IOSR Journal of Mathematics (IOSR-JM)
e-ISSN: 2278-0661, p-ISSN: 2278-8727, Volume 21, Issue 5, Ser. 2 (Sept. – Oct. 2025), PP 47-57
www.iosrjournals.org

Hazard-Based Duration Modeling Of Court Cases: An Actuarial Analysis Of Criminal And Civil Litigation Timelines In Kenya

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Abstract:
Background*: Timely resolution of court cases is fundamental to upholding justice and sustaining public trust in the judiciary. However, Kenya's judiciary continues to face persistent delays in both civil and criminal litigation, which undermine access to justice and erode institutional credibility. This study seeks to evaluate the determinants of case duration in Kenya's Magistrates' Courts, with a focus on identifying systemic bottlenecks and quantifying the impact of adjournments, legal representation, and case type on timelines.*
Materials and Methods*: The study applies hazard-based duration modeling techniques using survival analysis on a dataset of over 3 million cases filed between FY 2020/21 and FY 2024/25. Censoring was applied to unresolved cases. The Kaplan–Meier estimator was used to estimate survival curves for civil and criminal cases, while the Cox Proportional Hazards model was employed to identify predictors of case longevity. Statistical significance of survival differences was assessed using log-rank tests.*
Results*: The results indicate that criminal cases generally have longer lifespans compared to civil cases, with significant differences confirmed ($p < 0.005$). The Cox model reveals that adjournments and legal representation strongly predict prolonged case resolution. Civil cases record a median duration of 594 days, substantially longer than the 144 days for criminal cases, and are 33% less likely to be resolved within a given timeframe. Legal representation, while central to fair hearing, is associated with a 50% reduction in the likelihood of timely resolution, while each adjournment decreases resolution probability by 46%.*
Conclusion: *This study demonstrates the utility of actuarial survival models in judicial performance measurement and legal analytics. It contributes to theory by advancing hazard-based approaches to case flow analysis. For practice, it offers empirical insights to inform judicial case management, procedural reforms, and predictive workload allocation. For policy, it aligns with the Social Transformation through Access to Justice (STAJ) Blueprint, recommending adoption of data-driven case management systems, stricter adjournment policies, and reforms to expedite low-value civil disputes.*

Key Word*: Survival Analysis; Hazard Models; Case Duration; Judicial Efficiency; Case flow Management.*

Date of Submission: 04-10-2025 Date of Acceptance: 14-10-2025

I. Introduction

Efficient and timely resolution of cases is a globally accepted indicator of judicial performance and access to justice, and a cornerstone of democratic governance, legal certainty, and the rule of law. Across the globe, judicial systems are increasingly evaluated on the basis of how efficiently they manage case backlogs and resolve disputes. In advanced jurisdictions such as the United States, Canada, the United Kingdom, and various European Union nations, substantial investments have been made in digitization, predictive analytics, and empirical performance monitoring to streamline case processing. These jurisdictions have institutionalized tools such as electronic filing, technology-supported case scheduling, and digital court registries, enabling courts to reduce delays and improve access to justice. In addition, actuarial techniques such as the Kaplan-Meier estimator and the Cox Proportional Hazards model are now widely used in these contexts to analyze time-to-resolution and predict litigation outcomes. These approaches help courts to identify systemic inefficiencies, allocate resources based on empirical workload patterns, and monitor magistrates-level performance using real-time case flow data.

Many African countries are still grappling with protracted litigation timelines driven by judicial understaffing, infrastructure constraints, and a lack of empirical decision-support systems. Nations such as Nigeria, Ghana, South Africa, and Uganda have initiated digital reforms, introducing virtual courts and e-justice platforms, but the integration of survival analysis and other empirical models into court administration remains minimal. While some regional progress has been recorded in adopting alternative dispute resolution (ADR)

mechanisms, quantitative evaluations of their impact on reducing case durations are scarce. This reflects a broader underutilization of data analytics in Africa's justice sector.

In Kenya, despite the rollout of the Judiciary's Social Transformation through Access to Justice (STAJ) Blueprint 2023–2033, systemic delays in criminal and civil litigation continue to undermine public confidence and burden litigants. Although e-filing systems have been introduced across the Country, their implementation is uneven, and paper-based processes remain dominant in most courts. Frequent adjournments, shortage of judicial officers, procedural rigidity, and backlog accumulation remain entrenched challenges. The FY 2023–24 State of the Judiciary and Administration of Justice Report revealed that civil litigation has moderately benefited from virtual hearings introduced during the COVID-19 pandemic, but criminal cases, especially those involving capital offences and remand prisoners, continue to experience prolonged delays. This has led to significant implications for the rights of accused persons, including the violation of the constitutional guarantee to be tried within a reasonable time.

Although some empirical studies have been conducted on court performance in Kenya, few have applied actuarial survival models to systematically analyze case durations or compare criminal and civil case trajectories. This study addresses that gap by employing the Kaplan–Meier and Cox Proportional Hazards models to examine the time-to-resolution of court cases. These techniques not only offer methodological robustness but also allow for the estimation of hazard rates and the impact of covariates such as court type, representation status, and case complexity. By doing so, the study contributes to an evidence-based foundation for judicial policy reform and strategic resource allocation in Kenya's legal system.

II. Statement Of Problem

Despite judicial modernization efforts under the STAJ framework and increased investment in court automation, Kenya's judiciary continues to experience significant delays in resolving both criminal and civil cases. These delays pose serious threats to the credibility and effectiveness of the legal system, leading to adverse outcomes such as prolonged pretrial detention, rising litigation costs, loss of confidence in the rule of law, and denial of timely justice.

While existing research has documented these delays, most studies are descriptive and fail to employ robust statistical or actuarial models that could provide predictive insights into litigation timelines. The lack of empirical modeling obscures understanding of the structural and procedural determinants of court efficiency, particularly in distinguishing how these factors affect criminal and civil cases differently. Moreover, key policy questions remain unanswered. What is the average duration of criminal versus civil cases in Kenya's judiciary? What are the systemic or case-level predictors of early or delayed resolution? How do factors such as legal representation, court workload, and case complexity shape litigation timelines? Without empirical answers to these questions, efforts to enhance judicial productivity, reduce backlog, and implement case management reforms risk being misaligned or inefficiently targeted.

This study addresses these critical gaps by applying Kaplan-Meier survival estimates and Cox Proportional Hazards models to Magistrates' Court case data in Kenya. It offers a rigorous, evidence-based approach to comparing the litigation trajectories of criminal and civil cases. By quantifying case durations and identifying the factors that influence their resolution, the study supports the design of data-informed judicial interventions aligned with the STAJ agenda and international best practices.

III. Literature Review

Efficient judicial systems are critical for the administration of justice, protection of rights, and enhancement of economic and social development. However, judicial delays remain a persistent problem globally, especially in developing countries. Court case delays have been a subject of extensive scholarly debate, with studies emphasizing the administrative, procedural, and institutional determinants of judicial efficiency. Survival analysis techniques, including the Kaplan-Meier estimator and the Cox Proportional Hazards model, have been successfully applied in various domains to analyze time-to-event data.

Theoretical Framework:

Efficient judicial systems are critical for the administration of justice, protection of rights, and enhancement of economic and social development. However, judicial delays remain a persistent problem globally, especially in developing countries. This review situates the research within the broader academic and policy discourse on litigation timelines and demonstrates how actuarial modeling approaches, particularly survival analysis, offer a robust tool for analyzing court case duration.

Queueing Theory of Justice: Queueing theory originates from operations research and is used to model waiting lines and service systems. In the judicial context, it conceptualizes courts as service systems where cases (inputs) wait in line for adjudication (service), influenced by the number of magistrates, available time, and

institutional efficiency. The theory is particularly useful for understanding how congestion, backlog, and limited judicial capacity contribute to delays. Recent studies in public administration have applied queueing models to evaluate the impact of court staffing levels and automation on throughput and delay.

Dispute Resolution Theory: This theory explains how litigation behavior is influenced by perceived benefits, risks, and procedural complexities. Initially proposed in the 1980s, it posits that the decision to pursue litigation or settle is contingent on expected legal outcomes and transaction costs. Contemporary extensions of the theory incorporate case complexity, legal representation, and judicial predictability as key determinants of dispute trajectories and duration. Dispute resolution theory thus supports the inclusion of explanatory covariates in survival analysis models of litigation timelines.

Survival Analysis Theory: Survival analysis, also known as time-to-event analysis, is a statistical framework for analyzing the expected duration until one or more events occur. The Kaplan-Meier estimator and the Cox Proportional Hazards model are widely used in healthcare, finance, and more recently, legal studies to examine time to case resolution. Survival analysis provides insights into both the probability and the rate of event occurrence over time, offering superior interpretability compared to traditional regression models when dealing with censored data, such as unresolved cases.

Empirical Literature Review

Globally, developed countries have embraced data-driven judicial performance measurement. In the United States, empirical studies using hazard-based models have shown that court congestion, legal representation, and case type significantly affect litigation duration. Similarly, large-scale analyses of civil cases in China have demonstrated that legal aid, court digitization, and automation substantially reduce case processing times. Across Europe, digital transformation initiatives, such as electronic filing and case tracking systems, have been highlighted as instrumental in reducing delays and improving transparency. These reforms, combined with predictive modeling and performance benchmarking, have enabled courts in countries like Estonia, the Netherlands, and Canada to maintain high clearance rates.

In contrast to developed nations, many African judicial systems continue to experience chronic inefficiencies. Comparative reviews show that while digital court systems are emerging in countries such as Ghana, Nigeria, and South Africa, the application of empirical and actuarial methods in litigation modeling remains limited. Regional assessments emphasize that many African countries lack the institutional capacity and data infrastructure to support data-driven case management. Studies from Uganda and Nigeria further point to high adjournment rates, under-resourced courts, and weak data collection as primary contributors to protracted case durations. These challenges constrain the implementation of advanced survival analysis techniques in judicial settings, despite their potential to inform policy and resource allocation.

In Kenya, judicial delay remains a fundamental barrier to justice, despite reforms outlined in the Social Transformation through Access to Justice (STAJ) blueprint. Research highlights those systemic inefficiencies, including case backlogs, procedural delays, and inadequate automation, continue to undermine judicial performance. Criminal cases, particularly those involving capital offences, are disproportionately affected by delays, often due to extended pre-trial detention and frequent postponements. Limited adoption of virtual courts outside urban areas has further slowed the pace of litigation. However, during the COVID-19 pandemic, virtual courtrooms significantly improved clearance rates for civil disputes in Nairobi. Despite these developments, the application of actuarial survival models to estimate and compare criminal and civil case durations in Kenya's judiciary has not yet been explored.

This highlights a major gap in empirical research, descriptive studies exist, but methodological rigor in modeling litigation timelines through survival analysis remains largely missing.

Conceptual Framework: This study conceptualizes litigation duration as a function of institutional and procedural factors. The dependent variable is time to case resolution, operationalized as the number of days between case filing and conclusion. The independent variables are grouped into: Procedural Factors such as Legal Representation, Adjournment Frequency and Institutional Factors such as Case Type, Caseload per Magistrate. These factors are hypothesized to influence the pace and likelihood of timely resolution.

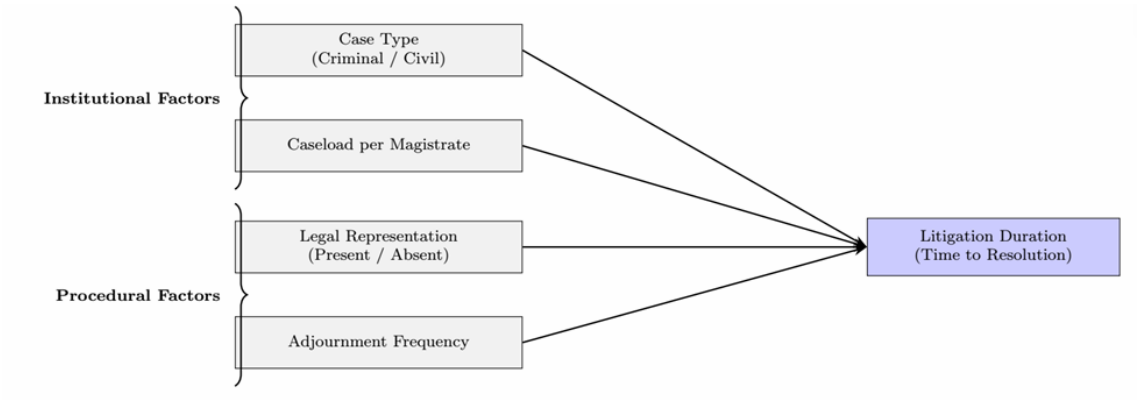

Figure 1. Conceptual Framework for Modeling Litigation Duration

These variables are modeled using Kaplan-Meier survival functions and Cox Proportional Hazards regression to estimate and compare survival times across groups. The conceptual model aligns with survival analysis theory and dispute resolution frameworks and is expected to inform policy, resource allocation, and judicial case management practices in Kenya.

IV. Methodology

Study Design: This study adopts a positivist research philosophy, which emphasizes objective measurement and the use of statistical techniques to analyze observable phenomena. This approach supports the application of actuarial and survival analysis models to assess litigation durations and their predictors within Kenya's judicial system. This design is suitable for time-to-event data and allows comparisons between groups through survival analysis.

The research employs a quantitative, retrospective, and analytical design. It analyzes secondary data from resolved civil and criminal court cases filed between July 2020 and June 2025, with a specific focus on Magistrate Courts. These courts offer geographic and institutional diversity, enhancing the generalizability of findings.

The study also includes the entire population of resolved cases filed within the specified period. This census approach strengthens statistical inference by eliminating sampling error and increasing external validity.

Data Collection: Data were obtained from the Judiciary's Case Tracking System (CTS), following formal approval by the Judiciary. A structured data abstraction tool was used to ensure consistency and reduce extraction bias. Key parameters include, Case ID and Type (Criminal or Civil)**,** Filing and Conclusion Dates**,** Court Level and Station**,** Workload per Magistrates**,** Number of Adjournments (counts) and Presence of Legal Representation (Yes/No)**.**

Variables: The **dependent variable** is case duration, defined as the number of days from filing to resolution. Right-censored cases (unresolved at data collection) are incorporated into the survival models. **Independent variables** include case type, number of adjournments, workload per magistrates and legal representation status.

Empirical Modeling: This study conceptualizes case resolution as a *time-to-event* process, where the *event* is the conclusion of a case and unresolved cases are treated as right-censored observations. It applies survival analysis techniques to estimate survival probabilities and evaluate the impact of explanatory variables on case duration. Two core models are employed: the Kaplan–Meier Estimator to estimate non-parametric survival functions, and the Cox Proportional Hazards Model to assess the effect of covariates on case resolution rates.

Empirical Modeling: This study conceptualizes case resolution as a *time-to-event* process, where the *"event"* is the conclusion of a case and unresolved cases are treated as right-censored observations. It applies survival analysis techniques to estimate survival probabilities and evaluate the impact of explanatory variables on case duration. Two core models are employed: the Kaplan–Meier Estimator to estimate non-parametric survival functions, and the Cox Proportional Hazards Model to assess the effect of covariates on case resolution rates.

Survival and Hazard Functions: Let denote a non-negative random variable representing the time (in days) to case resolution. The *survival function* denotes the probability that a case remains unresolved beyond time :

The cumulative distribution function and the corresponding probability density function are given by:

The hazard function , also known as the instantaneous failure rate, represents the conditional probability that a case is resolved at time , given that it has remained unresolved until that time and is defined as:

Here, represents the probability that a case remains unresolved beyond time , is the probability density function, and is the hazard function, capturing the instantaneous rate of resolution at time . This function satisfies that (*all cases are unresolved at time zero*) and (*all cases are eventually resolved*).

Kaplan–Meier Estimator: The Kaplan–Meier estimator is a non-parametric statistic used to estimate the survival function from time-to-event data. It accounts for right-censored observations, which occur when the event of interest (e.g., case resolution) has not yet occurred for some subjects by the end of the study period. Given distinct event times , with events and individuals at risk at , the estimator is:

This stepwise function provides survival estimates for both civil and criminal cases.
Log-Rank Test: To assess differences in survival curves between civil and criminal cases, the log-rank test is applied. The test statistic is:

where is the observed number of events in group 1, the expected number under the null hypothesis, and the variance. Under the null hypothesis , the statistic follows a chi-square distribution with one degree of freedom.

Cox Proportional Hazards Model (CPH): The CPH model is used to estimate the effect of covariates on the hazard of case resolution. The model is specified as:

where is the unspecified baseline hazard function and is a vector of regression coefficients.
Hazard Ratios: The hazard ratio for covariate is , interpreted as:
: Faster resolution (higher hazard)
: Slower resolution (lower hazard)
: No effect

Estimation via Partial Likelihood: The model is estimated by maximizing the partial likelihood:

with being the risk set at time . The log-partial likelihood is:

Data Analysis and Estimation Procedures: Data analysis was conducted in three main phases: descriptive exploration, survival estimation, and regression modeling. All statistical computations were performed using Python, with significance evaluated at the 5% level ().

Descriptive Statistics: Preliminary analysis involved generating summary statistics to characterize litigation timelines. Measures such as mean, median, standard deviation, and interquartile range were computed separately for civil and criminal cases. Frequency distributions were analyzed to highlight the variability in case durations and provide an empirical basis for modeling litigation timelines. Summary statistics were computed of key variables, including *case duration (mean, median, standard deviation, interquartile range), number of adjournments, legal representation status and case type e.g., criminal vs. Civil*
.
Survival Estimation and Regression Modeling: Survival analysis techniques were employed to model the time-to-resolution of court cases, incorporating both completed and right-censored observations. The analysis proceeded in two steps:
The **Kaplan–Meier estimator** was used to generate survival functions for civil and criminal cases. This non-parametric method allowed for the visualization of survival probabilities over time, accounting for censoring.
The **log-rank test** was applied to determine whether survival experiences differed significantly between case types.
The **Cox Proportional Hazards (CPH) model** was employed to estimate the effects of covariates on case resolution rates. The model was specified as:

where is the unspecified baseline hazard, and represents a vector of covariates such as number of adjournments, legal representation and case type.
Hazard ratios () were computed to quantify the effect of each covariate on the likelihood of case resolution at any given time where indicates faster resolution and indicates slower resolution.

Model diagnostics included:
- **Schoenfeld residuals test:** Assessed the proportional hazards assumption.
- **Variance Inflation Factors (VIF):** Evaluated multicollinearity among predictors.
- **Concordance Index (C-index)** and **Akaike Information Criterion (AIC):** Assessed model discrimination and parsimony.

Validity, Reliability, and Ethics
- **Reliability** was ensured through standardized data abstraction procedures and triangulation with physical court files.
- **Construct validity** was maintained by adhering to official judicial definitions and performance indicators.
- **Model validity** was evaluated using diagnostic residuals and global fit statistics.
- **Ethical clearance** was obtained through formal institutional approval and all case data were anonymized to protect confidentiality and privacy.

Model Assumptions and Limitations: Several assumptions were made for analytical tractability:
- The model treats each case process as a time-to-event path with right-censoring, though in practice, court procedures involve feedback loops and inter-stage dependencies.
- The Cox model assumes proportional hazards over time, which may not fully capture dynamic legal behaviors such as procedural adjournments or judicial discretion.
- The estimation assumes steady-state conditions and exponential-like service patterns, which may not always reflect congestion or resource constraints.

While these assumptions allow for interpretable modeling, they may introduce limitations regarding the precision and generalizability of the findings, especially under non-linear or path-dependent case trajectories.

V. Results, Interpretation And Discussion

This section presents descriptive insights on the distribution of case durations across civil and criminal matters. It includes frequency breakdowns and summary statistics to capture central tendencies and variability

Descriptive Statistics: Table 1 presents the distribution of cases by type along with descriptive statistics of case durations. Criminal cases constituted the majority of filings (59.1%), while civil cases accounted for 40.9%. Civil matters exhibited substantially longer average durations and greater variability compared to criminal matters.

Table 1 Case Type Distribution and Duration Statistics (in Days)

Case Type	Frequency	%	Mean	Std Dev	Min	Median	Max
Criminal	1,950,733	59.1	359.83	524.88	0	144	10,020
Civil	1,347,826	40.9	960.98	1,245.65	0	594	49,867

Source: Author (2025).

Civil cases have a significantly longer mean and median duration compared to criminal cases. The wide range and higher standard deviation in civil durations suggest greater variability and potential for delay. Criminal cases, by contrast, tend to conclude more quickly, with 75% resolved within approximately 421 days.

Correlation Analysis: Pearson correlation coefficients were computed to explore bivariate relationships between case duration and explanatory variables. Results show a weak but significant positive correlation between duration and adjournments ($r = 0.13$, $p < .001$), a weak negative correlation with workload per magistrate ($r = -0.09$, $p < .001$), and a moderate positive correlation with legal representation ($r = 0.30$, $p < .001$). These findings suggest that adjournments and legal representation are associated with longer litigation times, whereas higher workloads per magistrate are slightly associated with shorter durations, possibly reflecting prioritization or case management efficiencies as shown in Table 2.

Table 2. Correlation Coefficients and Model Discrimination Metric

Variable Pair	Correlation (r)	p-value
Duration and Adjournments	0.13	< .001
Duration and Workload per Magistrate	-0.09	< .001
Duration and Legal Representation	0.30	< .001
Concordance Index (C-index)	0.73	

Note: Correlations computed using Pearson's method; C-index from Cox PH model.
Source: Author (2025).

The model showed a Concordance Index (C-index) of 0.73, indicating good discriminatory power. This suggests that in 73% of comparable case pairs, the model correctly predicted which case would be resolved sooner, thus validating its utility in estimating judicial case duration.

Kaplan–Meier Survival Estimates: The Kaplan–Meier estimator was used to compute and visualize survival functions for civil and criminal cases. As illustrated in Figure 2 civil cases remain unresolved for longer periods relative to criminal cases. This is evident from the slower decline of the civil survival curve, which indicates a larger proportion of ongoing cases over time.

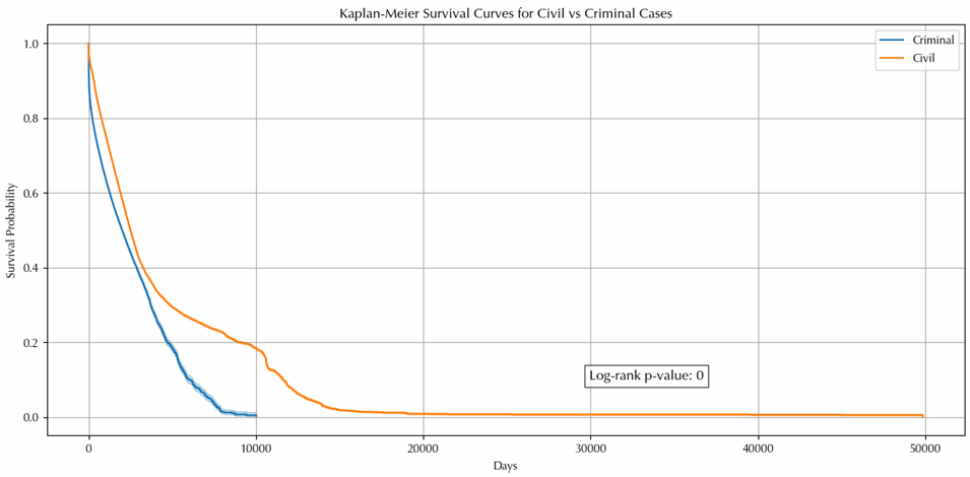

Figure 2. Kaplan--Meier survival curves for civil and criminal cases

At approximately 10,000 days (about 27 years), the survival probability for criminal cases nears zero, whereas civil cases exhibit a heavier tail, suggesting a portion remains unresolved even after that period. The log-rank test (^{2} = 32,440.31, p < .001) confirms a statistically significant difference between the two groups.
The Figure shows that:

a. The survival curve for criminal cases declines steeply, showing that most cases are resolved within the first few thousand days. By around 8,000 days (~22 years), the probability of a criminal case remaining active is near zero.
b. In contrast, civil cases decline more gradually, with a substantial proportion still unresolved beyond 10,000 days. This points to systemic delays and procedural bottlenecks in civil litigation

Cox Proportional Hazards Model Results: To assess the joint effect of multiple predictors on case resolution time, a Cox Proportional Hazards (CPH) model was fitted using 3,298,560 case records. Among these, 824,404 cases had been resolved (uncensored), while 2,474,156 were right-censored (still pending at the date of data extraction). The Breslow method was used to estimate the baseline hazard. The model was estimated using the *lifelines. CoxPHFitter* in Python, with *'duration'* as the time-to-event variable and '*event observed'* as the event indicator. The partial log-likelihood was -11,436,851.92, with a concordance index of 0.73, indicating good discriminatory power. The log-likelihood ratio test was highly significant (^{2} = 342,625.02, df = 4, p < 0.005), confirming the joint significance of the covariates.

Table 3. Model Summary Statistics for Cox Proportional Hazards Model

Metric	Value
Baseline Estimation Method	Breslow
Concordance Index (C-index)	0.73
Partial Log-Likelihood	-11,436,851.92
Log-Likelihood Ratio Test	$\chi^2(4)$ = 342,625.02, p < .005
Partial AIC	22,873,711.85

Total Observations	3,298,560
Right-Censored Cases	2,474,156
Events Observed	824,404

Source: Author (2025).

Table 4. Cox Proportional Hazards Model Estimates

Covariate	Coef	Hazard Ratio (exp(coef))	95% CI (HR)	p-value
Case Type (Criminal = 1, Civil = 2)	-0.39	0.68	[0.67, 0.68]	< 0.005
Legal Representation	-0.71	0.49	[0.49, 0.49]	< 0.005
Adjournments (Count)	-0.61	0.54	[0.54, 0.54]	< 0.005
Workload per Magistrate	0	1	[1.00, 1.00]	< 0.005

Source: Author (2025).

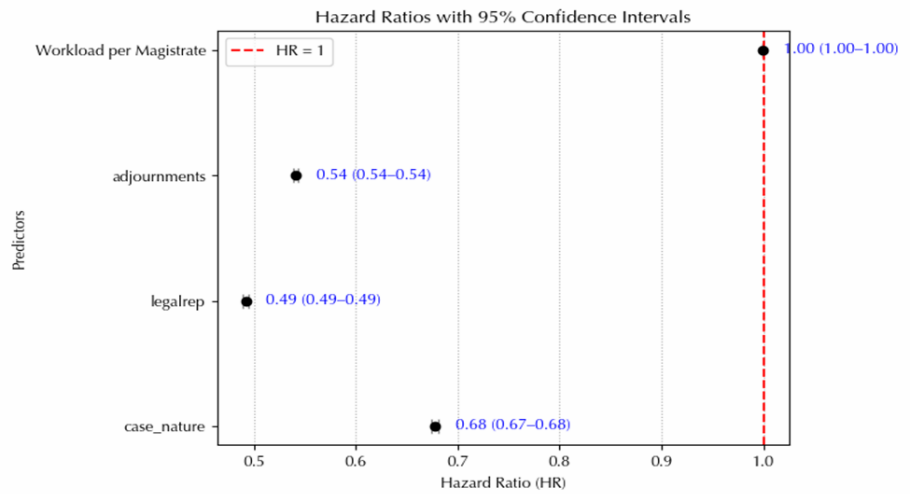

Figure 3. Hazard Ratios with 95\% Confidence Intervals

The results show that all four covariates were statistically significant:

a. Case nature: = -0.39, HR = 0.68, 95% CI [0.67, 0.68], p < .005. Civil cases were associated with a significantly lower hazard of resolution compared to criminal cases, suggesting that civil cases are approximately 32% less likely to be resolved at any given time.
b. Legal representation: = -0.71, HR = 0.49, 95% CI [0.49, 0.49], p < .005. Cases with legal representation were 51% less likely to be resolved at any given time.
c. Adjournments: = -0.61, HR = 0.54, 95% CI [0.54, 0.54], p < .005. Each additional adjournment was associated with a substantial decrease in the hazard of resolution, implying that adjournments reduce the likelihood of timely resolution by 46%.
d. Workload per Magistrate: = -0.00, HR = 1.00, 95% CI [1.00, 1.00], p < .005. While statistically significant due to the large sample size, the effect size is negligible, suggesting that within the observed range, variations in workload per magistrate did not materially influence case resolution times.

The model's concordance index of 0.73 indicates good predictive discrimination. Overall, the results reinforce the Kaplan–Meier estimates and highlight that procedural factors, particularly adjournments and the handling of civil cases, contribute substantially to judicial delays.

VI. Discussion

This section discusses the findings in relation to existing literature, judicial policy, and the strategic goals outlined in Kenya's Social Transformation through Access to Justice (STAJ) Blueprint. It further offers actionable recommendations to enhance judicial efficiency and reduce case delays based on empirical evidence from the Kaplan-Meier survival analysis and Cox Proportional Hazards modeling.

Discussion of Findings: The Cox Proportional Hazards model indicated that all four covariates were statistically significant predictors of case duration.

a. **Duration disparities between Civil and Criminal Cases:** Case nature had a negative and significant effect on resolution time = -0.39, HR = 0.68, 95% CI [0.67, 0.68], p < .005). This means civil cases were approximately 32% less likely to be resolved at any given point in time compared to criminal cases. These results reinforce prior evaluations by the Judiciary, which identified procedural inefficiencies, such as lengthy interlocutory processes and weak enforcement mechanisms, that slow down civil litigation. Globally, similar

disparities have been attributed to the constitutional urgency attached to criminal trials versus the relatively lower immediate pressure on civil matters.

b. **Impact of Legal Representation:** Legal representation was associated with a substantial reduction in the likelihood of resolution = -0.71, HR = 0.49, 95% CI [0.49, 0.49], p < .005), implying that cases with legal counsel were 51% less likely to conclude at any given time. While legal counsel ensures procedural fairness, the findings suggest that representation can also prolong timelines through strategic defenses, interlocutory applications, and adjournment requests. This observation supports findings by Mbithi et al. (2020), who noted that while legal representation improves procedural fairness, it also increases case complexity and prolongs trial timelines, especially in adversarial systems where delays may be tactically exploited.

c. **Role of Adjournments in Delays:** Adjournments had a strong negative impact on case resolution (= -0.61, HR = 0.54, 95% CI [0.54, 0.54], p < .005). Each additional adjournment reduced the likelihood of timely resolution by 46%. This confirms long-standing concerns in Kenya's judiciary that adjournments, whether due to absenteeism, procedural delays, or administrative inefficiencies, are a major driver of backlog. Comparable findings have emerged across African jurisdictions, including Uganda and Nigeria, where adjournments are consistently cited as a major source of inefficiency and delay (*UNODC, 2021; Abebe & Tsegaye, 2022)*

d. **Workload Effects on Case Duration:** Workload per magistrate, measured as the volume of cases assigned to a judicial officer, was statistically significant but with a negligible effect size (= -0.00, HR = 1.00, 95% CI [1.00, 1.00], p < .005). While higher workloads might be expected to slow resolution, the inverse relationship suggests that stations or judges handling heavier caseloads may adopt stricter time management, streamlined hearings, or prioritization strategies to meet targets. However, this efficiency gain may not be sustainable, as prolonged excessive workloads risk burnout, reduced decision quality, and long-term systemic delays, observations that have been flagged in Commonwealth judicial capacity reviews (*Commonwealth Secretariat, 2022).*

e. **Overall Model Performance:** The model's concordance index (C-Index) of 0.73 indicates good predictive discrimination. These results are consistent with Kaplan–Meier survival estimates, confirming that procedural factors, particularly adjournments and the slower handling of civil cases, are substantial contributors to judicial delays. The minimal effect of workload suggests that structural and procedural reforms may yield greater efficiency gains than mere redistribution of caseloads.

Policy Implications: This study suggests the following implications for judicial policy and practice in Kenya:

i. Data-Driven Case Management: The application of survival analysis highlights the utility of empirical modeling for workload forecasting, performance tracking, and early identification of bottlenecks.

ii. Civil Justice Reform: Civil case processes require targeted reforms such as simplified procedures, mandatory pre-trial conferencing, and increased adoption of settlements to expedite resolution.

iii. Adjournment Regulation: Stricter adjournment policies, time-bound hearing frameworks, and firm judicial enforcement mechanisms are critical, aligned with *Zero-Adjournment* commitments under the STAJ Blueprint.

iv. Balanced Legal Representation: The findings call for strategic reforms in legal aid to balance fairness with efficiency such as encouraging early mediation and regulating procedural applications.

v. Workload Redistribution: Introduce equitable workload allocation across stations and judicial officers, supported by periodic caseload audits, to prevent overburdening while maintaining efficiency.

Recommendations: Based on the findings, the following are recommended:

i. Implement Performance-Based Adjournment Monitoring: Integrate adjournment tracking into judicial performance metrics. Presiding Judges and Heads of Station should be accountable for avoidable delays.

ii. Automate Cause List and Scheduling Systems: Scale up the use of digital cause lists and scheduling tools to minimize manual processing and reduce case inactivity.

iii. Introduce Civil Fast-Track Protocols: Pilot fast-track procedures for low-value civil disputes, modeled after Small Claims Court procedures to streamline resolution.

iv. Mainstream Predictive Analytics in Case Management: Institutionalize the use of survival models, queueing theory, and risk prediction tools for workload management and resource allocation.

v. Strengthen Pre-Trial and ADR Mechanisms: Expand pre-trial screening, case conferencing, and Alternative Dispute Resolution (ADR) to shorten trial durations and reduce formal hearings.

vi. Revise Legal Aid Guidelines: Enhance legal aid frameworks to incorporate triaging, mediation, and early settlement mechanisms to avoid unnecessary trial escalation.

vii. Adopt Workload Balancing Frameworks: Establish judicial staffing norms based on caseload thresholds, and reassign cases dynamically across stations to match demand with available capacity.

Recommendations for Future Research: To extend this study's contributions, future research could explore:

i. Time-Varying Covariates: Examine how effects of key predictors,like adjournments, change over the course of a case's life.
ii. Post-Trial Case Flow: Investigate execution, appeal, and review phases to provide a fuller picture of case lifecycle dynamics.
iii. Regional and Station-Level Comparisons: Analyze variations in case durations across court stations to identify resource gaps and localized inefficiencies.
iv. Multi-State Models: Apply multi-state survival frameworks to trace stage transitions (e.*g., filing hearing judgment execution*), allowing richer modeling of judicial workflows.

VII. Declarations

Funding and Conflict of Interest: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors, and the author declares no conflicts of interest or competing interests.

Ethics Approval and Consent: Ethical clearance was obtained through formal institutional approval. The study relied exclusively on secondary, anonymised court data that did not involve direct interaction with human subjects, and all case data were anonymised to ensure confidentiality and privacy.

Data and Code Availability: The datasets analysed were derived from publicly available annual court performance reports and registry records of the Kenyan Judiciary. Processed data and the custom *Python* scripts used for hazard-based duration modelling are available from the author upon reasonable request.

Acknowledgments: The author wishes to acknowledge the valuable review and constructive feedback provided by Mr. Dominic Nyambane, Assistant Director, Directorate of Strategy, Planning and Organizational Productivity, which helped improve the quality of the manuscript.

Author Contribution: The author conceived the study, designed the methodology, conducted the statistical analysis, and drafted the manuscript. The author approved the final version of the paper.

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