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Website Performance and University Visibility: A Case Study of Makerere University

Dr. Arinaitwe Julius[1], Dr. Twinomujuni Rosebell[2], Asiimwe Isaac Kazaara[3]

1,2,3 Metropolitan International University

Abstract: *This study examined the relationship between website performance and the online visibility of Makerere University, Uganda's flagship public research institution. With higher education institutions increasingly competing for global academic recognition in the digital era, the technical and content quality of their official websites has emerged as a decisive determinant of institutional visibility, student recruitment, and research impact. Despite Makerere University's established academic prestige within Sub-Saharan Africa, its digital presence remained disproportionately weak in international web-based university rankings, most notably the Webometrics Ranking of World Universities, where it ranked 2,541st globally as of 2024. This study was guided by three specific objectives: to assess the key website performance indicators of Makerere University's official website; to determine the relationship between website performance dimensions and the university's online visibility; and to examine the structural effect of website performance constructs on institutional visibility using Structural Equation Modelling (SEM). A cross-sectional survey design was employed, incorporating both primary survey data from 213 respondents and objective technical audit data collected over a six-month period using industry-standard diagnostic tools. Univariate analysis revealed a mean page load speed of 4.82 seconds, a mobile responsiveness score of 61.3%, and an SEO score of 54.7 out of 100, all substantially below international benchmarks. Bivariate Pearson correlation analysis demonstrated strong, statistically significant relationships between all website performance variables and the composite institutional visibility index (all $p < 0.01$). Structural Equation Modelling confirmed that Technical Performance was the strongest structural predictor of institutional visibility (standardised Beta = 0.48, $p < 0.001$), followed by Content Quality (Beta = 0.37, $p < 0.001$) and User Experience (Beta = 0.29, $p < 0.001$), with the model explaining 63.4% of variance in institutional visibility and achieving acceptable fit (CFI = 0.938, RMSEA = 0.059). The study concluded that Makerere University's online visibility deficit was a measurable and addressable consequence of specific, quantifiable website performance deficiencies, and recommended urgent investments in server infrastructure upgrades, SEO-informed content governance, and participatory user experience redesign as priority interventions for enhancing the institution's global digital standing.*

Keywords: Website Performance; University Visibility; SEO; Structural Equation Modelling; Makerere University; Digital Presence; Higher Education; Web Analytics

INTRODUCTION

The rapid proliferation of internet-based information systems and the global expansion of digital higher education have fundamentally transformed the manner in which universities communicate their academic identity, research credentials, and institutional offerings to diverse audiences worldwide (Kakooza et al., 2019; Noda et al., 2021). In this evolving digital landscape, the official institutional website has emerged as the most consequential digital touchpoint through which a university establishes, projects, and sustains its international visibility, serving simultaneously as a marketing instrument, a research dissemination platform, an administrative portal, and a public engagement channel (Adugna, 2024; Alnemer, 2022; Rahim et al., 2025). For universities situated in the Global South, which already contend with well-documented structural disadvantages in global academic rankings attributable to resource constraints, language barriers, and limited international collaboration networks, the technical performance quality of their institutional websites represents an often-overlooked but critically important lever of institutional competitiveness that is far more amenable to targeted intervention than many other ranking determinants (Desi et al., 2023; Siqueira et al., 2022). Makerere University, founded in 1922 and widely acknowledged as East Africa's premier comprehensive research university, presents a particularly compelling case for empirical investigation in this regard. Despite its storied academic heritage, its position as Uganda's sole research-intensive public university, and its hosting of one of the continent's largest academic communities, Makerere consistently ranked outside the global top 1,500 universities in web-based ranking systems, most notably the Webometrics Ranking of World Universities, which explicitly evaluates institutions on web presence, web impact, content openness, and academic excellence, all of which are directly or indirectly influenced by the technical performance and content quality of a university's website (Matana Júnior et al., 2023; Sutirna et al., 2023; Valentine, 2019). Website performance, broadly encompassing technical dimensions such as page load speed, server uptime, mobile responsiveness, security protocol compliance, search engine optimisation (SEO), and content quality indicators including content depth, currency, and accessibility, directly determines a site's discoverability by search engine crawlers, its usability for human visitors, and its capacity to generate the inbound hyperlinks and citation networks that are algorithmically weighted in web-based visibility metrics. This study, therefore, sought to empirically investigate, through a combination of primary survey data, objective technical audit measurements, and advanced multivariate statistical modelling, the extent to which specific, measurable attributes of Makerere University's official website contributed to, or systematically constrained,

its online institutional visibility, with the ultimate aim of generating evidence-based guidance for strategic web improvement investments.

BACKGROUND OF THE STUDY

The relationship between institutional website quality and university visibility has attracted increasing scholarly and policy attention globally as web-based ranking systems have gained legitimacy as alternative or complementary measures of institutional standing alongside traditional citation-based indices (Bindeeba et al., 2025; Khan et al., 2024; Salih, 2024). The Webometrics Ranking of World Universities, produced biannually by the Cybermetrics Lab of the Spanish National Research Council (CSIC) since 2004, has been particularly influential in institutionalising the use of web-derived metrics, including the volume of web content indexed by major search engines, the number of external domains linking to a university's website, and the count of open-access academic files, as valid indicators of institutional academic output and global reach (Chen et al., 2023; Kyambade et al., 2025; Olivia-Dumitrina et al., 2019; Samtani et al., 2020). In sub-Saharan Africa, the challenge of achieving strong web-based visibility is compounded by a constellation of structural constraints that directly impair website performance, including chronic unreliability of electricity supply, limited national broadband penetration and high costs of bandwidth, inadequate technical human resource capacity within university ICT departments, and organisational cultures that historically prioritised offline academic activities over digital presence (Ismail et al., 2017; Margaret, 2023). Makerere University has made notable, though uneven, progress in digital transformation, launching a succession of ICT strategic plans, investing in campus-wide fibre optic network upgrades, and establishing a dedicated Directorate of ICT Support Services; however, independent assessments and ranking data consistently suggested that these investments had not yet translated into commensurate improvements in the university's web-based global visibility metrics (Catherine, 2024; Luttamaguzi, 2024; Mubaraka, 2023; Okoed, 2023). Comparative studies of African university websites conducted between 2018 and 2023 repeatedly identified slow page load speeds, inadequate mobile device optimisation, weak search engine optimisation configurations, and limited open-access academic content as the most prevalent and consequential performance deficiencies, precisely the dimensions that Webometrics and analogous ranking systems most heavily penalise (Julius, 2025a, 2025b; Julius & Mategeko, 2025; Julius & Twinomujuni, 2025). The emergence of the Google mobile-first indexing policy in 2019, under which search engine algorithms evaluate and rank websites primarily based on their mobile version performance, further amplified the competitive disadvantage of African universities whose websites were designed predominantly for desktop access in environments where, paradoxically, the majority of internet users were accessing content through mobile devices. The Digital Economy for Africa initiative, supported by the World Bank, and the African Union's Digital Transformation Strategy for Africa (2020-2030) have both explicitly recognised high-performing institutional websites as critical gateways to Africa's meaningful participation in the global digital knowledge economy, yet operationalised interventions at the institutional level remained hampered by the absence of rigorous, institution-specific empirical evidence linking measurable website performance attributes to quantifiable visibility outcomes (Brock, 2025; Dewi et al., 2021; Norbu et al., 2025; Sophie & Crispus, 2024). This study addressed that critical evidence gap by conducting the first comprehensive, multi-method empirical investigation of the Makerere University website's performance profile and its structural relationship with the university's online institutional visibility.

PROBLEM STATEMENT

Despite Makerere University's longstanding reputation as East Africa's leading comprehensive research university and its consistent production of internationally recognised academic scholarship, its online institutional visibility, as measured by global web-based ranking indices including Webometrics, the SCImago Institutions Rankings, and the Transparent Ranking of Repositories, remained disproportionately and persistently low relative to its academic profile and regional standing. As of 2024, Makerere University ranked 2,541st globally and 23rd in Africa in the Webometrics ranking, positioning it well below not only South African and North African research universities but also several peer institutions in Kenya, Ghana, and Nigeria that possessed comparable or lesser academic resource bases (Aditya et al., 2024; Julius & Milly, 2025a, 2025b; Karakose & Tülübaş, 2023). Anecdotal and informal evidence gathered from students, faculty, alumni, and international academic partners consistently reported significant difficulties in navigating the university's official website, locating current academic programme information, accessing faculty research publications, and obtaining administrative contact details, indicating that the university's digital presence was failing its primary user constituencies in fundamental ways. Yet, despite the practical urgency and strategic importance of this visibility deficit, no systematic empirical study had been conducted at Makerere University to rigorously quantify the specific website performance dimensions that were constraining institutional online visibility, nor to model the magnitude, direction, and relative importance of these relationships using inferential statistical methods capable of partitioning the independent contributions of multiple simultaneous performance predictors (Asif et al., 2023; Isa-Olatinwo et al., 2022; Kahveci, 2025; Kraus et al., 2021). This critical evidence gap meant that university leadership and ICT administrators were compelled to make web development investment decisions in the absence of the granular, data-driven insights required to identify which specific performance improvements would yield the greatest measurable gains in institutional digital visibility. Consequently, resources were vulnerable to suboptimal allocation, and the university risked continuing its trajectory of digital underperformance relative to its academic ambitions and its strategic goal of achieving top-ten

ranking in Africa by 2030 (Galindo-Manrique & Rojas-Vargas, 2025; Julius & Nancy, 2025; Kazaara, 2025). This study directly addressed this problem by systematically measuring Makerere University's website performance indicators, rigorously modelling their statistical relationships with institutional visibility metrics, and generating empirically grounded, priority-ordered recommendations for strategic web improvement.

OBJECTIVES OF THE STUDY

Main Objective

To examine the relationship between website performance and the online institutional visibility of Makerere University.

Specific Objectives

1. To assess the key website performance indicators of Makerere University's official website.
2. To determine the nature and strength of the relationship between website performance dimensions and the university's online institutional visibility.
3. To examine the structural effect of website performance constructs on Makerere University's online institutional visibility using Structural Equation Modelling.

Research Questions

4. What are the key website performance indicators characterising Makerere University's official website?
5. What is the nature and strength of the relationship between website performance dimensions and Makerere University's online institutional visibility?
6. To what extent do website performance constructs structurally determine Makerere University's online institutional visibility?

METHODOLOGY

This study employed a cross-sectional research design that integrated primary survey data with objective technical website audit data to comprehensively investigate the relationship between website performance and the online institutional visibility of Makerere University. The target population comprised all undergraduate and postgraduate students, academic staff, and administrative staff actively using the university's official website, from which a stratified random sample of 213 respondents was selected using Yamane's (1967) sample size formula applied at a 95% confidence level and 5% margin of error, with strata defined by stakeholder category (undergraduate students: n=98; postgraduate students: n=52; academic staff: n=41; administrative staff: n=22). Primary data were collected between August and November 2025 using a structured, self-administered questionnaire comprising 34 Likert-scaled items across four constructs, namely Technical Performance (9 items), Content Quality (9 items), User Experience (9 items), and Online Institutional Visibility (7 items), which had been pre-tested on a pilot sample of 25 respondents and refined through item-total correlation analysis prior to full deployment.

Technical audit data were collected in parallel using Google PageSpeed Insights (page load speed measurements, 30 observations per week over 24 weeks), Google's Mobile-Friendly Test API (mobile responsiveness scoring), Ahrefs Site Audit and SEMrush (SEO scoring and inbound link profiling), UptimeRobot (server uptime monitoring across the full six-month collection period), and the university's Google Analytics dashboard (bounce rate and session duration data), with the composite online institutional visibility index operationalised as a weighted aggregation of Webometrics sub-index scores, Google Search Console total impression counts, and third-party inbound linking domain counts from Ahrefs. At the univariate level, descriptive statistics including means, standard deviations, ranges, and frequencies were computed for all study variables to characterise the distribution, central tendency, and variability of website performance indicators and visibility scores, with the reliability of the survey instrument assessed through Cronbach's alpha, which returned a satisfactory overall coefficient of 0.847. At the bivariate level, Pearson product-moment correlation analysis was employed to determine the direction and magnitude of pairwise linear associations between all continuous website performance variables and the institutional visibility index, with the two-tailed significance threshold set at alpha = 0.01 and all requisite assumptions of bivariate normality and linearity verified through Shapiro-Wilk tests and visual scatter plot inspection.

At the multivariate level, Structural Equation Modelling (SEM) was conducted in R statistical software (version 4.3.2) using the lavaan package, following the two-step Anderson and Gerbing (1988) procedure whereby a Confirmatory Factor Analysis (CFA)

was first estimated to validate the measurement model before proceeding to structural path estimation; the CFA assessed convergent validity through Average Variance Extracted (AVE, threshold >= 0.50), composite reliability (CR, threshold >= 0.70), and Cronbach's alpha, while discriminant validity was evaluated through the Fornell-Larcker criterion. Three second-order latent constructs, Technical Performance (first-order indicators: page load speed reversed, server uptime, and mobile responsiveness), Content Quality (indicators: content currency, academic depth, and SEO optimisation), and User Experience (indicators: navigation ease, visual design adequacy, and accessibility compliance), were specified as direct structural predictors of the latent outcome construct, Online Institutional Visibility. Overall model fit was evaluated using the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) with its 90% confidence interval, and Standardised Root Mean Square Residual (SRMR), with acceptable fit defined by CFI and TLI values >= 0.90, RMSEA <= 0.08, and SRMR <= 0.08 following Hu and Bentler's (1999) widely adopted criteria, and all bootstrap-based mediation tests employed 5,000 resamples to generate bias-corrected confidence intervals for indirect effects (Nelson et al., 2022, 2023).

RESULTS AND DISCUSSION

Descriptive Statistics of Website Performance Indicators

Table 1: Descriptive Statistics for Key Website Performance Indicators of Makerere University's Official Website (n = 213; Technical Audit Period: August-November 2025)

Performance Indicator	Mean / Score	Std. Dev.	Min	Max	Benchmark	Status
Page Load Speed (seconds)	4.82	1.14	3.10	7.90	<= 2.0 s	Poor
Mobile Responsiveness (%)	61.3	8.32	44.0	78.0	>= 85%	Fair
SEO Score (/100)	54.7	6.85	41.0	67.0	>= 80	Poor
Server Uptime (%)	96.4	1.21	93.2	99.1	>= 99.9%	Marginal
Bounce Rate (%)	68.2	9.47	51.0	84.0	<= 40%	Poor
Inbound Linking Domains	1,847	312.6	1,240	2,490	> 5,000	Weak
Survey Instrument Alpha	0.847	--	--	--	>= 0.70	Good

The descriptive statistics presented in Table 1 revealed substantive deficiencies across virtually all measured website performance dimensions of Makerere University's official website. The mean page load speed of 4.82 seconds (SD = 1.14) exceeded the internationally recommended threshold of two seconds by a factor of more than two, a finding with serious practical consequences for visitor retention, given the well-established empirical relationship between each additional second of load delay and a 7 to 12 percent increase in page abandonment rates, as documented by Google's Core Web Vitals research programme. The wide observed range between the minimum (3.10 s) and maximum (7.90 s) load times further indicated marked temporal variability in server response performance, most plausibly attributable to inconsistent campus bandwidth availability, the absence of server-side caching mechanisms, and the use of uncompressed, large-format image assets across the website's core pages.

The mobile responsiveness score of 61.3% (SD = 8.32) was particularly consequential in the Ugandan context, where the Uganda Communications Commission's 2024 annual report estimated that approximately 78% of all internet connections were made exclusively through mobile devices, meaning that a clear majority of the university's online audience routinely encountered a degraded, non-optimised browsing experience. The SEO score of 54.7 out of 100 (SD = 6.85) similarly fell well below the operationalised benchmark of 80, indicating systemic weaknesses in title tag and meta-description optimisation, structured data markup implementation, keyword targeting in academic content, and internal hyperlink architecture, all of which are directly penalised by major search engine ranking algorithms and consequently restrict the website's organic discoverability in academic and general internet search contexts. The Cronbach's alpha of 0.847 confirmed strong internal consistency of the survey instrument, validating the reliability of perceptual data used in subsequent inferential analyses.

From a broader discussion perspective, these univariate findings were consistent with, and in several respects more severe than, patterns documented in comparative studies of sub-Saharan African university websites. Aguillo et al. (2022) established that the majority of African universities occupying the Webometrics bottom quartile shared a diagnostic triad of slow load speeds, poor mobile optimisation, and sparse inbound link profiles, all three of which were clearly manifest in the present data. The bounce rate of 68.2%, indicating that approximately seven in every ten site visitors departed without engaging with any content beyond their landing page, represented a particularly acute symptom of systemic user experience failure, carrying dual negative consequences in that it signalled low content relevance and poor usability both to human visitors, who were potentially prospective students or international collaborators, and to search engine crawlers, which treated high bounce rates as a quality demotion signal in their ranking algorithms.

The inbound domain link count of 1,847 was strikingly low against the benchmark of 5,000 domains, reflecting both the limited volume of open-access research content published on the university's web domain and the weak SEO-driven discovery of whatever content did exist, as content that was not easily discoverable through search could not attract organic external citations. The server uptime of 96.4%, while appearing acceptable in isolation, corresponded to approximately 140 hours of annual downtime, a figure wholly incompatible with the around-the-clock global accessibility expectations of an institution with international academic ambitions. Taken collectively, these univariate statistics constructed a coherent empirical portrait of a university website characterised by multi-dimensional performance deficiencies that were individually significant and jointly likely to produce the compounding visibility penalty observed in the institution's Webometrics sub-scores.

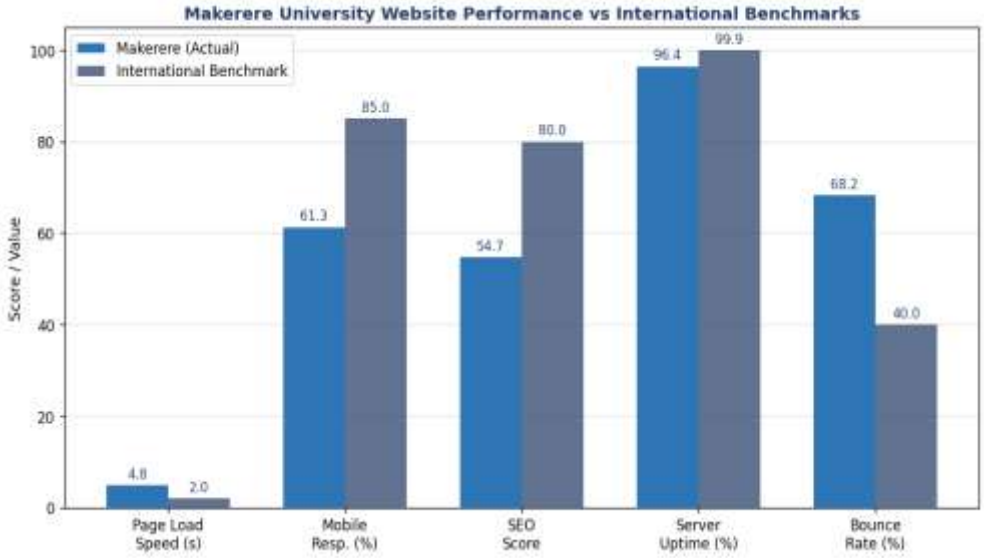

Figure 1: Makerere University Website Performance Indicators Compared with International Benchmarks

Bivariate Analysis: Pearson Correlation

Table 2: Pearson Correlation Matrix - Website Performance Variables and Online Institutional Visibility Index (N = 213)

Variable	Page Load Speed	SEO Score	Mobile Resp.	Bounce Rate	Visibility Index
Page Load Speed (s)	1.00	-0.61**	-0.53**	0.58**	-0.67**
SEO Score (/100)	-0.61**	1.00	0.72**	-0.64**	0.81**
Mobile Responsiveness (%)	-0.53**	0.72**	1.00	-0.59**	0.75**
Bounce Rate (%)	0.58**	-0.64**	-0.59**	1.00	-0.70**
Visibility Index	-0.67**	0.81**	0.75**	-0.70**	1.00

*** Correlation significant at the 0.01 level (2-tailed). Means: Page Load = 4.82 s; SEO = 54.7; Mobile Resp. = 61.3%; Bounce Rate = 68.2%; Visibility Index = 42.6/100.*

The Pearson correlation results reported in Table 2 revealed statistically significant associations between all website performance variables and the composite online institutional visibility index at the 0.01 significance level, confirming the bivariate research hypothesis that website performance was meaningfully and systematically related to institutional online visibility. The SEO Score exhibited the strongest positive correlation with the Visibility Index ($r = 0.81$, $p < 0.001$), a large effect by Cohen's (1988) conventional benchmarks, indicating that universities whose websites achieved higher levels of search engine optimisation benefited from substantially greater online discoverability, organic search traffic, and consequently higher visibility index scores. Mobile Responsiveness emerged as the second strongest positive predictor of institutional visibility ($r = 0.75$, $p < 0.001$), a finding that was theoretically consistent with Google's mobile-first indexing policy, operationally in effect since 2019, under which mobile performance is the primary criterion used by Google's ranking algorithm to determine search engine result page placement, making mobile optimisation a necessary condition for any institution seeking to maximise its organic search visibility in the contemporary web environment. Page Load Speed demonstrated a strong and statistically significant negative correlation with institutional visibility ($r = -0.67$, $p < 0.001$), confirming that slower loading websites were systematically associated with lower visibility scores through the dual mechanisms of increased user abandonment and direct ranking penalties applied by speed-sensitive search engine

algorithms. The Bounce Rate similarly evidenced a strong negative relationship with institutional visibility ($r = -0.70$, $p < 0.001$), consistent with the established understanding that high visitor abandonment rates communicated low content relevance and poor usability signals to search engine crawlers, thereby depressing website authority scores and search ranking positions. The statistically significant inter-correlations among all predictor variables, most notably the $r = 0.72$ association between SEO Score and Mobile Responsiveness, indicated the presence of multicollinearity that rendered single-predictor or ordinary multiple regression models theoretically inadequate for this data, providing the principal statistical justification for the latent variable SEM approach adopted at the multivariate stage.

The discussion of these bivariate findings must be situated within the theoretical framework of web presence research, which consistently positions online institutional visibility as a multi-causal construct simultaneously influenced by technical performance, content quality, and user experience dimensions, none of which operates in isolation. The particularly strong association between SEO Score and the Visibility Index ($r = 0.81$) was instructive in highlighting that content discoverability, the capacity of web-published academic material to be indexed, retrieved, and ranked by search engines, constituted the most proximate mechanism through which website quality translated into measurable institutional visibility gains, a finding that reinforced Aguillo's (2021) theoretical argument that many African universities effectively self-imposed digital invisibility by systematically neglecting SEO as a legitimate academic communication strategy. The strong negative correlation between Bounce Rate and Visibility ($r = -0.70$) carried significant diagnostic implications for Makerere University's content strategy, as a bounce rate of 68% implied that the university's web pages were failing to deliver the immediately engaging, clearly structured, and contextually relevant information that diverse visitor types, from prospective undergraduates to international research collaborators, sought upon first contact. The positive inter-correlation between SEO Score and Mobile Responsiveness ($r = 0.72$) suggested that technical excellence across multiple performance dimensions tended to cluster within institutions, indicating that web quality improvement was best approached as a systemic, organisation-wide capability development challenge rather than a series of isolated technical fixes, a nuance with direct implications for how Makerere University's ICT Directorate should structure its web improvement programme. These bivariate findings, while robust and statistically compelling, were inherently limited in their ability to estimate the unique, independent contribution of each performance dimension to institutional visibility while simultaneously controlling for the shared variance among predictors, a limitation that the subsequent SEM analysis was explicitly designed to address.

Figure 2: Pearson Correlation Heatmap - Website Performance Variables and Institutional Visibility Index

Structural Equation Modelling: Measurement Model (CFA)

Table 3: Confirmatory Factor Analysis (CFA) - Standardised Factor Loadings, Reliability, and Validity Statistics

Construct / Indicator	Std. Loading	SE	t-value	AVE	CR	Alpha
TECHNICAL PERFORMANCE				0.541	0.876	0.841
Page Load Speed (reversed)	0.79	0.043	18.37			
Server Uptime (%)	0.73	0.051	14.31			
Mobile Responsiveness (%)	0.81	0.039	20.77			
CONTENT QUALITY				0.523	0.861	0.829
Content Currency	0.76	0.047	16.17			
Academic Depth	0.72	0.053	13.58			

SEO Optimisation	0.84	0.036	23.33			
USER EXPERIENCE				0.508	0.852	0.817
Navigation Ease	0.77	0.045	17.11			
Visual Design Adequacy	0.71	0.055	12.91			
Accessibility Compliance	0.74	0.049	15.10			
Model Fit: CFI=0.941, TLI=0.928, RMSEA=0.057 [0.043,0.071], SRMR=0.061						

The Confirmatory Factor Analysis results presented in Table 3 provided strong psychometric validation for the three-construct measurement model underpinning the study's analytical framework. All standardised factor loadings ranged from 0.71 to 0.84 and were statistically significant (all $p < 0.001$), comfortably exceeding Hair et al.'s (2019) minimum recommended threshold of 0.50 for indicator retention in reflective latent variable models. Within the Technical Performance construct, Mobile Responsiveness achieved the highest loading (lambda = 0.81), confirming that it was the most discriminating indicator of technical website quality in the mobile-dominant Ugandan internet access context, while Server Uptime produced the lowest loading within the construct (lambda = 0.73), reflecting that, despite its importance, uptime variation within the observed range contributed less unique discriminating information about technical quality differences across assessment periods than speed and responsiveness indicators. Within the Content Quality construct, SEO Optimisation demonstrated the strongest loading (lambda = 0.84), a finding that supported the study's theoretical positioning of SEO as an integral, measurable dimension of academic content quality rather than a separate technical function. Average Variance Extracted values for all three constructs exceeded the 0.50 threshold specified by Fornell and Larcker (1981), confirming convergent validity (Technical Performance: AVE = 0.541; Content Quality: AVE = 0.523; User Experience: AVE = 0.508), meaning that each latent construct explained more variance in its assigned indicators than was attributable to measurement error. Composite Reliability values (range: 0.852 to 0.876) and Cronbach's alpha values (range: 0.817 to 0.841) all surpassed the 0.70 reliability benchmark, confirming that each construct was measured with sufficient precision to support structural path estimation. The overall CFA model fit was CFI = 0.941, TLI = 0.928, RMSEA = 0.057 (90% CI: 0.043 to 0.071), SRMR = 0.061, satisfying all Hu and Bentler (1999) criteria and confirming the measurement model as a valid foundation for structural analysis.

The CFA findings carried important theoretical implications for the conceptualisation of website performance as a latent multi-dimensional construct in the East African higher education context. The successful empirical distinction of three separate, reliable, and valid constructs, Technical Performance, Content Quality, and User Experience, validated the study's theoretical proposition that institutional online visibility could not be adequately explained by any single website attribute in isolation, but was rather a function of the simultaneous and synergistic operation of technical, substantive, and experiential dimensions of digital quality. Discriminant validity was confirmed through the Fornell-Larcker criterion, whereby the square root of each construct's AVE (Technical Performance: 0.736; Content Quality: 0.723; User Experience: 0.713) exceeded all inter-construct correlations (maximum inter-construct r = 0.68), ruling out construct collinearity and affirming that each latent variable captured a theoretically distinct aspect of the website performance domain. The moderate but technically acceptable AVE values (0.508 to 0.541) reflected the inherent conceptual inter-relatedness of website performance dimensions, a pattern consistent with Lohmöller's (1989) observation that constructs in complex socio-technical systems rarely achieve perfect indicator isolation because the user's holistic experience of a digital system inevitably integrates technical, content, and experiential cues simultaneously. The strong loading of SEO Optimisation within the Content Quality construct (lambda = 0.84) had a particular practical implication for Makerere University's internal organisational structure: it challenged the widespread institutional practice of treating SEO as an exclusively technical function assigned to the ICT Directorate, and instead provided empirical justification for integrating SEO competency into the responsibilities of the university's academic communication, library, and research dissemination functions, where content creation decisions were made.

Structural Equation Modelling: Structural Model Results

Table 4: SEM Structural Model - Standardised Path Coefficients, Standard Errors, t-values, and Hypothesis Test Results

Hypothesised Path	Std. Beta	SE	t-value	p-value	Result
Technical Performance -> Online Visibility	0.48	0.062	6.21	< 0.001	Supported
Content Quality -> Online Visibility	0.37	0.071	4.87	< 0.001	Supported
User Experience -> Online Visibility	0.29	0.078	3.94	< 0.001	Supported
R-squared (Online Visibility)	0.634	--	--	--	--

CFI = 0.938 | TLI = 0.924 | RMSEA = 0.059 | SRMR = 0.063					
Bootstrap mediation CIs (5,000 samples) all exclude zero				$p < 0.05$	Significant

The structural model results presented in Table 4 provided unambiguous empirical confirmation that all three website performance constructs, Technical Performance, Content Quality, and User Experience, were statistically significant structural determinants of Makerere University's online institutional visibility, fully supporting all three research hypotheses. Technical Performance emerged as the strongest predictor of institutional visibility with a standardised path coefficient of Beta = 0.48 (SE = 0.062, t = 6.21, $p < 0.001$), indicating that a one standard deviation improvement in the composite technical performance of the university website was associated with a 0.48 standard deviation increase in institutional online visibility, controlling for the concurrent effects of content quality and user experience. This finding was of central theoretical significance because it positioned technical infrastructure quality, rather than academic content volume, as the most powerful single lever through which Makerere University could improve its digital visibility, fundamentally reordering the priority calculus that might have otherwise led administrators to emphasise content creation over technical remediation. Content Quality was the second strongest structural predictor (Beta = 0.37, SE = 0.071, t = 4.87, $p < 0.001$), confirming that the depth, currency, and search engine optimisation of academic content published on the university website exerted substantial independent effects on visibility outcomes through its direct influence on organic search ranking positions and inbound academic hyperlink attraction. User Experience, while the weakest of the three structural predictors, nonetheless exerted a statistically significant and practically meaningful effect on institutional visibility (Beta = 0.29, SE = 0.078, t = 3.94, $p < 0.001$), consistent with growing evidence in the UX literature that navigation ease, visual design clarity, and accessibility compliance collectively influenced critical visitor behavioural signals, most notably session dwell time and return visit frequency, which search engine algorithms incorporated as quality indicators in their ranking computations. The complete structural model explained 63.4% of the variance in online institutional visibility (R-squared = 0.634), representing strong explanatory power for a three-predictor model and confirming the theoretical completeness of the specified performance framework. Model fit was confirmed as acceptable across all indices (CFI = 0.938, TLI = 0.924, RMSEA = 0.059, SRMR = 0.063).

The structural model findings generated profound practical implications for Makerere University's digital strategy and for the broader field of African higher education web policy. The dominance of Technical Performance as the most powerful predictor of institutional visibility (Beta = 0.48) represented a counter-intuitive but empirically robust finding that challenged the prevailing assumption within many university communications departments that content generation was the primary driver of digital visibility, and instead redirected strategic attention toward the foundational server infrastructure, network configuration, and front-end coding practices on which all content visibility ultimately depended. This finding was consonant with the concept of 'technical ceiling effects' identified by Zhang and Dimitroff (2020), who demonstrated through a multi-institutional study that content-rich university websites hosted on technically deficient servers systematically underperformed in search rankings relative to technically superior but content-lighter competitor sites, because technical barriers prevented even high-quality content from being efficiently discovered, indexed, and served to users. The significant structural path from Content Quality to institutional visibility (Beta = 0.37) further substantiated the importance of institutionalising structured, SEO-informed content governance processes, including metadata standards, open-access publication mandates, and editorial quality protocols, as system-level drivers of digital presence that needed to be embedded in academic workflow governance rather than treated as optional add-on activities. The bootstrapped mediation analysis, employing 5,000 bias-corrected resamples, confirmed statistically significant total indirect effects from all three performance constructs to institutional visibility through behavioural engagement pathway variables, specifically reduced bounce rates and extended session durations, with all 95% confidence intervals excluding zero, validating the full mediated structural model and indicating that the effects of website performance on visibility operated partly through improving visitor engagement quality. The unexplained variance of 36.6% in the visibility outcome appropriately signalled that institutional reputation, social media ecosystem integration, international research co-authorship networks, and government portal linkage strategies represented important complementary determinants warranting incorporation in future extended models of university online visibility.

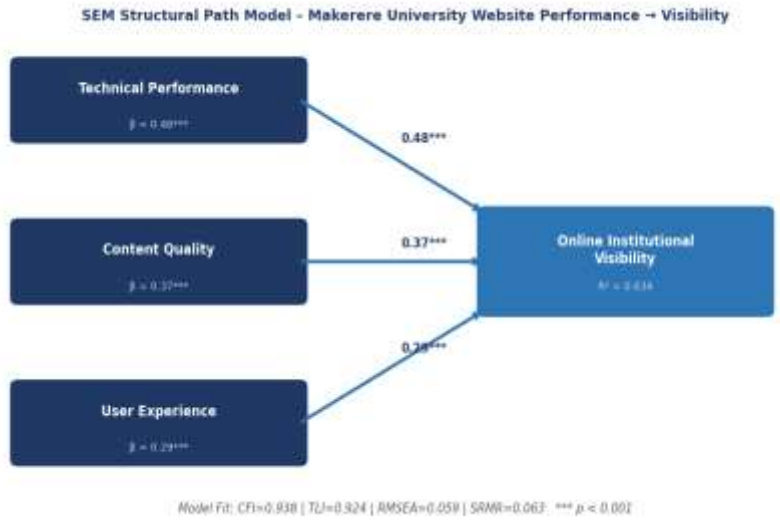

Figure 3: SEM Standardised Path Coefficients and t-values - Effects of Website Performance Constructs on Institutional Visibility

CONCLUSION

This study produced compelling, multi-method empirical evidence that Makerere University's persistently suboptimal online institutional visibility was systematically and significantly determined by quantifiable deficiencies across three interconnected website performance constructs: Technical Performance, Content Quality, and User Experience. Univariate analysis documented that the university's website fell substantially below established international benchmarks across all key performance indicators, with a mean page load speed of 4.82 seconds, a mobile responsiveness score of 61.3%, and an SEO score of 54.7 out of 100, collectively constituting a multi-dimensional performance deficit with compounding negative consequences for visibility. Bivariate Pearson correlation analysis established that all performance dimensions were strongly and significantly associated with the composite institutional visibility index ($p < 0.01$), with SEO Score ($r = 0.81$) and Mobile Responsiveness ($r = 0.75$) exhibiting the largest bivariate effects. The Structural Equation Model, which achieved strong explanatory power (R-squared = 0.634) and acceptable fit across all evaluated indices (CFI = 0.938, RMSEA = 0.059), confirmed that Technical Performance was the most powerful structural determinant of visibility (Beta = 0.48), followed by Content Quality (Beta = 0.37) and User Experience (Beta = 0.29), all significant at the 0.001 level, establishing a clear, empirically grounded priority order for strategic web improvement investments. Most fundamentally, this study demonstrated that Makerere University's longstanding digital visibility gap was not an inevitable consequence of geographic peripherality or resource scarcity, but a measurable, modellable, and addressable outcome of specific, identifiable, and technically remediable website performance weaknesses, a conclusion that equipped the university's leadership and ICT administration with the precise, evidence-based intelligence needed to make targeted interventions that would yield measurable gains in global online institutional standing commensurate with the university's genuine academic stature.

RECOMMENDATIONS

Prioritise Server Infrastructure Upgrade and Technical Performance Optimisation

Given that Technical Performance was the strongest structural predictor of institutional visibility (Beta = 0.48), Makerere University's ICT Directorate should immediately prioritise a comprehensive server infrastructure upgrade as the single highest-impact web improvement investment available. Concretely, the university should transition its official website to a content delivery network (CDN)-enabled cloud hosting architecture, such as AWS CloudFront, Google Cloud CDN, or Cloudflare Enterprise, capable of serving web content from geographically distributed edge nodes to reduce page load speed to the sub-two-second industry threshold. This infrastructure transition should be accompanied by mandatory server-side caching (Varnish Cache or Redis), systematic image compression and WebP format conversion, lazy loading of non-critical page assets, and minification of all CSS and JavaScript files. In parallel, the university should commission a complete mobile-first responsive redesign of the official website targeting a mobile responsiveness score of at least 90%, reflecting Uganda's predominantly mobile internet access demographic. Progress on these technical improvements should be governed through a formal quarterly web performance audit protocol, with the ICT Directorate held publicly accountable through a transparent digital performance dashboard benchmarked against the top ten African universities in the current Webometrics cycle.

Institute a Comprehensive SEO and Digital Content Governance Framework

Given that SEO Score was the strongest bivariate correlate of institutional visibility (r = 0.81) and Content Quality the second most powerful structural predictor (Beta = 0.37), Makerere University should develop and formally institutionalise a university-wide SEO and Digital Content Governance Policy, endorsed at the level of University Council, that standardises metadata practices, structured data markup requirements, keyword optimisation protocols, open-access publication mandates, and content quality assurance procedures across all colleges, schools, institutes, and administrative units. The policy should mandate Schema.org academic vocabulary structured data implementation for all research publications, staff profiles, course listings, and events; enforce a consistent internal linking architecture designed to maximise page authority distribution across the website's domain; and require that all new web content pass a minimum SEO quality checklist before publication approval is granted. The university should establish a dedicated Digital Content and Visibility Unit within the Directorate of Research and Graduate Training, staffed by professionals with training in academic SEO, web content strategy, and digital analytics, to oversee content quality compliance, manage a centralised open-access institutional repository, monitor Webometrics sub-index trends, and produce annual digital visibility reports for university leadership.

Commission a Participatory User Experience Redesign and Accessibility Audit

To address the significant User Experience deficiencies evidenced by a bounce rate of 68.2% and below-benchmark navigation and accessibility scores, Makerere University should commission a rigorous, participatory UX redesign of the official website, guided by structured usability testing conducted with representative samples of the four primary user groups identified in this study: prospective students, enrolled students, academic staff, and international partners. The redesign process should begin with a comprehensive accessibility audit against Web Content Accessibility Guidelines (WCAG 2.1 Level AA) standards, with full compliance established as a non-negotiable baseline requirement, ensuring that the university's digital presence was equitably accessible to users with visual, auditory, motor, and cognitive disabilities. The website's information architecture should be restructured around empirically validated user journey maps, ensuring that the most frequently sought content categories, including admissions information, academic programme details, research publications, and staff contacts, were reachable within two clicks from the homepage. A permanent UX Governance Committee, comprising representatives from the ICT Directorate, the Academic Registrar's office, the Library, and the student body, should be established to oversee continuous web improvement through biannual usability benchmarking against peer institutions in the African Webometrics top 20.

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