Demographics

Gender	Doctoral Students (n)	Percent (%)	Doctoral Supervisors (n)	Percent (%)
Male	67	62.6	79	54.5)
Female	40	37.4	66	(45.5)
Total	**107**	**100**	**145**	**(100)**
Age Bracket in (Years)				
23–31	35	32.7	7	4.8
32–40	41	38.3	34	23.4
41–49	25	23.4	46	31.7
50 and above	6	5.6	58	40.0
Total	**107**	**100**	**145**	**100**

4.3 Descriptive Statistics of University Research Facilities

The findings indicate moderately high levels of perceptions of research facilities among doctoral students (M = 3.90, SD = 0.82) and always higher scores among supervisors (M = 4.38, SD = 0.68), which represents a definite perceptual difference (SD=0.48). Supervisors were more favourable to the facilities across all indicators, indicating that there is a systematic difference in the experience of adequacy and accessibility of infrastructure. The greatest divergences are in access-related items, especially online academic materials and e-library support, where supervisors are very satisfied compared to students. Conversely, lesser disparities are seen in the core infrastructure, like computer laboratories and internet connection, where both groups record relatively stable and moderately high scores. The ratings of infrastructure by supervisors were more positive in a systematic way, which is what Knight et al. (2024) calls an institutional assessment of optimism bias. Conversely, students had lower scores, especially in aspects of access like e-library services and online resources. This is a structural anomaly, as infrastructure can be at the institutional level, but its functionality and access can differ dramatically at the user level.

The highest rated supervisors are those in the specific study locations and e-library facilities, which portrays a high institutional trust in these locations. Nevertheless, the lowest score is registered in facilities that cater to disabilities

in both groups, which means that this is a coherent area of weakness. The increased standard deviations in the student body indicate a greater diversity of experiences, which could imply disparities in access or usage among the groups of users. Overall, the distribution is that of sufficient infrastructure provision, albeit with extreme differences in access and experience to users (See Table 3).

Table 3

Doctoral Students and Supervisors' Responses on University Research Facilities

Statement	Doctoral Students (Mean)	SD	Doctoral Supervisors (Mean)	SD
Updated academic library resources	3.92	0.83	4.32	0.69
Equipped computer laboratories	3.95	0.77	4.29	0.67
ICT resources support research	3.94	0.80	4.33	0.66
Stable internet connection	3.93	0.82	4.30	0.66
Facilities accommodate disabilities	3.73	0.94	4.17	0.85
Staff guidance on digital platforms	3.97	0.75	4.38	0.71
Access to online academic materials	3.81	0.84	4.51	0.63
Designated study spaces	4.02	0.80	4.52	0.63
E-library support	3.80	0.83	4.59	0.60
Grand Mean	3.90	0.82	4.38	0.68

Qualitative interviews with deans reinforced these findings. As one dean noted:
"We have existing Memoranda of Understanding (MoUs) with institutions like KALRO and ILRI that help bridge the gap in access to specialized research infrastructure" (Dean 05, interviewed on 4th, August, 2025).

4.4 Descriptive Statistics of Timely Doctoral Studies Completion

The outcomes have shown a moderate level of perceptions of timely doctoral completion among the students (M = 3.54, SD = 0.95) and significantly higher ratings among the supervisors (M = 4.57, SD = 0.67), indicating a strong perceptual difference. All indicators were rated higher by the supervisors, indicating higher institutional confidence as opposed to the student experiences.

The biggest differences are seen in core outcome indicators, especially high graduation and timely completion (students: M = 3.25; supervisors: M = 4.52) and completion within expected time (students: M = 3.34; supervisors: M = 4.52), which means that students feel that there are considerable delays compared to the expectations of the institution. By comparison, smaller gaps can be observed in process-related factors, supervisory support (students: M = 3.88; supervisors: M = 4.68), which is the highest-rated indicator in both groups. According to Hill and Conceicao (2020) and Breitenbach (2023), supportive institutional structures and accountability mechanisms are essential in enhancing the rate of completion. Nevertheless, the results imply that Kenyan universities are prone to implementation gaps, i.e., the presence of policies that are not operationalized (Momanyi, 2022).

The records of high graduation and timely completion among the students have the lowest mean and the largest variability (SD = 1.12), showing inconsistency and uncertainty surrounding the schedule of completion. There is less variance in the responses of supervisors in general, meaning that they had more consistent views of institutional effectiveness. Together, the distribution demonstrates a distinct trend: although the supervisory and institutional support mechanisms are assessed as positive, outcome-based measures of timely completion are relatively low among students (See Table 4).

Table 4

Doctoral Students and Supervisors' Responses on Doctoral studies Completion

Statement	Doctoral Students (Mean)	SD	Doctorial Supervisors (Mean)	SD
High graduation and timely completion	3.25	1.12	4.52	0.78
Completion within expected time	3.34	1.06	4.52	0.74
Institutional support for coursework completion	3.49	0.95	4.55	0.63
Support for thesis defence	3.74	0.83	4.60	0.64
Supervisory support enhances completion	3.88	0.80	4.68	0.55
Grand Mean	3.54	0.95	4.57	0.67

4.5 Relationship between Research Facilities and Timely Doctoral Studies Completion

A simple linear regression model was used to analyze the predictive value of the university research facilities (independent variable) on timely doctoral completion (dependent variable). Doctoral students and supervisors were analyzed separately to understand differences in perceptions. Omoya et al., (2024) state that challenges of doctoral training such as ICT integration issue yet a critical role in the improvement of doctoral outcomes, which is evident in the positive attitude toward digital infrastructure in Africa. However, results differ with previous ones as it shows that the impact of infrastructure does not equally cut across stakeholders. The estimation of regression coefficients (B), standard errors (SE B), standardized coefficients (B), t-values, and p-values was computed through SPSS v25. The model presupposes a linear relationship in which changes in research facilities predict the same changes in timely doctoral completion (See table 5).

Table 5

Regression Coefficients Predicting Doctoral studies Completion

Respondent Category	Predictor	B	SE B	β	t	p
Doctoral supervisors	University Research Facilities	0.239	0.082	0.229	2.898	0.004
Doctoral students	University Research Facilities	0.267	0.236	0.116	1.134	0.259

Table 5, which shows the results, displays conflicting trends among the two groups of respondents. Among supervisors, university research facilities significantly predict timely doctoral completion (B = 0.239, SE = 0.082, β = 0.229, t = 2.898, p = 0.004, p<.05, 2-tailed). The results imply that there is a positive and statistically significant correlation at the 0.05 level, which implies that positive changes in research facilities correlate with high chances of timely doctoral completion. The standardized coefficient (β = 0.229) represents a low level of effect, which means that the research facilities have a significant, but not the sole, influence on the results of completion. In contrast, among doctoral students, the relationship is positive but statistically non-significant (B = 0.267, SE = 0.236, β = 0.116, t = 1.134, p = 0.259, p<.05). Though the orientation of the relationship is in line with the model of the supervisors, the statistical significance is not strong, showing that the research facilities are not considered to be a determining factor as perceived by the students.

Overall, the regression findings suggest a divergence in belief that supervisors can consider research facilities as an important predictor of doctoral completion, but students cannot offer their full support. This supports earlier patterns of description and underscores the distinct role of institutional infrastructure in shaping timely doctoral completion. Haley et al. (2025) established that procedural clarity and a lack of individualized support are ineffective in guaranteeing doctoral completion. This argument is supported by data from the University of Nairobi, which highlights a mismatch between institutional design and operational effectiveness.

This result coincides with Momanyi (2022), who found a gap between the availability and usability of infrastructure, and Haley et al. (2025), who emphasized the impact of infrastructural friction on the experiences of postgraduates. Likewise, Mouton (2016) contends that doctoral education in South Africa is guided by conflicting policy imperatives, which lead to tensions and trade-offs within the system. The requirement of the knowledge economy to have more scholars and skills contributes to the demand for more PhDs, and single-focus policies do not have sufficient capacity to address emerging problems. These studies suggest that universities do not always pay attention to the inclusive nature of infrastructural design. This is a severe outlier, which means that infrastructure provision is different from equal access. These gaps are partially filled by external alliances with other organizations, including KALRO, ILRI, and KEMRI, which are utilized to access specialized infrastructure, consistent with Vekaria et al. (2023). Nevertheless, the skewed availability of these collaborations in different fields of study hinders their overall effectiveness, and more equal resource distribution plans should be implemented.

4.6 Testing Hypotheses

The null hypothesis (H_0) states that there is no relationship between university research facilities and doctoral completion at the University of Nairobi. The data results give conflicting evidence within respondent groups. In the case of doctoral supervisors, the null hypothesis is rejected (β = 0.229, p = 0.004, p < .05, 2-tailed), since there exists a positive and statistically significant relationship between research facilities and timely doctoral completion. These results imply that, from the supervisors' view, enhancement of research infrastructure plays a significant role in achieving the timely completion of doctoral education.

The null hypothesis is not rejected, however, in the case of doctoral students (β = 0.116, P = 0.259, P>.05, 2-tailed) since the relationship between the research facilities and the doctoral completion is positive but not significant. It means that research facilities are not viewed by students as a determinant factor, which affects the results of completion. In general, the findings indicate that (H_0) is rejected partially, but it depends on the type of respondent. The

alternative hypothesis (H_1) can thus be accepted based on the opinion of the supervisors but not that of the students. This trend is supported by qualitative data, where 12.4% of the students found research facilities and materials that needed improvement to advance the doctoral progression, although it was not statistically significant in the quantitative model. Qualitative insights deepened this interpretation. One dean stated:

> *"While a designated library section for graduate students exists, it lacks regular updates and fails to meet evolving research needs."* (Dean 07, 4th August 2025).

Theoretically, the inferential results are supported by General Systems Theory. This notion view university as a system that is interdependent, where infrastructure, supervision, administration, and policy need to work together (von Bertalanffy, 1968). Failure in any sub-system, especially the coordination of the infrastructure provision and user support, slows down the system's efficiency and postpones the doctoral completion. Meanwhile, the results also partly contest the Integration Theory of Tinto (Tinto, 1975). Although the theories assume that institutional resource access facilitates integration and persistence among the students, this research indicates that access is not enough. The functional integration also relies on the effectiveness of the students to utilize the available resources and as a result, it would be necessary to expand the Tinto model to include usability and institutional responsiveness.

4.7 Integration of Findings

The results indicate that university research facilities contribute significantly yet disproportionately to the doctoral attainment at the University of Nairobi. Supervisors quantified a statistically significant positive relationship between research facilities and timely completion, and students reported a positive but statistically insignificant relationship. Qualitatively, respondents affirmed this trend by citing the need to have better research materials, enhanced digital access, and better institutional support to utilize the available facilities. Collectively, the results indicate that research facilities are important; however, their impact is determined by the experience and support they receive within the institutional system. This implies that it is not just the availability of facilities, but accessibility, usability, and how many doctoral candidates are assisted in making use of it.

General Systems Theory and the Integration Theory developed by Tinto also fit the study. Regarding systems, research facilities are seen as a component of a broader university system, and impairments in that subsystem may slow down the doctoral process. Integration-wise, students tend to graduate successfully once they are well integrated into the academic environment with respect to access to resources, supervision, as well as institutional support. The existence of the perceptual difference between supervisors and students thus indicates that institutional systems are stronger on paper than on day-to-day doctoral experience. In practice, the results suggest that the University of Nairobi needs not only to increase the research infrastructure, but also to enhance the process of accessing and utilizing it by doctoral students. This involves enhancing e-library systems, enhancing internet reliability, assisting research online abilities, and minimizing administrative obstacles. In a broader sense, the findings indicate that institutional policies which view research facilities as active agents of completion, and not background assets, are necessary.

V. CONCLUSION & RECOMMENDATION

5.1 Conclusion

This paper examined how university research facilities contribute to the timely completion of doctoral degrees in the University of Nairobi, as well as offered both empirical and conceptual knowledge on the role of institutional infrastructure in doctoral education. The results indicate that research facilities are necessary but not a sufficient requirement for doctoral completion. Although the regression outcomes indicate that it is statistically significant that the supervisors view the relationship as positive, it is statistically insignificant when viewed through the eyes of the students. This variance indicates a basic disconnect between institutional delivery and user experience, which implies that infrastructure is not the panacea to better doctoral results.

The empirical evidence indicate that supervisors are more likely to equate adequacy with the presence of the facilities, however, students consider infrastructure in terms of accessibility, usability, and day-to-day functionality. This is an important distinction. In areas which are rated as adequate, students still report a lack of efficiency associated with limited access, unstable systems, and administrative limitations. Consequently, doctoral completion is not merely a product of resource availability, but a product which is determined by the efficiency with which the resources are incorporated in the research process.

The study contributes to the concept of infrastructure as a relational and experiential construct. Functional research environments improve academic productivity as well as the sense of belonging and institutional support among the students. On the other hand, structural obstacles add to the delays, disinterest, and lack of confidence in institutional mechanisms. The low scores in disability accommodation are also constant and therefore reflect that inclusivity is not highly developed, and this is an indication of structural inequities that hinder full access to doctoral education. The results also show differences in access to specialized infrastructure across disciplines, and external partnerships partially

fill the gaps but in uneven distribution. It shows that institutional capacity is not homogenous and that the distribution of re-sources may strengthen the existing internal inequalities unless managed strategically. Meanwhile, the dependence on external partnerships highlights the flexibility of the institutions as well as the structural constraints.

Theoretically, the research promotes the General Systems Theory since it illustrates that doctoral completion lies in the harmony of interdependent subsystems, such as infrastructure, supervision, and administrative support. Nevertheless, it questions the linear thinking in models of student integration because it demonstrates that resource access does not necessarily result in successful academic integration without usability and responsiveness. In practice, the paper highlights the existence of the necessity to change the nature of infrastructure provision to functionality. To make sure that investments translate into meaningful research support, universities should focus on user-centered assessment, enhance the working of physical and digital accessors, and integrate the feedback system to provide continuous feedback. The incorporation of the concept of inclusive de-sign to support the needs of various doctors is equally important.

To conclude, doctoral completion can be defined as a systemic effect, or rather a product of interaction between institutional structure and the experience of the students. Research facilities are important, and their impact is based on access, inclusivity, and successful integration within the academic landscape. Enhancing these dimensions is crucial to the achievement of better doctoral completion rates and the development of the research capacity in Kenya and other higher education settings.

5.2 Recommendations

Enhance functional availability and usability of research facilities: The results indicate that although research facilities in most cases exist, there is still unequal access and the utilization of the research facilities, especially on the side of students. The university needs to change the provision-focused investment into user-centered infrastructure management, improving digital access systems, stable internet connection, and modernizing e-library platforms. Institutionalization of feedback mechanisms by the users of the system should be included to detect the obstacles in real time to be able to make reactive improvements. This suggests a special focus to inclusive design, in particular disability accommodation, which proved to be a persistent weak point.

Improve the institutional support structures towards resource utilization: The lack of correlation between the perceptions of the supervisors and the students shows poor institutional mediation in utilizing the available resources. Structured doctoral support systems should be developed at the university such as mandatory orientation on research facilities, ongoing training on digital research tools, and integrated supervision practices that proactively connect the students to available infra-structure. Enhancing the technical and administrative capacity will help to make sure that the facilities are not just available but also properly used during the research process.

Enhance coordination and equity in the access to resources among faculties: The research found differences in access to specialized facilities and external collaboration in disciplines. The university ought to be more coordinated in its resource allocation process by encouraging equal access to shared research resources and broadening interdisciplinary and external partnerships. This will minimize structural inequalities and improve the number of doctors attaining a doctorate in all disciplines.

Declaration of Interest

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