An implementation of case based reasoning in enhancing the process of stare decisis on rape cases in Zimbabwe’s regional courts.

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DEDICATION

This thesis is dedicated to my family, friends my wife to be as well as my children to be.
ACKNOWLEDGEMENT

Firstly I would like to thank the Lord Almighty God for protecting me, and giving me such a wonderful opportunity to be here through his unmerited favor and grace. It’s all because of God that I reached this far.

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ABSTRACT

For the past 2 decades the use of artificial intelligence to augment human efforts has become a growing field. In that respect artificial intelligence involves such aspects like rule-based reasoning, neural networks, biometrics as well as case based reasoning just to name but a few. Applications of these technologies have been in all sectors of industry and the economy including the judicial sector as well. In the judiciary sector artificial intelligence has been used to help lawyers build cases, verify case evidence, create a favorable atmosphere for the victim to interact fearlessly with the jury among some of the most important uses. This thesis explores the use of case based reasoning in the judiciary field, whereby an e-court system was designed to help in augmenting the magistrate’s efforts during the litigation process on rape cases using stare decisis. The need for an e-court system comes as a measure to address the challenges currently looming the Zimbabwean regional courts which includes the speculation of bias, inconsistencies, as well as the long time it takes during the litigation procedure. In testing the applicability of case based reasoning on stare decisis on rape cases the researcher exposed the system to experts in the judiciary field and their views on the system were captured and analyzed there by drawing some inference on whether the use of case based reasoning is a useful technique when handling rape cases. More so the e-court system was also created as a mechanism to help in safe case documentation storage and easy case documentation retrieval.

DEFINITION OF TERMS

1. **Case Based Reasoning (CBR)** - An artificial intelligence concept in which new problems are solved basing on solutions of similar past problems.
2. **Stare decisis** - A concept by which points in litigation are decided using precedents.
3. **Precedent** - a previous experience or action that is considered as an illustration or guide to be considered in succeeding comparable circumstances
4. **Regional Magistrate** - A civil officer or lay judge who administers the law at a regional court
5. **E-Court System** - A computer based online system that augments or performs the processes done by a judiciary worker.
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CHAPTER ONE: PROBLEM IDENTIFICATION

1.0 INTRODUCTION

The processes of emulating the problem solving techniques used by human beings in solving societal problems using computers has become a common and very handy practice in the technological world. Technologies like biometrics, neural networks as well as case based reasoning are just but a few techniques in which the technological world adopts the human nature in solving problems. In that respect case based reasoning is a technique in which a person or a machine solves current problems by means of adapting solutions that were used to solve old problem, that is it offers a reasoning paradigm that is people routinely solve their problems.

According to Zimbabwe National Statistics (ZimStat)’s preliminary statistics of the first quarter of 2014, at least one woman is raped in Zimbabwe in every 90 minutes. According to the Rape Abuse and Incest National Network (RAINN), 97 % of all rape offenders are never punished or never face the consequences of the crime that they commit. Whilst according to ZimStat a rise with an average of 10% each year has been noted on rape and sexual offence crimes since 2010, a lot is left to be desired when reports of Zimbabwean jails overflowing with criminals are still yet to be head in Zimbabwe. Fairness doesn’t only apply to the victim; it also applies on the side of the offender that is an offender should not be overcharged for the crimes that they commit.

According to the Oxford dictionary stare decisis is a legal principle of determining points in litigation according precedent. In that respect, precedent is a previous case or legal decision that maybe or must be followed in subsequent similar cases. Other than just using legislation, in Zimbabwe it is best practice to implement stare decisis whenever it is applicable and to make sure that precedent which correctly or best suits the current case at hand is selected, a more comprehensive and more reliable way to select the precedent need to be put in place. The current situation at hand bases on human judgment on selecting the perfect precedent, this is highly susceptible to bias and inconsistences. In a way to curb the biases and inconsistences the author is applying the technique of artificial intelligence, case based reasoning to be more specific as a
way of improving the selection criteria on the precedent thereby having a more realistic way to represent rape cases in Zimbabwe’s regional courts.

1.1 BACKGROUND OF STUDY

With a notable rise in the number of rape cases annually in Zimbabwe, a lot is left to be desired on the efficiency of a completely human based litigation system in deducing a sentence which is the current case in Zimbabwe’s regional courts (Madhuku 2010) postulated that “Under Zimbabwean and South African law, the common law is made up of two components of non-statutory law, namely

1) A collection of rules and principles made by judges in previous cases.
2) Rules and principles contained in that portion of the body of law called ‘Roman Dutch law’ that is not reflected in any previous court decision”. From the above statements we can deduce the importance of the law of precedents in as far as the Zimbabwe judiciary is concerned and hence the need to put in place mechanisms to make it more effective and handier in as far as the litigation process in courts is concerned. Rape case re-appeals are a clear indication that the current system being used in the judiciary is subject to bias and that’s the reason why the author had to device a more comprehensive way that will in a way help in curbing bias.

Currently the judge can just look at the facts raised on the case and select a case model using those facts and pass judgment. This is liable to bias, inconsistencies and is likely to be a slow and tedious process hence the need to automate this process leaving the judge with only the task of analyzing facts gathered by the system and come up with a sound decision. Since we have so many regional courts in Zimbabwe dealing with rape cases, there is the need to access the system via online mechanisms so that the information can be accessed from a central repository to maintain consistence and uniformity of the litigation process.

1.2 PROBLEM STATEMENT

Regional courts in Zimbabwe make use of a completely human based litigation process which is slow, and has the problem of not factoring in all factors related to a case when trying to apply the
law of precedent. This makes the litigation process prone to bias and inconsistencies that comes up with the way the human beings work. In that respect, human beings get tired, they get weary and there decision making is subject to being inconsistent basing on their mood at a that particular moment as well as subject to preceding events.

In a bid to avoid factoring in the problems associated with the human nature in arriving at a decision, an independent mechanism that will augment human efforts need to be put in place. More-so a human being can never remember all the cases that can be applicable to the current case, hence with the diversity of cases being tried there is need to put in place mechanisms that will save human beings the headache of knowing cases by head, or the trouble of searching for cases using key words only from the web.

A notable rise in rape cases has been observed in Zimbabwe owing to the economic constraints hence the need to come up with a system which will help in selecting a proper model of the current case which will help ease decision making there by reducing the issue of back logs at courts there by delivering justice to the people who deserves it in a fast way. Easy access to case material needs to be put in place thereby avoiding the issue of banking with hard copy files or relying on the internet for referencing purposes hence the need to implement a system that will keep the case documentation safe as well as improve the accessibility of case materials to all courts in Zimbabwe.

1.3 RESEARCH OBJECTIVES

1) To design and demonstrate an online system that makes use of case based reasoning to reduce bias on the aspect of stare decisis on rape cases.
2) To demonstrate the improvement of the knowledge base thereby widening the decision making pool through building the knowledge base with current cases.
3) To demonstrate the use of a mechanism that will assist the magistrate in deducing the final verdict.
4) To demonstrate the use of a case documentation upload platform for easy access to case files.
5) To investigate and evaluate the significance of the e-court system in decision making
1.4 RESEARCH QUESTIONS

The main idea behind the research is to address the problems raised in the problem definition and try to model a system that will give reliable answers to the following questions:

1) Is case based reasoning applicable in performing stare decisis on rape cases?
2) Does case based reasoning reduce bias in reference case selection?
3) To what extend can we bank on case based reasoning in providing sentences which are consistent?

1.5 JUSTIFICATIONS

The current rape case litigation system has shown some bit of loopholes. More so a notable increase in the number of re-appeals on rape cases shows that there is something lacking in the current system being used. The centralized system will not only benefit one regional court but will be used as a benchmark for uniformity in Zimbabwe’s regional courts on how rape cases should be handled. Elimination of manual selection of reference cases and the use of the proposed judgment functionality will be of paramount importance in improving efficiency, reducing time taken in reaching a decision as well as curbing biases that can be brought about through voluntary or involuntary human errors.

More so instead of taking some time navigating through files in a bid to retrieve documentation related to a case, the proposed system will ease the navigation of case documentation through attaching a case’s documentation to a case through the case documentation upload functionality. This will also be used as a measure of safeguarding the integrity of case files since no alterations will be allowed on the case to unauthorized users and though the use of role based authentication someone will be liable to all changes done on the case.

To add on to the many merits that the author’s proposal will bring to the judiciary, there is the issue of improving the speed of the litigation process. The system will do much of the analysis of the raised facts and select close cases that will be used as a guideline to the current case. This
will in a way improve the speed at which the judiciary procedure takes place in that it will eliminate some manual processes like having to go through the whole document in trying to find related facts in a case. This will reduce the problem of back logs thereby rendering justice in a fast and more effective way. Throughout the world, communication and information technologies are generating a new revolution already as significant and far-reaching as those of old times.

Technological advancements now enables us to store, retrieve, process and communicate information in whatever form it may take, unlimited by distance, volume and time. This revolution adds huge new capacities to human intelligence and constitutes a resource which changes the way we work together and the way we live together. Indeed the advancement in technologies like case based reasoning has unleashed new capabilities in the way things are done including how things are handled in the judiciary sector.
CHAPTER 2: LITERATURE REVIEW

2.0 INTRODUCTION

This chapter takes a look at what has been covered so far with regards to enhancing decision making in courts. It also takes a look at other areas of study in which case based reasoning has been implemented and the advantages it has brought to the technological world. Justice Fredrick Egonda-Ntende in 2005 advocated that, “if the way people work, live, and play is changing then beyond no doubt would this affect the administration of justice as it is part of this changing world and the Judiciary ought to take advantage of the new developments that may enhance the delivery of its own services.” He also added that, ‘The changes that come with the availing of information to all, or rather the potential availability of information to all, within the information age, will no doubt affect how part of our population relates to the courts”, which is a clear indicator that technological advancements are now a necessity to all sectors of industry including the judiciary sector.

2.1 RAPE CASES AND STARE DECISIS

(Feltoe 2005) Defines rape as, “Intentional, unlawful sexual intercourse by a male over 12 years of age, with a woman without her consent.” Although rape is regarded as a dreaded offence that has ruined the lives of many promising persons in society, (Jordan 2004) went on to say “Few victims approach the police, and even fewer cases proceed to the point of prosecution”. This is a clear indication that in as much as the process of stare decisis is being implemented in courts there is room that not all factors are being factored in during the decision making process resulting in many offenders escaping the wrath of the law. (Jordan 2004) further added that “Many studies have been conducted of rape cases which resulted in prosecution, examining in particular the progress of such cases through the court system, and the ways in which victims of rape experience trial procedures (for example, Adler, 1987; Lees, 1997; van de Zandt, 1998)”, this indicates that manual implementation of the litigation process has a greater bearing on the speed at which justice is delivered hence the need to automate some of the process in a way to reduce the number of back logs hence avoiding further damage to society. The proposed
system will come with the benefits of speeding up the litigation process as well as with the advantage of factoring in all possible factors that can be used in deciding the cases to be used during the stare decisis process. (Anderlini 2010) Voiced that, “Precedents, if they have evolved in the right direction" will often bind the Courts to avoid the temptation to be present-biased”.

2.2 GENERAL OVERVIEW OF A CASE BASED REASONING (CBR) SYSTEM.

The process of using precedents to decide the outcome of the current case is the process of stare decisis. If precedents help in reducing bias then well selected precedents will go a long way in further reducing bias. In that respect the author’s is mainly focusing on modeling a system that helps in reducing bias through factoring all facts in the selection of good precedents.

(Sankar & Simon 2004) Postulates that,” CBR can be declared also as a model of reasoning that incorporates problem solving, understanding, and learning, and integrates all of them with memory processes. These tasks are performed using typical situations called cases, already experienced by a system”. (Sankar & Simon 2004) Suggested that, “A case may be defined as a contextualized piece of knowledge representing an experience that teaches a lesson fundamental to achieving the goals of the system”

Case based reasoning is a technology which basically involves four basic main steps, that is:

1) RETRIEVE- Get the most similar case
2) REUSE- Make use of the information in the retrieved case to solve the problem
3) REVISE- Analyze the proposed solution to find out if no additions or subtractions should be effected
4) RETAIN- Keep the solved case which may be helpful in solving future cases.

For a system to be referred to as a case based reasoning system, the above steps have to be followed in the order they are presented. As illustrated by (Aamodt & Plaza 1994), below is a diagram showing the general overview of a Case Based reasoning system.
Figure 2.2-1 diagrammatically explains the general architecture of a case based reasoning system. As said earlier on, it involves four basic steps that is retrieve, reuse, revise and retain.
2.3 ANALYSIS OF THE CURRENT SYSTEM IN USE

The main agenda of the judiciary is to hear and determine cases in a fair and timely manner to both the victim and the offender. In that respect the process taken to reach the final sentence must be efficient, effective as well as equitable. The system must be efficient in the sense that it should avoid unnecessary wastage of resources which includes time through unnecessary delays, effective in that the system should achieve its intended purpose as well as equitability in that it should be just as well to all people irrespective of whom they are. In that respect with human judgment only a lot of factors will make it hard if not impossible to achieve the above three goals on all rape cases, thereby calling for the need to engage computer systems that will help enhance decision making.

(Schmatt 2011) postulates that “A major function of the Judicial Commission of New South Wales under the Judicial Officers Act is assisting courts to achieve consistency in approach in the sentencing of offenders. The Commission's objectives in this area are to reduce unjustified disparities in sentences imposed by the courts, to improve sentencing efficiency generally, and to reduce the number of appeals against sentences, thereby releasing valuable resources which can be redeployed to reduce court delays.” In that respect human beings by nature and due to numerous factors can never be consistent.

The current system in use in deciding the verdict on rape cases is more human centered that is much of the processes towards reaching the verdict are done by the magistrate. The process starts with the clerk of court assigning judgment numbers and court numbers to court cases. Each case goes into a hearing whereby the magistrate gathers all facts relating to the current case. After gathering facts the magistrate goes on to analyze the facts, looking also at previous cases. This process of analyzing facts is a very tedious procedure since it involves reading through hard copy case files from the court’s library or reading through soft copy case files from such sites like http://www.law.co.zw. Case sites like http://www.law.co.zw are very helpful, but the challenge with them is that they don’t incorporate all facts relating to the current case, hence giving the magistrate a more tedious assignment of using his mind to try and select a case that best suits the current case.
To add up to the above point, due to the numerous and time consuming processes required in reaching the verdict, the Zimbabwe legislature then set the maximum time required to reach a verdict to three month. However the author believes that if a case based reasoning system is used instead, not only will it reduce the time taken to reach the verdict, but it will also help in improving consistency by means of factoring all facts relating to the case in question. The diagram below is an illustration of the current judiciary system being used on stare decisis on rape cases in Zimbabwe:

![Diagram of current judiciary system](image)

Figure 2.3-1 Overview of current judiciary system

### 2.3.1 Technology in The Judiciary

According to [Unsupported source type (InternetSite) for source OEC13.], “There is wide scope for further informatisation of court activities in OECD (Organization for Economic Co-operation and Development) countries. The majority of courts in OECD countries have electronic forms, websites and electronic registers, but many countries either have not yet
implemented online facilities and the possibility for lawyers to follow up cases online, or have done so only in a minority of courts. Investments in court computerisation are related with higher productivity of judges (measured as cases solved per judge), especially in countries where computer literacy is widespread facilitating the take-up of ICT-based opportunities.” This is a clear indication that the introduction of information technology can be a handy tool in improving the effectiveness. In Zimbabwean courts they still have a long way to go in implementing technology in courts. Take for instance the case file handling is still being done manually hence the need for the introduction of case uploading functionality which allows for easy storage and retrieval of case files.

Not only will the introduction of information technology in Zimbabwean courts improve effectiveness, it also improves the integrity of case files and improves maintainability of data as well as protection of files from natural hazards through the use of constant backups. Use of ICT in courts has also been known as a tool which reduces the time it takes to reach justice. This is a clear indication that computer systems are very handy in reducing the time it takes to reach justice.

Systems like the JIRS (Judiciary Information Research System) is a computerized database containing legally and statistically relevant information on sentencing and other legal information to help the judiciary to make better decisions. It was developed by the Judicial Commission of New South Wales under the guidance of experienced judicial personnel. The JIRS paved way as one of the world leaders in computerized sentence databases and knowledge management.

(Schmatt 2011), added that, “The object of the sentencing component in JIRS is not to limit the sentencing discretion of each judicial officer. Its purpose is to provide judicial officers with rapid and easy access to the collective wisdom of the courts in order to assist them with their sentencing decisions.” The system was used to provide primary research resources such as judgments and legislation, linked to secondary research materials, like summaries of judgments, commentaries, and sentencing statistics.

In a bid to incorporate technology in the judiciary, previous works have already been implemented but mainly the works tend to focus much on data management and elimination of
paperwork in the judiciary. Take for example the e-Courts systems which comprises of many services which the author is going to explain in detail, its mainly focusing on data management and passing information to the general public not on how mainly on enhancing decision making. The systems comprises of functionalities like the Web Civil local which contains both disposed and active local civil cases in the USA, users can search for cases of their interest. It also comprises of e-Track which is a platform by which users get notifications if progress resumes on cases of their interest. This is more general public centric not specifically considering how the sentence or court procedure has an impact on the offender or the victim.

Most recent works in technology in the judiciary includes the currently being implemented NH e-Courts project, which is a 5 year project which started in 2011. The project’s core initiative is electronic case filling. Its primary aspects includes, electronic filing of case documents, electronic signatures and payments of fines and fees and electronic notices to parties. Other systems which are not part of the NH e-Courts system but form a bigger picture of the e-Courts systems include the Jury management system which was implemented in August 2013. The main focus of this system is to eliminate paper work as much as possible through the introduction of online questionnaires, automated mailing as well as enhanced jury selection.

As part of the big picture of e-Courts we find the implementation of NH Trial Court Call center in New York which provides callers with case information from the judicial branch electronic case management system and procedural information from a variety of resources including the judicial branch website. From the analysis of this system again we discover that it is mainly focusing on dispersing information to the general public and not directly aiding to the decision making process on court procedures. This leaves the gap of aiding decision making in courts unfilled which calls for a different approach or different technology which will focus more on the litigation process being very pertinent.

More works include the e-Court* Kokua system which was implemented in Hawaii, which just likes its rivals is a system mainly focusing on case management and accessing of case data by users which may include the general public. Most systems in the judiciary are currently addressing the problem of electronic access to data which leaves the decision making side of the judiciary sector unexplored.
Sentenzi Online (Judgments Online) is one of the services that falls under the e-Government initiative of the country Malta. It is offered by the Ministry for Justice, Dialogue and the Family so that more people will benefit from the use of information technology and communication services. Below is a diagram that is a screen short from the Sentenzi system, which shows one of the system’s main functionalities that is to search for cases basing on a certain criteria.

The image shown in Figure 2.3-2 is a screen shot which shows a list of cases extracted from the database basing on a certain criteria but that doesn’t mean in any way that the cases are related. In that respect the system is more like an informative system to whoever will be concerned.
In Zimbabwe technology is finding its way into the judiciary field with introduction of case management sites like http://www.law.co.zw. The problem with this site is it is not being updated and also its purpose is only to give users an insight of what is going on in the country in as much as court cases are involved. In that respect users have the opportunity to download and view case documentation. In that same respect the author is trying to make case management easier through tying a case to its documentation that is if one searches a case of interest, they will have the privilege to view the documentation associated with that case as well.

Case based reasoning has also found its way in the legal and judicial sectors with the implementation of such systems like HYPO and CATO. According to (Aleven & Ashley 1992) HYPO is a case based reasoning system that models how attorneys argue when confronted with a case, either real or hypothetical, whereas according to (Aleven 1997) CATO is an intelligent learning environment that helps law students to learn the basic skills of building an argument when leading a case.

2.3.2 Overview of Case Based Reasoning Systems

Early development works in case based reasoning saw the development of such generic systems like the FREE CRB GUI system, which was a java version of case based reasoning. The system would create cases and as a result get the closest matches based on the criteria used. Free CRB GUI was not specific to any domain, it was generic but challenges were in trying to modify it to suit a specific domain. The developers said it was open source but it turned out to be the other way round since some of the source code was hidden and it wasn't an easy task for developers to tunnel it in a way they wanted.

Moreover one more challenge with FREE CRB GUI was not user friendly and it contained some strong jargon which doesn't go very well with general users. With a fast growing need for computing on the rise these days, developers need to create systems which are easy to use and easy to understand. So instead of banking on already existing case based reasoning applications, the researcher had to develop his own web based case based reasoning system in a bid to move side by side with current trends in the software development circles as well as in providing a comprehensive system that will fit perfectly well in the suggested domain.
In analyzing whether case based reasoning should be used in the judiciary systems and legal set ups, Ashley poses a question “should researchers in a civil law jurisdiction pursue work on implementing AI & the Law models of case-based legal reasoning in a civil law context?” To that question his answer was “the answer may well be, “Yes”!” (Ashley 2004) The above statement shows that there is a possibility that case based reasoning can be a handy tool in enhancing problem solving in the judiciary sector.
CHAPTER 3: RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter summarizes the methodology used to carry out the research as well as the techniques used to gather the information which helped in modeling the system. The methodology was used to create an e-court system specifically for stare decisis on rape cases at regional courts. Many methods were used to gather data during the pre-implementation process. The main methods that were used are qualitative methods such as interviews and direct observations.

3.1 RESEARCH DESIGN

3.1.1 Pre-implementation Literature Survey

The current system being used in selecting reference cases and therefore deducing a sentence was studied by the researcher. The merits and demerits of such a system were also analyzed to see if improvements are needed in the performance of the current system, the efficiency as well as its effectiveness in relation to bias. The researcher also went further to look at systems being used in other countries and how relevant they can be in solving the current problems being faced by Zimbabwean courts. More so the review of the Zimbabwe Criminal Law Guide was very handy in coming up with the main parameters that are considered when looking at a rape case.

3.1.2 Pre-implementation Interview Survey

The researcher conducted some one-on-one interviews with experts in the judiciary field. Experts included lawyers which made up a significant percentage of the fifteen people who were interviewed. Out of the fifteen people who were interviewed, six were fully qualified lawyers who have been in the judiciary for a minimum of three years. Other interviewees included prosecutors and chief prosecutors most of them with the Bindura regional court, as well as top magistrates.
Efforts to interview a good number of magistrates during the pre-implementation phase were in vain since most of the targeted persons were not available for questioning due to work commitments. The interviews were conducted using open questions such as “What mechanisms does the judge use to decide which reference cases to take? “This gave the researcher an overview of how rape cases are handled and the mechanisms used to deduce a sentence with many recognizing the importance of previous cases in deducing sentences. However some points which included how the prosecutor interrogates the suspect among others were irrelevant to the study and this made the interviews unnecessarily longer. The main purpose of the pre-implementation survey was to understand the business processes done during the litigation process on rape cases.

From the interviews conducted it was noted that when a magistrate wants to implement the process of stare decisis they suspend a case and go and study cases related with the current case from the case repository, which is a folder with .doc and .docx files of all cases that can be used as precedents. This has two main challenges associated with it, the first challenge being the challenge of speed on the litigation process since the case has to be suspended for a while until the magistrate gathers enough information from the precedent cases. The second challenge is on maintaining consistency. Factoring in all aspects that are subject to the current case is a great challenge when the human mind is being used without any augmentation from an automated system. This comes due to the fact that the human brain is subject to being tired and can be affected by other factors like social factors.

3.1.3 Pre-implementation Direct Observations

The researcher attended four court proceedings in which rape cases where being tried. In a bid to gather more information and gain more understanding the researcher had a feel of the court proceedings and managed to observe from an audience’s view the types of questions that were asked, how they were answered and the notes that were taken down by the court personnel which helped in analyzing the current case. The researcher wanted to go a step further by taking pictures of the proceedings as well as recording audios of the court proceedings but unfortunately that was prohibited due to some rules and regulations which govern confidentiality in courts.
3.1.4 Combination of Interviews and Observations

This helped the researcher to have a wide base of information gathered using different methodologies rather than banking on one data gathering methodology. The researcher was much more concerned with qualitative analysis rather than quantitative analysis.

3.2 POPULATION AND SAMPLING

In Zimbabwe regional courts are sub-classed into 3 different regions, that is the Eastern region, the Central region as well as the Western region. Due to financial challenges the researcher chose three regional courts, that is the Mutare, Harare as well as the Bindura regional courts for the demonstration. The researcher based on the assumption that the court procedures at all the regional courts are the same. At most five regional magistrates can be found at one regional court in Zimbabwe. All in all thirty participants were chosen to participate in the demonstration. The researcher demonstrated the system at three different stations that is the Mutare regional court, Harare regional court as well as the Bindura regional court. Participants are classified into four main categories that are lawyers, student lawyers, magistrates as well as prosecutors.
3.3 ABSTRACT SYSTEM OVERVIEW FOR NEW E-COURT SYSTEM

According to the Figure 3.3-1 above, the system is sub divided into four main parts the first one being the Web portal. The web portal is the user interface which is accessed by authenticated users via a web browser of their own choice. The portal will then interact with the system client component which in turn links the web browser to the system business side. The portal basically has four main functionalities.

1) Provides an interface to record new cases that is data entry functionality
2) Provides an interface to upload case documentation
3) Provides an interface to view and edit both cases and case documentation
4) Provides the platform to input parameters of a current case, thereby retrieving a set of reference cases as well as give a proposed judgment basing on the gathered facts.

The business side defines the domain of the system as well as mapping the entities of the system to their respective tables in the database. This component is actually the core or heart of the system and it links the system to both the database and the case repository. When a new case is being handled the judge will put the parameters relating to the case on the “process new case” form, the system will then retrieve the closest matches of the current case from the database and calculate the suggested sentence. When the current case is approved as a new reference case then on approval the case is added to the database for selection on upcoming cases.

3.3.1 How Case Based Reasoning (CRB) Was Implemented In The e-court System.

The author made use of a collection of old rape cases retrieved from the Bindura regional court to create a database of reference cases. The collection of cases formed the basis for the retrieval process of the CBR life cycle. The author modeled the system in such a manner that it collects a summary of the main points of a case which is used do comparisons with the parameters of the current case to find out which cases matches or closely matches the current case.

The cycle then goes on to the reuse phase whereby the retrieved cases are analyzed and facts about them are used to try and solve the current case. This process produces the suggested solution and in most cases this won’t be final solution to the problem. According to the system design the author modeled the system to calculate the average of the sentences from the suggested reference cases. It is up to the judge and his panel to make the suggested sentence as final. More so Case based reasoning doesn’t select the exact match only, but it selects a closest match in the case of no exact match being found. In that respect the four best cases were selected in the event of many matches being found basing on the match score. For example, out of a total number of eighteen attributes, twelve attributes may match thereby coming up with a 72% percentage match. Owing to that, a case selected if it has twelve attributes matching with the current case then four attributes will be different.

After the reuse process the cycle moves on to the revise stage, whereby the suggested solution is analyzed to find out if it should be passed as the final judgment. This is more like a fitness test to
find out if the suggested solution is fair enough compared to the state of the crime. During the fitness test that’s where the magistrate may either take the case with the highest percentage match or take the average of all the selected precedents. In most cases the suggested solution needs to be panel beaten in order to suit the current case.

More so circumstances where we can have cases having the same percentage match can be possible. This can be attributed to the fact that all attributes were given a uniform priority score of one. So whenever an attribute in the current case matches an attribute in a selected case, the priority of the selected case increases by one; but this doesn’t necessarily mean that all attributes on a rape case have an equal priority. In that respect attributes like infection of HIV have higher priorities but the priority is not measurable in terms of scores. So in terms of matching percentage scores it is the duty of the magistrate to then analyze the matching attributes and find out if there are attributes that have more weight that will be matching.

After the solution has been revised, the case then qualifies to be added in the case base so that it can be considered as a reference case. However due to rules and regulations that govern how cases are tried in the country, for case to be approved as reference case a higher court should approve it as a reference case. So according to the author’s model, all tried cases are save somewhere in the database where only after approval that’s when they can be regarded as reference cases.
3.3.2 Use Case Diagrams

![Use Case Diagram for the E-court System User in General]

Figure 3.3-2 Use Case Diagram for the E-court System User in General
Figure 3.3-3 System Administrator Use Case on E-court System
3.4 FLOW CHARTS

3.4.1 Enter Reference Case Data

Figure 3.4-1 Precedents Data Entry Flow Diagram
3.4.2 Precedents Data Retrieval Use Case

Figure 3.4-2 Precedents Retrieval and Deduction of Suggested Sentence
3.5 SYSTEM USAGE SCENARIOS

The user interface was designed using the apache wicket web development tool coupled with the use of the twitter bootstrap tool for beautification purposed.

3.5.1 Login screen

![E-Court System Login Page](image)

The screen in Figure 3.6-1 above is the first screen that the user encounters upon running the system. Basing on the user logged in as this will lead to the respective home page. In that respect
the home page for the systems administrator is different from that one for any other user in that it consists of the Manage User tab which cannot be found on any other page.

3.5.2 System Administrator Home Page

Figure 3.5-2 System Administrator's Home Page
3.5.3 Clerk-Of-Court home Page

Figure 3.5-2 General User Home Page
3.5.4 Data Entry Screen

![Data Entry Screen](image)

Figure 3.5-3 Data Entry Page
3.5.5 Case File Upload Screen

Figure 3.5-4 File Upload Page
3.5.6 Case Processing Page

Figure 3.5-5 New Case Processing Page
3.5.7 Precedent Cases Results Page

![Precedent Cases Table]

Figure 3.5-6 Case Processing Output Page

3.5.8 System Security

In order to avoid the use of plain text passwords the author implemented some salts. A salt is a piece of additional text that is added to a password before hashing it. In that respect the author used the user’s email address as the salt. The SHA-1 hashing algorithm was used to hash the passwords and below is a diagram which shows the password table:
3.6 SOFTWARE DEVELOPMENT TOOLS

1. Netbeans 7.3 IDE
2. Maven Build System
3. JPA API and Hibernate Persistence framework
4. Spring Framework
5. Wicket framework
6. MySQL database
7. Twitter Bootstrap
8. Apache Tomcat

3.6.1 Netbeans 7.3 IDE
Netbeans is an integrated development environment (IDE) for developing primarily with Java, but also with other languages, in particular PHP, C/C++, and HTML5. It is also an application platform framework for Java desktop applications and others. The IDE was used to develop all
the components of the project since it is java based and the Netbeans IDE has support for all the frameworks that were used within the project.

3.6.2 Maven Build System
It is a tool that is used to build and manage Java-based programs. Maven's primary goal is to allow a developer to comprehend the complete state of a development effort in the shortest period of time. It is based on the Project Object Model concept, which is an XML file which guides the structure of a project and its dependences. Maven was used to create a uniform build of the whole system as well as to manage all the dependences of the system.

3.6.3 JPA API and Hibernate Persistence framework
JPA is a java based application programming interface which helps in the management of relational data in Java applications. Within the JPA API is also another language known as the Java Persistence Query Language (JPQL) which in this case was used to create abstract entity based queries on the relational database other than using traditional implementation specific languages like SQL. Hibernate is a piece of software that facilitates object relational mapping. That is it represents and converts data between the database and the application. The processes that hibernate facilitates are illustrated in the diagram below:

![Figure 3.6-1 Hibernate ORM Architecture](image-url)
3.6.4 **Spring Framework**
The Spring Framework is a Java based platform that provides an infrastructure support for developing Java applications. Spring handles the infrastructure so you can focus on your application. Spring was used to manage the creation and destruction of components during the application’s life cycle. The spring framework was mainly used to build the logic of the application and to model the domain of the application. In short it was used to model the back end of the application.

3.6.5 **Wicket Framework**
Apache Wicket is a lightweight component-based web application framework for the Java programming language conceptually similar to Java Server Faces and Tapestry. The framework was used to build the application’s web portal which is what the user use to communicate with the system. In other words the wicket framework was used to develop the front end of the system.

3.6.6 **MySQL Database**
MySQL is an open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). The researcher used the database to store the cases in a way that they become easy to retrieve. The data was stored in the form of relations and since the DBMS is light weight it could run on the researcher’s laptop comfortably alongside with other applications.

3.6.7 **Twitter Bootstrap**
Bootstrap is an open-source collection of tools used in the creation of websites and web applications. It contains HTML and CSS based design templates that can be used for typography, forms, navigation, buttons and other interface components, as well as some JavaScript extensions which are usually optional. The framework aims at easing web development mainly targeting on the look-ability of the user interface. The researcher used this framework on beautifying the user interface and saving time due to using already defined java scripts as well as cascading style sheets.
3.6.8 Apache Tomcat
Usually called Tomcat, this is an open source web server which was used to house the application. The author chose this web server due to its ease in setting up, ability to run on different OS platforms as well as its ability to provide a "pure Java" HTTP web server environment for Java applications to be run in.
CHAPTER 4: DATA ANALYSIS PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 INTRODUCTION

This chapter addresses the presentation and analysis of data gathered as results of the research. This will give an overview and conclusion of how effective the e-court system is on addressing rape cases using the stare decisis approach. The data collection procedure was achieved through the participation of 30 individuals. All the participants were well versed with the procedures that take place during the litigation process on rape cases that is all the participants are currently employed in the judiciary sector or they were once employed in the judiciary sector and the remainder is still practicing.

4.1 FINDINGS FROM SYSTEM TESTING

The author made use of a case testing strategy to find how close the retrieved cases match the criteria case.

Table 4.1-1 Table of attributes used to test e-court system

<table>
<thead>
<tr>
<th>attribute</th>
<th>value</th>
</tr>
</thead>
<tbody>
<tr>
<td>accomplice</td>
<td>criminalBelow16</td>
</tr>
<tr>
<td>assault</td>
<td>Evidence</td>
</tr>
<tr>
<td>attemptedRape</td>
<td>falseRepresentation</td>
</tr>
<tr>
<td>characterOfRespondent</td>
<td>Penetration</td>
</tr>
<tr>
<td>consent</td>
<td>Pregnancy</td>
</tr>
<tr>
<td>counts</td>
<td>solicitingOrEnticing</td>
</tr>
<tr>
<td>statutoryRape</td>
<td>Threats</td>
</tr>
<tr>
<td>transmissionOfHIV</td>
<td>victimIntellectuallyHandicaped</td>
</tr>
<tr>
<td>viloence</td>
<td>indecentAssult</td>
</tr>
</tbody>
</table>

The table above shows the attributes that were used to test the matches between the case being tried and the selected retrieved precedent cases. If the attribute in the table is found on the retrieved case then the total score of the retrieved case increases by one. Since there are eighteen
attributes it implies that the total score of the criteria case is eighteen. In that respect the author
used the formula in Equation 4.2.1 to calculate the percentage match:

\[
\text{% MATCH} = \frac{\text{CURRENT CASE SCORE}}{\text{CRITERIA CASE SCORE}} \times 100\%
\]

Equation 4.1-1 Formula to calculate % Match

After running the system on three consecutive times, the following test results were retrieved from the system:

From Figure 4.1-1 above test, it was found out that the closest match had a 94.444% match. If we calculate the average percentage match from the results above we find out that the average match is above 80 % which is a very good match.
## Precedent Cases

<table>
<thead>
<tr>
<th>Case Name</th>
<th>Judgment Number</th>
<th>Facts Leading To Sentence</th>
<th>Evidence</th>
<th>Statutory Rape</th>
<th>Assault Counts</th>
<th>Consent</th>
<th>Sentence</th>
<th>Match Score</th>
<th>% Match Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>MURIMA VS STATE</td>
<td>YU8906T</td>
<td>Infected Victim with HIV</td>
<td>AVAILABLE</td>
<td>YES</td>
<td>GUILTY</td>
<td>YES</td>
<td>9 years 0 months 0 days</td>
<td>10</td>
<td>55,556</td>
</tr>
</tbody>
</table>

### AVERAGE SENTENCE

The AVERAGE Sentence is 9 years 0 months 0 days.
Figure 4.1-3 Case Match Test 3

In general, by assessing the results from Figure 4.1-1, Figure 4.1-2 as well as Figure 4.1-3 it can be deduced that only cases with a match above 50% are selected from the case base. Considering the match statistics presented from the results it can be shown that the case based reasoning algorithm is selecting precedent cases that are at least 50% closer to the current case being tried as well as at most 94,444% close to the current case being tried.

4.2 FINDINGS FROM THE QUESTIONNAIRES

Data was collected from 30 participants from the judiciary sector. Participants were selected from three regional courts all from the northern region. Efforts to reach the other two regions that is the western region and the southern region were in vain due to the cost associated with the travelling. The selected courts were the Harare regional court, the Mutare regional court as well as the Bindura regional court all from the Eastern region.

4.2.1 Age, gender and class analysis of the respondents
As illustrated by **Table 4.2-1** the majority of the participants in the survey were males. According to the author’s findings an even distribution between the genders was only found in the student lawyer groups and a greater number of the female participants came from the prosecutor category. Considering the data in the fig above it can be concluded that the majority of the respondents were above the age of thirty one which signifies more experience in the judiciary field. The age groups 31-40 and 22-30 were mainly used because those are the age groups which can best appreciate the importance of technology in the judiciary sector. Therefore the results gathered best describes a sample which can represent both technology and experience in the judiciary field. A balance between experience in the use of technology as well as the knowledge of the judiciary field and how rape cases are tried was struck using the evenly distributed sample of participants.

### 4.2.2 Availability of computers
The research has been designed to use the computer as the primary mechanism to access the system. The system can be accessed via mobile devices from the web browser but this doesn’t provide a good view of the system, hence for better user view a computer with a relatively wide screen will present a better view of the system. In that respect an analysis of the availability of computers at the stations assessed was necessary to find out if the system can be deployed without the need for extra computers.

As illustrated by the statistics in Figure 4.3-1 above the majority of participants confirmed that there were computers at their stations this makes deployment of the e-court system easier.
However some participants responded that there were no computers at their stations. This can possibly be as a result of misconceptions about the purpose of the study that is some participants would have thought that the purpose of the study was to gather information so as to make room for the donation of computers.

4.2.3 Internet access

Figure 4.2-3 below shows the availability of internet access at the stations interviewed. Internet access is an important aspect since according to the design of the system, the database is supposed to be centralized. According to the statistics gathered 80% of the responses fall in the poor internet access and no access group which is a clear indication that centralizing the system will not be such a good idea due to accessibility problems.
Table 4.2-3 Assessment of Internet Accessibility at stations of Demonstration

<table>
<thead>
<tr>
<th>How good is the internet access at your station?</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Excellent</td>
<td>2</td>
<td>6.7</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Good</td>
<td>4</td>
<td>13.3</td>
<td>13.3</td>
<td>20.0</td>
</tr>
<tr>
<td>Poor</td>
<td>12</td>
<td>40.0</td>
<td>40.0</td>
<td>60.0</td>
</tr>
<tr>
<td>No internet Connection</td>
<td>12</td>
<td>40.0</td>
<td>40.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.2-2 Internet Assessment at Station of Demonstration Pie chart
4.2.4 Assessment of bias in current system and new e-court system

1) Do you think the system currently in use in the candidate selection is subject to bias and inconsistencies?
2) The use of the e-court system can help in reducing bias and improve consistency on rape case litigation.

The statistics in Figure 4.3-4 shows that the majority of the respondents believe that the current system in use in the judiciary sector on deciding the outcome on rape cases is subject to bias. Only a small percentage of the respondents either strongly disagrees of just disagree that the current system in use is subject to bias. After demonstration of the new e-court system the results as illustrated by the fig above shows that the majority of the respondents believed either strongly agree or agree that the new e-court system can reduce bias. Comparing the results for the old and new system bias assessment the author concluded there is need to introduce the new e-court system in the Zimbabwean judiciary as a measure of curbing bias.
4.2.5 Assessment of the old system versus new e-court system on time of litigation

1) Considering speed on litigation do you think the current system in use is fast enough?
2) The option to use e-court system reduces the time it takes during the litigation process on rape cases

Figure 4.2-4 Assessment of time of Litigation Using both the old system and the new E-Court System

Figure 4.3.5 above shows that a greater number of the respondents generally believe that the current judiciary system is very slows hence the need to improve on the speed of the litigation process. This improvement calls for the introduction of a new technology to be used in the way the cases are handled hence the need to try and incorporate case based reasoning in the decision making on stare decisis of rape cases. Comparison of the bars for how fast the current system is with the bars of whether the new system can reduce time of litigation shows that the new e-court system can address the problem of time of litigation. The evidence of the positive impact of the new e-court system on time of litigation is shown by a big number of respondents who strongly agree or agree that the new e-court system reduces the time of litigation on rape cases.
4.2.6 Assessment of the impact of the new e-court system on consistency and uniformity across all regional courts

The chart in Figure 4.2-5 shows the assessment of consistence on the new e-court system. Statistics of the respondents’ views on the system shows that approximately 80% of the respondents either strongly agree or just agree that the e-court system can improve consistence during the litigation process on rape cases. In intuitively implicates that the majority of the respondents advocate for centralization of the e-court system as a measure which improves consistency and uniformity.
4.2.7 Assessment of contribution of e-court system on final verdict

Table 4.2-4 Assessment of whether e-court is Helpful when deducing the Final Verdict Table

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>5</td>
<td>15.7</td>
<td>18.7</td>
<td>18.7</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>11</td>
<td>33.3</td>
<td>36.7</td>
<td>52.3</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
<td>13.3</td>
<td>13.3</td>
<td>65.7</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>10</td>
<td>33.3</td>
<td>33.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
<td>103.0</td>
<td>103.0</td>
</tr>
</tbody>
</table>

![Figure 4.2-6](image)

Figure 4.2-6 Assessment of whether E-court system is Helpful in Coming up with the Final Verdict Graph

According to the statistics in Figure 4.3-7 and Table 4.3-4 it was shown that slightly above half of the total number of respondents either agrees or strongly agree that the e-court system is very handy in deciding the final verdict on rape cases using stare decisis. However some of the respondents though still believe that the system has no contribution on the on deciding the final verdict and only the judge’s contribution should be regarded as final.
4.2.8 Assessment of whether respondents recommend the use of the e-court system

Table 4.2-5 Assessment of Whether users recommend the Use of E-court system or not

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>7</td>
<td>23.3%</td>
<td>23.3%</td>
<td>23.3%</td>
</tr>
<tr>
<td>Agree</td>
<td>14</td>
<td>48.7%</td>
<td>48.7%</td>
<td>70.0%</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>6.7%</td>
<td>6.7%</td>
<td>76.7%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>7</td>
<td>23.3%</td>
<td>23.3%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.2-7 Assessment of Whether users Recommend the Use of E-court system or not

Figure 4.3-7 shows that the majority of the respondents support that the e-court system should be used as an augmenting tool in the implementation of stare decisis on rape cases. This is characterized by 23% of the respondents who agree coupled with 47% who strongly disagree that the e-court system should be used. 30% of the respondents either strongly disagree or disagree.
4.2.9 Analysis of e-court system user friendliness measured against system accessibility

1) The e-court system is usable and user friendly
2) The e-court system is easily accessible

From the statistics in Figure 4.3-8 it can be deduced that though the majority of the respondents agree or strongly agree that the system is user friendly, the main challenge is on accessibility. The challenge on accessibility is characterized by no respondents who strongly agree that the system is easily accessible plus a very small figure of the respondents who agree that the system is easily accessible as measured against the vast number of respondents who either strongly agree or strongly disagree to the easy accessibility of the e-court system. The challenges with accessibility can be attributed to poor internet connection as characterized by Fig 4.3-5 which shows that 80% of the respondents said that there was either poor internet connection or no internet access at all at their sites.
4.3 CHAPTER SUMMARY

Basing on the data gathered in this research the researcher concluded that case based reasoning can be implemented in augmenting decision making on rape cases using stare decisis. According to the results gathered the majority of the respondents believe in the e-court system’s efficiency, effectiveness and consistency as well as user friendliness. Most of the participants also believe that the e-court system can also aide on reducing the time it takes during the litigation process. More so the case match tests show that we can bank on case based reasoning as a decision making tool on augmenting decision making on rape cases.

However the results also show that centralizing the e-court system is not a very good idea considering the great challenge in both hardware resources as well as internet access at the majority of regional courts in Zimbabwe. In that respect, the author concluded that decentralizing the system will be a better option for the time being to improve accessibility though this will however have an adverse effect on consistency with other courts.
CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

This chapter takes a look at the conclusions that can be drawn from the research as well as the recommendations that the author discovered from the results of the research. It also takes a look at the future works that can be done to improve the way things are done in the judiciary sector when handling rape cases as well as other cases in general. The outcome of this chapter will give the responsible authorities and other interested stakeholders an insight on the pertinent issues that needs to be addressed in a bid to facilitate a smooth flow of the system. Generally the chapter takes a look at those aspects of which are important but were outside the scope of the author’s project.

5.1 AIMS AND OBJECTIVE REALIZATION

The aim of the research was to come up with an e-court system that is based on case-based reasoning that will be used to augment the magistrate’s litigation procedure during the trial of a rape case using stare decisis.

The researcher implemented a web based e-court system and exposed it to the users. This exposure to the end users helped the researcher to discover a lot of loopholes and challenges that he had over looked during the course of the research. Basing on the research results gathered we can safely say that the research objectives were achieved to a greater extend. In that respect the set objectives were as follows:

1) To design and demonstrate an online system that makes use of case based reasoning to reduce bias on the aspect of stare decisis on rape cases.

2) To demonstrate the improvement of the knowledge base thereby widening the decision making pool through building the knowledge base with current cases.
3) To demonstrate the use of a mechanism that will assist the magistrate in deducing the final verdict.

4) To demonstrate the use of a case documentation upload platform for easy access to case files.

According to the results of the study, the e-court system reduces bias and the knowledge base of the decision making pool is improved with each and every passing case, provided it’s approved as a precedent case. The suggested verdict functionality coupled with the ranked precedent cases if a functionality which helps in realising objective number 3. Finally objective number 4 was realised through the creation of a file upload module which helps in collecting supporting documentation for each and every case that is approved as a precedent case.

More so the research helped in answering the following research questions which were posed in chapter one of this document:

1) Is case based reasoning applicable in performing stare decisis on rape cases?
2) Does case based reasoning reduce bias in reference case selection?
3) To what extend can we bank on case based reasoning in providing sentences which are consistent?

On research question one, basing on the results from the case match criterion we can deduce that case based reasoning is applicable because all the precedent cases retrieved from the case base, were at least fifty percent matching with the case being tried.

To respond to research question two, we can conclude that indeed case based reasoning help in reducing bias basing on the responses from the respondents, on whether e-court system can reduce bias.

Lastly through combining the match test with the responses from the respondents we can argue that we can bank on case based reasoning to a greater extend, since it’s not only providing close matches of the current case but it is also doing it in an efficient and effective way.
5.2 CHALLENGES ENCOUNTERED

A lot of challenges were encountered during the implementation of the research. Main challenges involved the lack of adequate hardware and internet resource at places of implementation. This resulted in accessibility of the system being a challenge. Some of the users tried to access the system via their mobile devices since it’s a web based system but the orientation and size of the screen made the system’s usability and user friendliness a great challenge.

The other challenge was on the sampling itself. The 16 regional courts in Zimbabwe are subdivided into 3 main regions that is the eastern division, the central division as well as the western division. Initially the authors wanted to take a station from each of the 3 divisions but however due to financial constraints the other two regions that is the western and the central regions were unreachable. In that instance, the author had to deal with the Mutare regional court, Harare regional court as well as the Bindura regional court all from the eastern region as the implementing stations.

5.3 RECOMMENDATIONS

User friendliness of the system is an attribute that the developer really worked on, but it is highly appreciated if the implementing stations make room for workshops which will help in teaching users how to use the system as well as help users appreciate the merits that the system brings to the judiciary sector.

More so since there is a movement from a manual system to a computer based system at the begin phase data entry is a very pertinent issue hence the need to acquire more hardware resources is a very important investment at all the implementing stations.

Centralising the system has got so many advantages which includes creating uniformity amongst all the regional courts in Zimbabwe. Since this is very important it means that the system has to be accessed from a common online point. This requires a great investment in internet resources at the implementing stations. Investing on internet resources doesn’t only help in facilitating centralization; it also helps in improving the general accessibility of the system.
5.4 FUTURE WORKS AND FURTHER STUDY

The aspect of expert systems involves modelling a computer system that performs just like a human expert. In that respect the concept involves modelling a machine that is liable of replacing a human expert. This research modelled part of the magistrate expert hence there is need to incorporate the legislation procedure in the system since it is the other aspect that is used by magistrates during the litigation process.

More so there is need to incorporate the system in all aspects the judiciary and not implement it on rape cases only. Regional courts deal with many diverse cases so there is need to further improve the system to cater for other arms of the law as well as other crimes. This calls for the creation of an expert judge.

5.5 CONCLUSION

This study proves beyond no reasonable doubt that artificial intelligence to be more precise case based reasoning, can be implemented in the judicial sector to help in augmenting the efforts of the magistrates and judges in coming up with fair and consistent verdicts. More so the implementation of an e-court system is dependent on computer hardware and internet resources, hence the need to improve on such resources to mark an effective implementation of an e-court system.
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APPENDIX 1: QUESTIONNAIRE FOR NEW (E-COURT SYSTEM) AND OLD SYSTEM ASSESSMENT

STARE DECISIS E-COURT SYSTEM QUESTIONNAIRE

You are kindly requested to participate in our research for the rape case e-court system. In this questionnaire you are asked to respond to a few short questions regarding your views on the system, its applicability to the field of stare decisis, its effectiveness, as well as how useful it can be to you as an individual. No reward is to be given to participants hence participation is completely voluntary. If you feel uncomfortable to answer some of the questions outlined in this questionnaire you are free to withdraw. Thank you so much for your valuable time and most appreciated support.

SECTION A: PERSONAL INFORMATION

Tick where appropriate

1. Gender: male [ ] female [ ]

2. Class: lawyer [ ] student lawyer [ ] magistrate [ ] prosecutor [ ]

3. I have prior experience with the use of a computer: YES [ ] NO [ ]

4. Age range: 22-30 [ ] 31-40 [ ] 41-50 [ ] 51 and above [ ]

SECTION B: INTERNET EXPERIENCE

5. Are there some computers at your station?

[ ] Yes Many

[ ] Yes Few

[ ] No Computers at all

6. How good is the internet access at your station?

[ ] Excellent

[ ] Good

[ ] Poor
USE THE FOLLOWING KEY WHERE NECESSARY:
1 = STRONGLY AGREE  2 = AGREE  3 = DISAGREE  4 = STRONGLY DISAGREE

SECTION C: ANALYSIS OF THE SYSTEM CURRENTLY IN USE IN THE JUDICIARY

7. Do you think the system currently in use in the judiciary is subject to bias?

- [ ] Strongly agree
- [ ] Agree
- [ ] Disagree
- [ ] Strongly Disagree

8. Considering speed on litigation how would you rate the current system?

- [ ] Strongly agree
- [ ] Agree
- [ ] Disagree
- [ ] Strongly Disagree

SECTION D: STARE DECISIS E-COURT SYSTEM RESPONSES.

USE THE FOLLOWING KEY AND TICK WHERE NECESSARY:
1 = STRONGLY AGREE  2 = AGREE  3 = DISAGREE  4 = STRONGLY DISAGREE

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<thead>
<tr>
<th>RATING</th>
<th>1</th>
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<tbody>
<tr>
<td>1. The use of the e-court system can help in reducing bias on rape case litigation.</td>
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<td>2. The e-court system has a positive impact on consistence of decisions made using stare decisis</td>
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<td>3. The e-court system helps in producing a valid contribution to the final verdict given by the magistrate on rape cases</td>
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<td>4. I recommend that the e-court system can be used as a standard</td>
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<td>5.</td>
<td>Centralising the case database improves consistence among all regional courts in Zimbabwe</td>
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<td>6.</td>
<td>The e-court system is usable and user friendly</td>
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<tr>
<td>7.</td>
<td>The e-court system is easily accessible</td>
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<tr>
<td>8.</td>
<td>The option to use e-court system reduces the time it takes during the litigation process on rape cases</td>
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when performing stare decisis on rape cases