The Personal Injury Claims Calculator (PICC) System

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Abstract
Road accidents is a major contribution in personal injury claims. The accident victims are allowed to claim a certain amount of damages from negligible parties. In Malaysia, courts adopt the traditional method of Multiplier-Multiplicand Approach to calculate the compensation amount. However, there is still no available tool to estimate personal injury claim with respect to loss of earning. This study aims to expose Personal Injury Claims Calculator (PICC) as the first prototype system to calculate the contemplated loss of earning in Malaysia. In order to create the system, a flowchart is proposed. The PICC is built using Visual Basic and Microsoft Access. The users will fill up the details displayed in the system to get the expected compensation amount. It is expected that claimants, courts and lawyers would be among the target users of the PICC.
Keywords: Road Accidents, Claims, Loss of Earning, Flowchart, System

1.0   Introduction

Road accidents involving various types of vehicles increases almost every day. The Malaysian Institute of Road Safety Research (MIROS) reported that there are 521,466 cases of road traffic accidents recorded in 2016 as compared to 489,606 cases in 2015 (MIROS, 2017). The increase of 6.5% showed the rise of personal injury claims by an injured party because of the other's negligence. As the aggrieving party, they are allowed to claim a reasonable amount of damages as a result of the road accidents.

Massita et al. (2012) and Lim (1995) defined compensation as award of amount given to the wrong party who had pleaded responsible for the offenses committed and requires certain amount of payment to victims or beneficiaries parties. As to the compensation or damages, all the vehicle owners registered to third party insurance covers special damages and general damages. Special damages mostly cover vehicle and property damages. General damages refers to pain and suffering resulting from injuries to a person.

The insurance claims process commonly take a longer process and delay payment. This was consistent with the opinion of Norila et al. (2013) that the government delivery system experience delay. An amendment was made in 1984 to the Civil Law Act 1956 provisions regarding the claims for loss of earning. It restricted the category of claimants to a certain age category and other requisites before losses can be compensated. The amendment also introduced a multiplier system whereby the number of years to be compensated is measured for the loss of earning against the ages of the injured or deceased. Currently, Malaysia courts use the traditional Multiplier-Multiplicand approach to calculate the compensation amount in loss of earning.

The compensation amount using the Multiplier-Multiplicand approach is as follows:

Sum Award = Multiplicand * Multiplier

where

Multiplicand = Loss of Earning = Pre Injury Earning – Post Injury Earning

Multiplier = Pre-accident Earning – Post Accident Earning

       = if the claimant's age 30 and below = 16

       = if the claimant's age 31 and 54 = (55- age at injury or death date)/2

It is logically not reasonable to let the loss of future earning calculated by only multiplying the loss of earning with how many years left until the retirement age. The accuracy of the multiplier has been disputed since the latest age for retirement increases to 60 years old. While the government has implemented new retirement age, there is no corresponding change is made to the Civil Law Act 1956. This showed the weakness of the traditional calculation method assessing the loss of earning in personal injury claims.

Several studies (Massita et al 2012; Haslifah et al. (2011) suggested the Ogden Table where a series of actuarial tables are applied. This is the practice in the United Kingdom as shown in

Table 1:

The development of Ogden table in United Kingdom

Year	Development
1984	1st actuarial table was published for personal injury and fatal accident claims by the Government Actuary's Department (indicated by mortality rate)
1994	The 2nd edition of the table was published considering contingencies other than mortality rate
1998	United Kingdom implemented the new English Life Table and the committee reflected the changes as the 3rd edition
2000	Improvement of the edition by including explanatory notes for the tables to ease the lawyer, judges and juries
2004	The tables were updated twice by encountering life expectancy factor and due to the latest version of English Life Table data
2007	The 6th edition was published to cover the new data for contingencies other than mortality, such as educational level, likelihood of employment, disability and economic activity
2011	The 7th edition is the latest edition due to mortality rates used underlying the latest national population projections. This edition also provides the rate of interest from -2.0% to 3.0% (rising in steps of 0.5%)
2017	Improvement in discount rate since the 7th edition is not tabulated at a discount rate-0.75%. Thus, addition of a column of multipliers in each table calculated at a rate return of -0.75%.

Table 1 showed the development of Ogden Table in United Kingdom in response to the global economy and human livelihood. The practice in the United Kingdom can provide a useful lesson to Malaysia in order to minimise the waiting process and duration in getting the compensation claims. At the moment, Malaysia is still using Multiplier-Multiplicand Approach for calculating the compensation amount in loss of earning in Malaysia. As the approach largely relies on manual system, this may possibly lead to problems like miscalculation, time delay and cost ineffective. In order to address these problems, this study adopts the Ogden Table as a model to suggest an improved method for the calculation of personal injury claims. There is also no integrated tool for that purpose in Malaysia as widely deployed in developed countries such as the United Kingdom and United States.

Therefore, this study aims to achieve two objectives: first is to develop a flowchart for the loss of earning in personal injury claims system; and second, to build a prototype tool in predicting the compensation amount on loss of earning in Malaysia.

2.0   Literature Review
2.1   System
A system can be defined as a set of related components that produce specific results. Information system combines information technology, people, and data to support business requirement (Shelly & Rosenblatt, 2012). In order to create a system, first step is to design an algorithm such as flowchart. According to Gaddis (2008), flowchart is diagram that graphically depicts the steps that take place in a system that consist of four types symbols which are ovals, parallelograms, rectangles and diamonds. Each of these symbols represent a step in the system. The symbols are connected by arrows that indicate the flow of the program. To step through the symbols in the proper order, begin at the start terminal and follow the arrows until reach the end terminal.

2.2   Application of Claims
Bae et al. (2015) developed an electronic claim (eClaim) system for the private health insurance program to solve the problem in current private health insurance. The system was built based on International Standards including CDA (Clinical Document Architecture), IHE PDQ (Integrating the Healthcare Enterprise (IHE) Patient Demographic Query (PDQ)) and IHE XDR (Integrating the Healthcare (IHE) Cross - Enterprise Document Reliable Interchange (XDR)). CDA uses XML (Extended Markup Language) for encoding of the documents and breaks down the document in generic, unnamed, and non-templated sections. Documents can include discharge summaries, progress notes, history and physical reports, prior lab results, etc. Integrating the Healthcare Enterprise (IHE) is an initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information. The eClaim service solves problems in the current claiming process, reduces workload problem, minimises the inconvenience of patients who have to submit claim documents by hand and also cost overhead problem. But still, the system would not able to calculate the total amount of claim immediately because they have to follow some process and procedure.

Meanwhile, Baecker et al. (2009) introduced concepts for mobile claims assistance application between mobile phones and claims management enterprise systems based on mobile web services. They developed the application using Android platform (HTC's G1 mobile phone), BlackBerry OS (BlackBerry Storm 9500), and the iPhone 3G and claims

management product (SAP Claims Management 6.0 EHP4). The application enabled the user using the phone to submit an emergency call and report an insurance claim to a commercial claims management enterprise system. This application also helped Insurance companies to request a customer feedback after a claim is completed. In term of usability, the mobile application is not sufficient to submit complete case report since accidents require a more information.

In Malaysia, Najar et al. (2009) proposed a new model for healthcare insurance that it is only need some credits points which can be purchased online. The point can be subdivided to active points, expired point and pending point. The points' value can be assessed by Insurer Company, hospitals and clinics. They claimed that the model will eliminate middle agents role in the relation between the insurance agency and clients and also provide more flexibility in services. Yunos et al. (2016) applied regression analysis, back propagation neural network (BPNN) and adaptive neuro-fuzzy inference system (ANFIS) method as a learning tool for motor insurance claims in predictive modelling. They found that BPNN model is successful in modelling the Malaysian motor insurance claims.

Another study conducted by, Siti et al. (2014) investigated on the profiling of the cost third party bodily injury claim according to the science of injury scaling assessment. The injury severity was assessed using the Abbreviated Injury Scale (AIS) and the Injury Severity Score (ISS) was then calculated for each victim. The data were analysed using SPSS and were claimed that the AIS could be a potential tool for the insurance industry to use as a scientific reference to estimate injury cost especially for injury in the same body region with the same type of injury.

2.2.1   Application of Claims Calculator
Compensation claim calculators are useful starting point as they provide an estimate of the levels of compensation claimants can expect to receive for their injuries. These tools have been available on personal injury solicitors' websites for a number of years.

In the United Kingdom, a claim calculator has been developed and updated in 2017 named Quittance Personal Injury where it calculates the claim for multiple cases including road accident, whiplash injury, work accident, industrial disease, medical negligence, public liability, claims in England, Scotland and Wales (Quittance, 2017). Besides, Bott & Co solicitors developed their own Personal Injury Claims Calculator and updated in 2017 that allows users to see the amount of compensation they may receive for a personal injury they may have suffered (Bott and Co, 2017). Another solicitor firm established in 1994, Harris Fowler also had its own Personal Injury Calculator since 2016 which promote highly qualified specialist personal injury solicitors cover almost 23 type of claims (Harris Fowler, 2016). In the United States a claim calculator named AllLaw developed and updated in 2017 that used to determine a reasonable settlement payment for a car accident, slip and fall, or other type of personal injury case (Nolo, 2017).

All these calculators offer fast and accurate injury calculation that cover general and special damages including the loss of earnings (Quittance, 2017). Besides, they help to determine a reasonable settlement payment for car accidents, slip and fall, or other types of personal injury case (Nolo, 2017). According to Bott and Co. (2017), the amount figured should only be

viewed as a guide before specialist legal teal members to accurately calculate a potential claim.

3.0 Methodology

The Analysis, Design, Development, Implementation and Evaluation (ADDIE) method was employed in this study for system design and development. The ADDIE model is the generic process traditionally used by instructional designers and training developers. It contains five phases: Analysis, Design, Development, Implementation, and Evaluation. The PICC system was developed using Visual Basic and Microsoft Access.

i.   Analysis

Analysis phase is the prior step by draft a flowchart as a formalized graphic representation of a logic sequence of the model used in calculating the Personal Injury Claims. The system flow consists of interface designs and information required that will be included in the system. It plans properly to produce an interactive and user-friendly system. Besides, the software would be used which Visual Basic is also being prepared.

ii.   Design

In this phase, the interfaces drafted for the system have been designed using Visual Basic and pseudocodes for the module (Calculate) in the system were done as well. The homepage is designed by providing the primary aim of the PICC. The second page shows the details to be completed by the users and the amount entitle for the claimants will be displayed.

iii.   Development and Implementation

In development and implementation phase, PICC was developed on Windows 7 platform by using Visual Basic. The module was programmed according to the pseudocodes design in the previous phase.

iv.   Evaluation

In evaluation stage which is the system was tested to evaluate whether it was functioning properly as expected. The tests include the linking between the interfaces and avoid logical error in calculation process of personal injury claims. The PICC consist a few sets of questions that require the users to test the functionality of the system.

Figure 1 represents the process flow when the users consist of claimant, lawyer and the court try to find out the amount of total claims in loss of earning. The process starts with the users keying in their details information in the PICC system created. Later on, the PICC system will run and the user will get the entitled amount of claim.
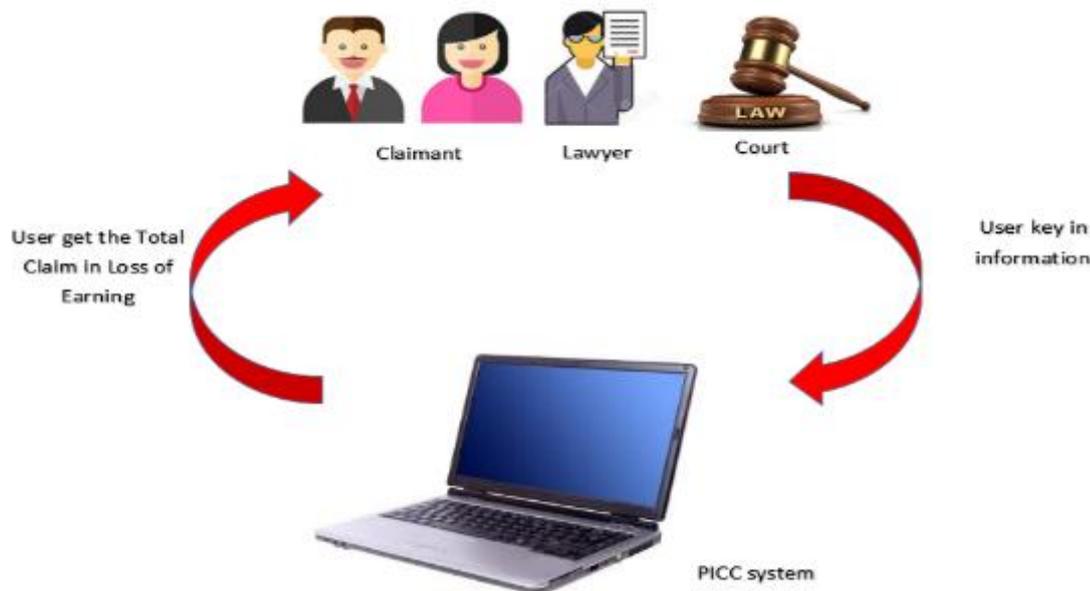
Figure 1: The System Architecture

,4.0 Results

4.1 PICC flowchart development

To calculate a total claim for the user between claimant and insurance agency, we created the PICC prototype. PICC empowered by the underlying patterns is aimed at providing a common language and useful contextual information for claimant, insurance agency and court.

Based on the claims process using rules and formula of the Ogden Table, we created the flowchart with two results of decision by gender female and male. According to Figure 2, calculation of total claim value involve **am** stand for multiplier value of loss of earning to pension age 65 males with basis of a 2½% rate of return in from Ogden Table (we assume as Table 1 or known as Table 9 in Ogden Table. Meanwhile, **af** is multiplier value for loss of earning to pension age 60 females with basis of a 2½% rate of return in from Ogden Table (we assume as Table 2 or known as Table 8 in Ogden Table.

Next, after the user insert the details of their educational level, capability before the accident and their working status before the accident, the system will identify the value **bm**. **bm** is the multiplier value of loss of earning to pension age 65 males in Ogden Table by considering able to work before accident with their educational level and working status (we let as Table 3 or known as Table A in Ogden Table) while for disabled to work before accident, we let as Table 5 or known as Table B in Ogden Table). Thus, the user must key in the correct information to ensure the calculation is accurate.

For gender female, we used the notation **bf** as the multiplier value of loss of earning to pension age 60 females in Ogden Table by considering able to work before accident with their educational level and working status (we let as Table 4 or known as Table C in Ogden Table) while for disabled to work before accident, we let as Table 6 or known as Table D in Ogden Table).

After that, the user will insert their amount the received in pre-injury (before accident), represent by c1 for male or **c2** for female. The first process occurs here as we want to calculate the Damages for loss of earning I:

i.   Damages for loss of earning I for male , **d1**= am x bm x c1
ii. Damages for loss of earning I for female , **d2**= af x bf x c2

Next step is the user will key in their working status and capability of work after the accident (post-injury). For gender male, the notation is **em** and female will be noted as **ef**. Same as before, male will refer to Table 3 or Table 5 while for female will use Table 4 or Table 6. Then, the user will insert post-injury amount given by the court and represent by **f1** (male) and **f2** (female). Second process occur by calculating the Damages for loss of earning II where:

i.   Damages for loss of earning II for male, **g1** = am x em x f1
ii. Damages for loss of earning II for female, **g2** = af x ef x f2

Lastly is third process, award for loss of earning or display output as Total Claim. It also categorized by gender.

i.   Total claim for male, **hm** = d1-g1
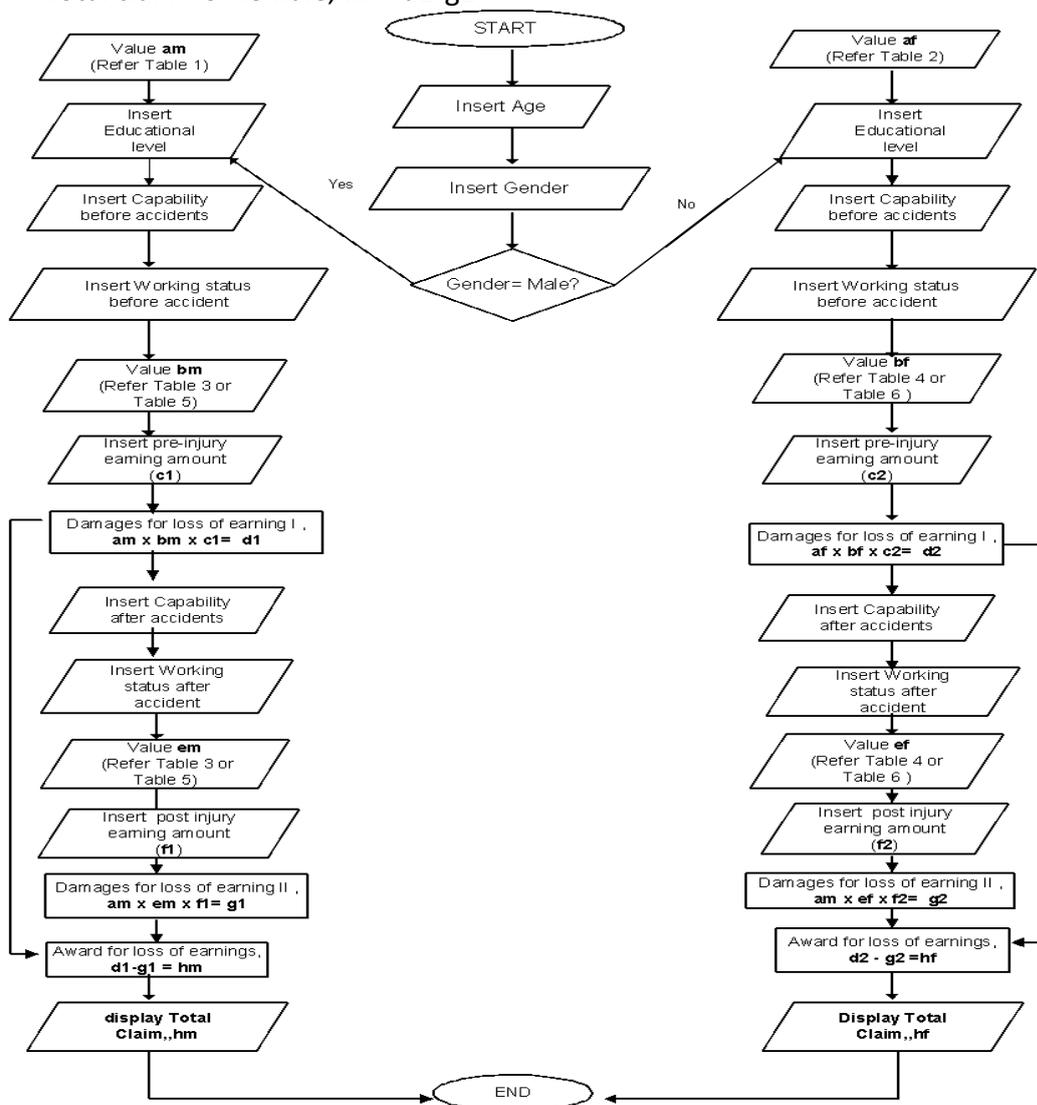ii. Total claim for female, **hf** = d2-g2

Figure 2: Flowchart for Personal Injury Claims Calculator (PICC)

4.2 PICC Interface

There are two pages of interface: welcome page of the system and second page displays the details needed to calculate the personal claim. Figure 3 shows the illustrating of system for Personal Injury Claims Calculator (PICC). The homepage of system states the main purpose of developing the PICC. To begin, users require clicking button "Get Started Now" to go to the next page.
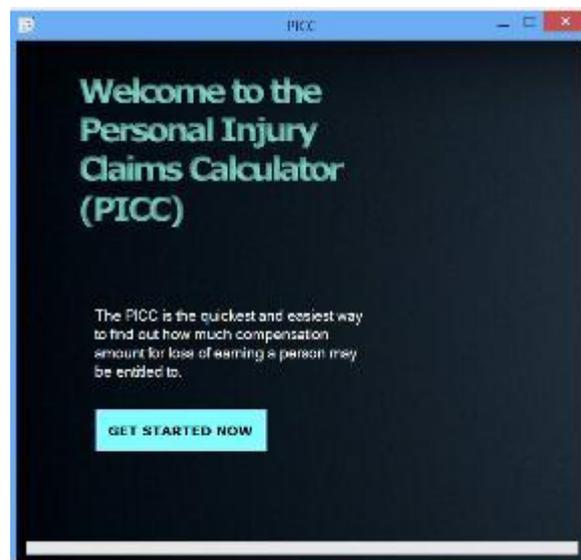

Figure 3: Screenshot illustrating of PICC welcome page

Meanwhile Figure 4 represents the details needed to calculate the personal claim. The PICC system allows the users to choose one answer from each question. However, users are advised to get the amount of pre- and post-injury earning verified by the court before using this system to ensure the claim calculated is correct. There are nine questions that users need to complete before getting the result. After all the details answered completely, then the users should click the button "Calculate" in order to know their expected claim amount otherwise button "Reset" to redo the calculation.

Figure 2: Screenshot illustrating of PICC system

5.0 Conclusion

In this paper, we have developed a flowchart to calculate the loss of earning amount in personal injury claims and built PICC as the prototype system in estimating the compensation amount on loss of earning in Malaysia.

6.0 Recommendation

As Malaysia still relies on manual system based on the Multiplier-Multiplicand Approach which is time consuming and cost ineffective, this study is significant to increase the quality of the calculation system involving the compensation amount of loss of earning in Malaysia. The Ogden Table is a feasible method to follow as employed in this study. We add value to the method by building the PICC and flowchart to facilitate the courts, claimants and lawyers in the assessment of the compensation. To provide more efficient and accurate calculation system, we recommend future research to consider part or region of claimant's injury, their contingency, retirement age of above 60 years (especially for those 70 years and above).

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