

Susman – Final Paper: Review of Published Studies
ICT Investment and Judicial Services

Most areas of government and business are actively working to implement information and communication technologies (ICT). ICT include a broad range of technologies such as email, video conferencing, and electronic case management systems (ECMS) which may include electronic filing and record keeping. Due to the pandemic, this push to implement ICT has become even greater. The driver behind the push to implement ICT is based on the belief that the implementation of ICT will make the provision of the entity's services more effective and efficient. Court systems, like other government and business sectors, are undertaking and implementing ICT with the goal to improve their judicial services and, thereby, improve access to justice. While it is generally accepted that ICT improve service delivery, this paper analyzes two observational studies undertaken to determine if the adoption of ICT by court systems has an actual positive causal effect on improving the delivery judicial services and access to justice.

The first study concerned the implementation of an ECMS in the courts of the Republic of Malawi, a developing African nation (Chawinga, et al., 2019, p. 1). The Republic of Malawi's judicial system is comprised of three categories of courts: 1) one supreme court, the Supreme Court of Appeal; 2) four appellate/superior courts, collectively the High Court; and 3) subordinate trial courts, the Magistrate Courts (p. 2). Within this framework, the Malawi judicial system implemented the ECMS in 2015 in the Supreme Court of Appeal and the four courts comprising the High Court (p. 2).

The ECMS was implemented based on the widely held belief that implementation of ICT in courts improve judicial services and access to justice through clearing case backlogs, better file management, and better tracking and communication of judgments (Chawinga, et al., 2019, pp. 2-3). Since the implementation of the ECMS, however, there had been no study of the actual effects of the ECMS to determine if it had improved judicial services and access to justice (p. 3). A type of observational study, a survey, therefore, was undertaken to evaluate the implementation of the ECMS by the Malawian judicial system and its corresponding effects (p. 3). The survey-based

study was a type of observational study using primary data because the researchers measured/observed the effects of the ECMS on judicial services without attempting to change or manipulate any variables (Remler & Van Ryzin, 2015, pp. 377-378).

The study took place in the courts that had adopted the ECMS, specially, the Supreme Court of Appeal and the four courts that comprise the High Court (Chawinga, et al., 2019, p. 5). The study focused on three objectives: (1) identification of the ECMS services offered; (2) benefits gained by implementing the ECMS; and (3) identification of factors affecting the ECMS operation (p. 3). To measure these objectives and, therefore, the effectiveness of the adoption of an ECMS, researchers first had to define these constructs (p. 4). For this study, the researchers used an established model for measuring ICT effectiveness, the information systems success model (ISSM) (p. 4). Further, in recognition that Malawi is a developing nation, the ISSM measures used were limited to the following six measures: 1) system usage; 2) system quality; 3) service quality; 4) information quality; 5) user satisfaction; and 6) net benefits (pp. 4-5).

To gather the data to measure the above effectiveness criteria, the instrument the researchers used was a self-administered survey questionnaire (Chawinga, et al., 2019, p. 6). This method of survey delivery is low-cost and moderately prompt (Remler & Van Ryzin, 2015, p. 233). However, this method limits the length of the survey instrument and its ability to include complex questions (p. 233). Due to these limitations, the survey was short and primarily consisted of simple, close-ended questions (Chawinga, et al., 2019, p. 6).

In administering the survey, the researchers used a non-probability, purposive sample (Chawinga, et al., 2019, p. 5). A purposive sample is used to allow the purposive selection of individuals that have a unique characteristic, role, or perspective (Remler & Van Ryzin, 2015, p. 158). In this case, the researchers purposively selected judges, court clerks, court registrars, and court information technology (IT) staff (Chawinga, et al., 2019, p. 5). These individuals were selected due to their unique roles within the court system and their use of the ECMS (p. 5).

The researchers sent surveys to 84 individuals in the targeted sample population and received 56 responses, a 67% response rate (Chawinga, et al., 2019, p. 6). The largest response rate, 66.1%, was from those serving in the role of court clerk (p. 6). The high response rate from court clerks was likely due to the fact that they are the largest number of staff of the four purposive roles targeted for the survey (p. 6). The fewest responses received from the four targeted groups, 5.4%, was from court registrars (p. 6). This low response rate among court registrars may have been due to existing court registrars being too overburdened to respond to the survey due to the increased workload caused continuing to maintain a paper-based system as well as the ECMS (p. 7).

Based on the survey responses, the researchers analyzed each of the six above-listed ISSM measures to determine the ECMS' effectiveness. System usage was examined first (Chawinga, et al., 2019, pp. 6-7). The chart below shows services the ECMS is used for and the corresponding usage rates:

ECMS Tasks/Services	Number of Respondents Using System for the Task/Service	Percentage of Respondents Using System for the Task/Service
Register new court files	41	73.2%
File case documents	33	58.9%
Communication	31	37.5%
View case files	27	48.2%
Retrieve case documents	24	42.9%
Issue notices of court hearings & judgments	17	30.4%
Process appeals & disposition of cases	4	25%

The survey responses indicate that there is high level system usage by judicial staff, the primary target users of the ECMS (pp. 6-7). In reviewing these usage rates, it is important to note that Malawi court staff must use the ECMS, and this requirement is likely the primary reason for high system usage (p. 9). However, the office of Director of Public Prosecution (DPP) that has access to and is a user group of the ECMS was not included in the survey (p. 8). Also, notably absent from the sample surveyed and, therefore, the usage statistics are key stakeholders in the judicial system of Malawi such as the private attorneys, prison officials and police, who do not have access to or use

of the system (p. 9). Limiting review based on usage by the primary target audience, which is the criterion for system usage under the ISSM, the ECMS system is considered as having achieved its goals for this criterion (p. 7).

Next the researchers examined the following three criteria: 1) service quality which measures the support services by IT staff to ECMS users; 2) information quality which measures among other criteria if ECMS content is secure; and 3) user satisfaction (Chawinga, et al., 2019, pp. 7-10). In all three areas, the ECMS is considered as having achieved its goals for these criteria (pp. 7-10). Specifically, the results found that IT staff provided sufficient support and training to judicial staff users of the ECMS to operate the system (p. 7). Results also showed that information in the ECMS was secure in that the system prevented files in the system from being misplaced or lost (p. 10). Further, results of the survey showed judicial staff users were generally satisfied with the ECMS (p. 10).

System quality was the one area analyzed where the ECMS failed to meet the criterion measurements set out in the ISSM (Chawinga, et al., 2019, p. 7). The failure in this area was due to lack of reliable internet connection, lack of high-speed internet, frequent power outages and inadequate staffing (p. 7). However, even with the failures in this one measurement area, the ECMS was found to have net benefits to justice delivery within the Malawi judicial system (p. 10). This finding of the net benefits was based primarily on the four other ISSM criteria where the ECMS was found to have met its goals (p. 10).

Overall, the study found that implementation of the ECMS improved justice delivery in Malawi and provided net benefits in three main areas: 1) court document security; 2) improved access, retrieval and tracking of court documents; and 3) improved communications between the DPP and the courts (Chawinga, et al., 2019, p. 11). Based on these findings, the researchers conclude that this study proves the adoption of ICT by courts significantly, positively impacts judicial performance (p. 10).

This study provides a good description of the current use and effectiveness of the ECMS. In general, observational studies are particularly good at describing the current state of the issue in question (Remler & Van Ryzin, 2015, p. 378). Observational studies ability to determine causation, however, is much more limited especially if the independent variable is endogenous (p. 378). In this study, the independent variable, the adoption of the ECMS by the Malawi court system, was endogenous. While this study can provide evidence that supports there is a causal connection between the adoption of ICT by court systems and judicial performance, it cannot prove adoption of ICT causes a positive improvement in judicial performance.

Next, the generalizability of this study, the ability to generalize the survey results from the sample population to the general population, is analyzed (Remler & Van Ryzin, 2015, p. 560). The generalizability of this study's findings depends in large part of the sampling methods used for the survey and the potential for sampling bias (pp. 153-154). The preferred approach to allow for generalizability to the population is to use random sampling (p. 159). However, it is not always possible to use random sampling. In this case, the researchers utilized a nonprobability sampling method, purposive sampling, to distribute the survey questionnaire (Chawinga, et al., 2019, p. 5). The purposive method was used to allow the survey to be distributed to individuals filling four targeted roles based on the researchers' interpretation that the individuals in those roles would be in the best position to respond to the survey questions (pp. 5-6). However, this type of sampling is subject to sampling bias, specifically, coverage bias and nonresponse bias (Remler & Van Ryzin, 2015, p. 154).

Coverage bias is when the survey results are biased because the sample frame did not fully include (i.e., cover) the population (Remler & Van Ryzin, 2015, pp. 152-153). While not completely clear from the published study, it appears there were other judicial staff roles that are users of the ECMS (e.g., court reporters) beyond the four targeted roles (Chawinga, et al., 2019, p. 6). Additionally, there was at least one set of ECMS users outside of direct judicial staff, the office

of the DPP, that were not included in the sampling frame (p. 6). The lack of inclusion in the sample of the complete population of ECMS users may have distorted study's results.

In addition to coverage bias, the survey may also have suffered from nonresponse bias meaning the survey responses are not an accurate representation due to low response rates (Remler & Van Ryzin, 2015, pp. 150-152). In this case, while the overall response rate 56 returned surveys out of a total of 84 distributed surveys (67%) response rate is not problematic, there were certain categories of responders that had extremely low response rates such as registrars (Chawinga, et al., 2019, p. 6). The researchers hypothesize this low response rate may have been due to short staffing in that area (pp. 6-7). However, it may also have been based on propensity to respond, in that those most likely to respond viewed the ECMS favorably; those least likely to respond did not view the ECMS favorably. Staff may not have felt comfortable in expressing negative views on the ECMS; therefore, they did not respond. In this case, the underrepresented group, the court registrars, were the group that had their workload increased with the implementation of the ECMS (p. 7). Without the responses of this group, the overall survey results may have had a positive bias in that the ECMS system was shown to have had a more positive effective than it had in reality.

The second study examined the effects of investing in ICT in the Brazilian courts (Gomes, Alves, & Silva, 2018, p. 480). Like many court systems, the Brazilian court systems have invested greatly in ICT as one of their primary strategies to improve the judicial process (p. 480). From 2009 through 2015, Brazilian courts invested over \$2,333,200,000 in ICT (pp. 481-482). This large investment in ICT to improve judicial processes was made, in part, based on prior studies that indicated courts that had the greatest investment in ICT were the courts that experienced the greatest increases in productivity and efficiency (p. 480). However, few empirical studies have been undertaken to examine ICT investment and its effects on court performance for Brazilian courts (p. 482). The objective of this study, therefore, is to examine the potential causal effects of ICT investment on Brazilian courts' productivity (p. 480).

To study this objective the researchers posed five hypotheses, with the first hypothesis being ICT investment directly increases court productivity (Gomes, Alves, & Silva, 2018, p. 483). The other four hypotheses consider the indirect effects of ICT investment on court productivity by treating ICT investment as both a mediator and a moderator (p. 483). The researchers identified two potential common causes that effect judicial productivity: 1) court caseload; and 2) court workforce (p. 484). In the case of court caseload, which represents the amount of work for a particular court, prior studies have shown the courts with the highest caseloads are the most productive (p. 484). Similarly, in the case of workforce, which represents number of staff to do the work, courts with the largest workforce are the most productive (p. 484). With these common causes identified, the study set out to test the following four additional hypotheses: 1) ICT investment is a mediator between the relationship of caseload and productivity; 2) ICT investment positively moderates, strengthens, the caseload and productivity relationship; 3) ICT investment is a mediator between the relationship of workforce and productivity; 4) ICT investment positively moderates, strengthens, the workforce and productivity relationship (p. 484).

To evaluate these hypotheses, the researchers undertook an observational study using secondary data (Gomes, Alves, & Silva, 2018, pp. 484-485). As noted with the first study examined, this study was an observational study because researchers measured/observed the effects of ICT investment on judicial performance without attempting to change or manipulate any variables (Remler & Van Ryzin, 2015, pp. 377-378). The secondary data used for the study was obtained from the country's Justice in Numbers report, published annually by the National Justice Council (CNJ) (Gomes, Alves, & Silva, 2018, p. 485). The Justice in Numbers report is considered as the main official source for statistical data on the Brazilian courts (p. 484). Data from the Justice in Numbers report was examined for the years 2009 through 2015 (p. 485).

In using this data, the court caseload variable was measured by taking the number of pending cases for each court divided by the number of judges for each court to obtain an average

per judge caseload (Gomes, Alves, & Silva, 2018, p. 485). The court workforce variable was measured by the number of staff that directly assist the judges in performing their judicial activities (p. 485). The ICT investment variable was measured splitting it into two different variables: 1) amount of investment in ICT acquisition; and 2) amount of investment in ICT maintenance (p. 485). Using the data with these measures, the researchers undertook a hierarchical linear regression analysis to test the first hypothesis (p. 485). The other four hypotheses concerning mediation and moderation were tested by the researchers using a conditional analysis (p. 485).

In performing the hierarchical linear regression analysis, the hierarchy of the three independent, explanatory variables was chosen based on the presumed relevance of each of the variables as shown in previous studies (p. 485). The hierarchy of the three variables in the study's regression analysis was as follows: 1) court caseload variable; 2) workforce variable; and 3) ICT investment variables (acquisition, maintenance and total) (pp. 485-486). The results of the regression analysis showed there was a strong correlation between all three variables and court productivity (p. 486). Further, the court caseload variable, court workforce variable, and all three ICT investment variables were shown to be statistically significant with a p value of $< .05$. In the case of the court caseload variable, the court workforce variable, and the total ICT investment variable, all three had p values of $< .01$ (p. 486).

Overall, the hierarchical regression analysis found that each \$17.3 million increase in total ICT investment corresponded to a 14% increase in judicial productivity (Gomes, Alves, & Silva, 2018, p. 486). This result supports the first hypothesis that ICT investment directly increases court productivity (p. 486). The conditional analysis results also confirm three of the four other hypotheses. Specifically, the study results support that ICT investment acts as a mediator, or an intervenor between the variables of court caseload and workforce and the dependent variable, court productivity (p. 487). These results confirm the second and fourth hypotheses (p. 487).

Additionally, the study results support that ICT investment acts as a positive moderator between

workforce and court productivity, thus confirming hypothesis 5 (p 487). The study results, however, did not support that ICT investment positively moderates the relationship between court caseload and court productivity (p. 487). Instead, the study results show ICT investment weakens the relationship between these two variables (p. 487). The researchers propose this negative relationship may be a short-term effect due to the ICT adoption learning curve causing a short-term slow-down in court production (p. 487). An additional factor that may influence the moderator effect between court caseload and court productivity is that the investment in ICT has limited effect on the judicial activities of judges (p. 487). Overall, the study provides evidence that investment in ICT, both directly and indirectly, positively influences court performance (p. 488).

This study results show strong correlations between the three variables of interest and court productivity (Gomes, Alves, & Silva, 2018, p. 486). All three variables were shown to have statistically significant effects on court productivity (p. 486). Since the two control variables could have acted both as a common cause or an intervening cause, the researchers followed best practice by providing the results for both situations (Remler & Van Ryzin, 2015, p. 394). However, as the researchers note, a regression analysis does not prove a causal relationship (Gomes, Alves, & Silva, 2018, p. 486). Further, the results of the statistical significance tests, by themselves, do not prove causation (Remler & Van Ryzin, 2015, p. 357). Additionally, while the study did include control variables, the study results still may have been distorted due to omitted variables such as unmeasured variables or complex common causes that were not included in the analysis (Gomes, Alves, & Silva, 2018, p. 486). This type of omitted variable bias may substantially change the relationship between investment in ICT and court productivity by changing the magnitude of the relationship or reversing the relationship (Remler & Van Ryzin, 2015, p. 388). The researchers noted the possibility that the relationship between ICT investment and court productivity may be reversed or bidirectional (Gomes, Alves, & Silva, 2018, p. 487). A further limit, also noted by the researchers, is that the regression analysis assumes the relationship between ICT investment and

court productivity is a positive linear relationship. With this assumption there is the implication that court productivity will continue to improve with greater ICT investment (p. 486). This assumption, however, does not consider that the productivity of the courts has a limit, increased productivity indefinitely is not possible (p. 486).

With respect to the generalizability of the study results, the study utilized a large sample of data covering a seven-year period for all labor, state, and federal courts in Brazil (Gomes, Alves, & Silva, 2018, p. 480). This comprehensive data source in terms of coverage and time supports the generalizability of the results of this study to the broader population. Further, the findings of this study are consistent with the findings of previous studies regarding the strong positive correlation between investment in ICT and court productivity (p. 482). This study and prior studies show a pattern of analogous results which supports this study's generalizability (Remler & Van Ryzin, 2015, p. 143). Further, relationships, like the one shown between ICT investment and court productivity, are more generalizable than other types of descriptive findings (p. 144).

Both studies provided evidence of a strong correlation between court investment in ICT and improved court services and access to justice. Further, both studies were observational studies with the Malawi study using primary data collected from a survey of court personnel and the Brazil study using secondary data. As observational studies, both have limited ability to provide proof causation (Remler & Van Ryzin, 2015, p. 397). Based on the different means and methods used in the studies both had different limitations and weaknesses. The Brazilian study's authors included more transparent acknowledgements of the limitations of its study than did the Malawi study's authors. The Malawi study's authors tended to use more conclusive, less cautious, language when reporting its study's results and conclusions. Despite the weaknesses of each study and the inherent limitations of observational studies proving causation, both studies added further evidence to support a positive, causal relationship between court investment in ICT and improved court services and access to justice.

References

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