

CHAPTER 3

RESEARCH METODOLOGY

3.1. Methodology

The purpose of this research is to develop a database for the collection and analysis of occupational fatality. Program will present accident database and template for accident analysis and investigation on fatal electric shock and fatal falls. The Purposes of accident investigation are to find out causative factors and the hazardous conditions or practices that brought about the accident, thus proper action can be taken to prevent a recurrence of accident (Bowes, 2004).

There are three methods for developing accident report. First is using narrative text, second is coded data, and the third is combination of narrative text and coded data (Lincoln, 2004).

In this research, the researcher used the third method for creating electrical and fatal fall accident database. The reasons are because the coded data is structured format and the narrative text is additional information to describe the coded data.

Detail steps of methodology describes in Figure 3.1.

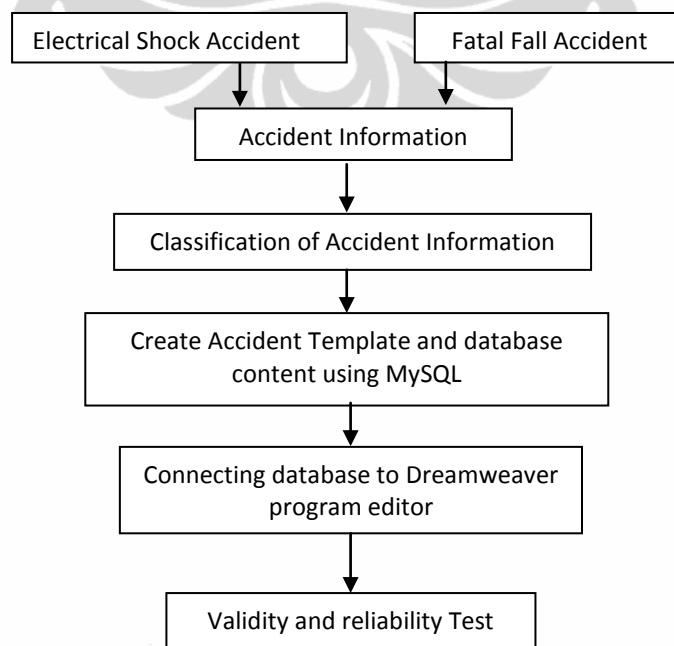


Figure 3.1 Framework diagram

3.2. Accident Information

The current study will include accident information of electrical shock accident and fatal fall accident. Source of accident information is from Taiwan Council of Labor Affairs. Every accident describes person, source of accident, cause of accident, source of injury, and injury event that happened to the victim.

3.3. Information Classification

In reality, accident information included quantitative and qualitative information. Qualitative information, for instance, how accident occurred, why accident happened, and accident prevention on investigation form become unmanageable if individual inspector complete an accident reports in unstructured format and **inconsistent**.

Inspectors define accidents, set out the purpose of investigations and lay down the requirements for reporting accidents. Thus, classification scheme is needed to classify qualitative information for further analysis.

Classification of accident information are divided into some parts, these are:

Injury event: no injury, un-recordable injury, recordable injury, fatality.

Injury is physical damage or hurt because of accident fracture. Injury event information is required in accident report, because it will describe what happened with the victim. (*dictionary.babylon.com/injury/*)

Employer information: Company name, type of industry, company size, company address.

Employee information: name, an identification number, gender, age, home address, phone number, occupation, working experiences.

Employee information is an important part of accident information and for company and government database.

Accident information: place of accident, task when accident occurred, cause of accident, source of injury, cause of injury, object or substance that directly injured the employee, how the accident occur.

Accident information is data elements to reconstruct previous accident and hazard pattern. Cumulative accident information will notify the common factors that cause of accident and it will be for prevention measure.

1. Other information: hours worked since last day off, and overtime worked since last days off.

Other information is adding information that might be required for accident report. From elements information above, inspector will know either the worker feel fatigue or relax when working, because it will be a parameter why accident could happen.

2. Prevention measure in narrative text

First accident prevention is required for preventing another accident, however it is a trigger for next prevention. It is necessary to describe first prevention measure for knowing how much inspector or company have contribution to prevent the further accident.

3. Inspector information: name, official position

Classification of accident information above based on the linkage of each element. Example classification for accident information, it has some elements are correlated, there are: place of accident, task when accident occurred, cause of accident, source of injury, cause of injury, object or substance that directly injured the employee, how the accident occur.

This research has two categories of accident, fatal electrical shock and fatal fall. Each category has special cause of accident, cause of injury, object or substance that directly injured the employee, task, source of injury, accident, injury event, and how accident occurred. Thus, the researcher encodes for each category with a certain code.

The aim of this database is making a structural accident database which helps inspector to **make a report and translate** qualitative data into analyzable data.

3.4. Template

Accident database template is a pre-developed page layout that contains accident database information and its basic explanation.

Based on previous explanations about accident classification, accident templates will be created and developed in structural classification. Table 3.1 below is modification of database template for accident report.

Table 3.1 Data base template for accident report

Information	Detail Information	Appearance In Program
Time of event	Month, date, Year	Selective item
	Days (workdays and weekend)	Selective item
Employee Information	Name	Free format
	An identification number	Free format
	Gender	Selective item
	Age	Selective item
	Home address	Free format
	Phone number	Free format
	Working Experience	Selective item
	Occupation	Selective item
Company profile	Company name	Free format
	company address	Free format
	Type of Industry	Code format
	Company Size (workers)	Selective item
Accident Information	Place of Accident	Free format
	Task when accident occurred	Selective item
	Cause of Accident	Selective item
	Source of injury	Selective item
	Cause of injury	Selective item
	Object or substance that directly injured the employee	Free format and Selective item
	How the accident occurred	Free format
Injury event	no injury	Selective item
	un-recordable injury	Selective item
	recordable injury	Selective item
	Fatality	Selective item
Other Information	hours worked since last day off	Free format
	overtime worked since last day off	Free format
Prevention measure	Description	Free format
Inspector information	Name, official position	Free format

Each element has consistent description, i.e. for describing task on electrical accident, there are: installing, moving, or repairing utility pole and power lines or other tasks that related to electrical task and accident.

Tables below describe the accident information in database format. These databases will be appeared in program, thus inspector select the information that is appropriate to the accident.

Time of event

Time of event provides information when the accident occurred. Also it will give the analyzer information about the weather or season related to the accident. The information contains of month, date, year and days of injury event. These factors appears in selective item, because the database creator have selective date from 1 until 31, month from January until December, 5 Years earlier and 5 years forward, days from Sunday until Saturday. Example of time event database is explained in Table 3.2 below.

Table 3.2 Example of time of event table

Case number	Day	Month	Date	year
1	Saturday	March	23	2011


Company

Company database have four types of elements to be filled manually with inspector. In Type of industry element, inspector has some code number for different type of industry. Table 3.3 below is company information and Table 3.4 is an example for company profile table.

Table3.3 Company database information

COMPANY				
Case number	Company name	Type of industry	Company size	Address
	Free format	Code Number	< 5 workers 5-9 workers 10-29 workers 30-49 workers 50-99 workers 100-499 workers >500workers Unknown	Free format

Table 3.4 Example of company profile table

Case number	Company name	Type of Industry	Company size	Address
1	AAA Company	1112	30-49 workers 	RRR Street No.6, YYY City, 12345

Employee

Employee database have some elements. Table 3.5 below is employee database information. Some elements such as employee name, home address, phone, occupation are filled by inspector manually.

Table 3.5 Employee database

EMPLOYEE								
Case number	ID Number	Employee Name	Gender	Age	Home Address	Phone	Occupation	Working Exp
1	Number format	Free format	Male Female	< 24 years 24-34 years 34-44 years 45-54 years >55 years Unknown	Free format	Free format	Free format	< 1 year 1-5 years 5 - 10 years 10-15 years > 15 years Unknown

Table 3.6 Example of Employee database

Case number	ID Number	Employee name	Gender	Age	Home Address	Phone	Occupation	Working experience
1	M76767	Mr. Roy	Men <input type="checkbox"/>	< 24 years <input type="checkbox"/>	LLL Road No.3, BBB City, 67890	5789-4567	Operator	< 1 year <input type="checkbox"/>

Accident Information

Accident information contains some information. Date of accident, place of accident, task when accident occurred, accident event, cause of accident, source of injury, cause of injury, object or substance that cause of injury, and how the accident occurred.

Task

Performing tasks when the accident occurred are divided into two types: first is related to electrical task and second is construction task. ID for electrical task is classified based on detail task classification. ID that is begin with number 1 is for working with specific equipment, ID that begin is begin with number 2 is for working with unspecific equipment, and if the task is not clear or unspecified while accident occurred, users of accident database can select task unspecified or unknown.

Table 3.7 Performing task related to fatal electrocution

ELECTRICAL TASK	
Code	Electrical task
99	Unknown
101	Installing, moving, or repairing utility pole and power lines
102	Installing cable TV wires or telecommunications lines
103	Working on electrical equipment
104	Stripping hot wires
199	Other electrical work
201	Routine machine operation
202	Operating vehicles
203	Operating hand tool
204	Welding
205	Cleaning
206	Material handling
207	Servicing/ repairing
208	Guiding the load / directing the crane operator
209	Resting
299	Other non-else classified task
999	Unknown

Table 3.8 Performing task related to fatal fall

Code	Non Electrical task
1	Removal of members and reinforcing
2	Hoisting and transport of members and materials
3	Site clean-up and work preparations
4	Structural unit element tasks
5	Unspecified task
6	Others

Table 3.9 Example of Electrical task

Case number	Code	Electrical task
1	101	Installing, moving, or repairing utility pole and power lines

Cause of Accident

In this research, researcher creates two kinds of accident cause, Accident Cause Electrical Shock and Accident Cause for Fatal fall. Table 3.9 gives accident database cause for fatal electrocution shock and Table 3.10 is the example of

appearance. Table 3.11 mention about accident cause fatal fall and Table 3.12 is the example of appearance.

Table 3.10 Accident cause for fatal electrocution database

ACCIDENT CAUSE ELECTRICAL SHOCK			
Code	INFORMATION	Detail code	Detail
1	Fail to de-energize electrical system	111	Fail to test the circuit element and electrical parts
		112	Not following Lock out/tag out
		113	Fail to check the status of the electrical systems
2	Used improper Personal Protective Equipment	221	Defective Personal Protective Equipment
		222	Personal Protective Equipment had not being used
		223	Protective device and shield were not used
3	Fail to maintain safe distances	331	Movement and Loss of Balance
		332	Fail to maintain distance when driving vehicle
		333	Exposed electrical parts
4	Poor work practices	441	Task Error
		442	Improper driving maneuver or hosting
		443	Improper outfit
		444	Inadequate wiring
		445	Operate electrical object with wet hands
		446	Accidentally breaking the power line when working
		449	Other unsafe work practice
5	Defective insulation	551	Damage insulation
		552	Missing insulation
		553	Insulated tool handles with damage missing insulation
6	Improper grounding	661	Improperly protected by a GFCI
		662	Back feed voltage
		663	Induced current
		664	Improper Grounding of associated fence, housing, enclosure, and supporting structure
7	Environment	771	Wet condition
		772	Cramped condition
		773	Low lighting
		774	Strong wind
		775	Struck by foreign object
9	Unknown		
10	Others		

Table 3.11 Example cause of electrical accident



Number of Cause	Code	Information	Detail code	Detail Information
1	3	Fail to maintain safe distances	333	Exposed electrical parts
2	5	Defective insulation	551	Damage insulation



Table 3.12 Accident cause for fatal fall

ACCIDENT CAUSE FALL			
Code	Cause of fall	Detail code	Detail cause of fall
1	Loss of body balance		
2	A General lack of physical strength		
3	Unsafe bodily action		
4	Distraction		
5	Insufficient mental capacities		
6	Insufficient physical capacities		
7	Mechanical failure		
8	Other		
9	Unsafe working environment	901	Unsafe ladder
		902	Unguarded openings
		903	Lack of complying scaffolds
		904	Unauthorized access to hazard area
		905	Contact with flying object
		906	Harmful substance
		907	Unfixed floor covering
		908	Bumpy & restricted walkways
		909	Poor lighting and ventilation
11	Lack of complying scaffolds	1101	Lack of Platform
		1102	Lack of Scaffold
		1103	Lack of fixed barrier
12	Being pulled down	1201	Being pulled down by collapsing
		1202	Being pulled down by Hoist
		1203	Being pulled down by Trolley
		1204	Being pulled down by ladders
13	Natural Disasters	1301	Rain
		1302	Strong Wind
		1303	Earthquake
		1304	Thunder
14	Remove protection measures	1401	Removal of barriers to facilitate material handling
		1402	The release of anchors after finishing a task
15	Inappropriate protection	1501	Unfixed floor cover
		1502	Insecure warning barrier
		1503	Broke Personal Protective Equipment
		1504	Ineffective safety net
		1505	Lack of secure anchor

Table 3.13 Example cause of fall accident

Number of Cause	Code	Information	Detail code	Detail Information
1	2 	A General lack of physical strength 		

Source of Injury

Source of injury is divided into fatal electrocution and fatal fall. Table 3.8 is describing source of injury for fatal electrocution. Table 3.9 is describing source of injury for fatal fall.

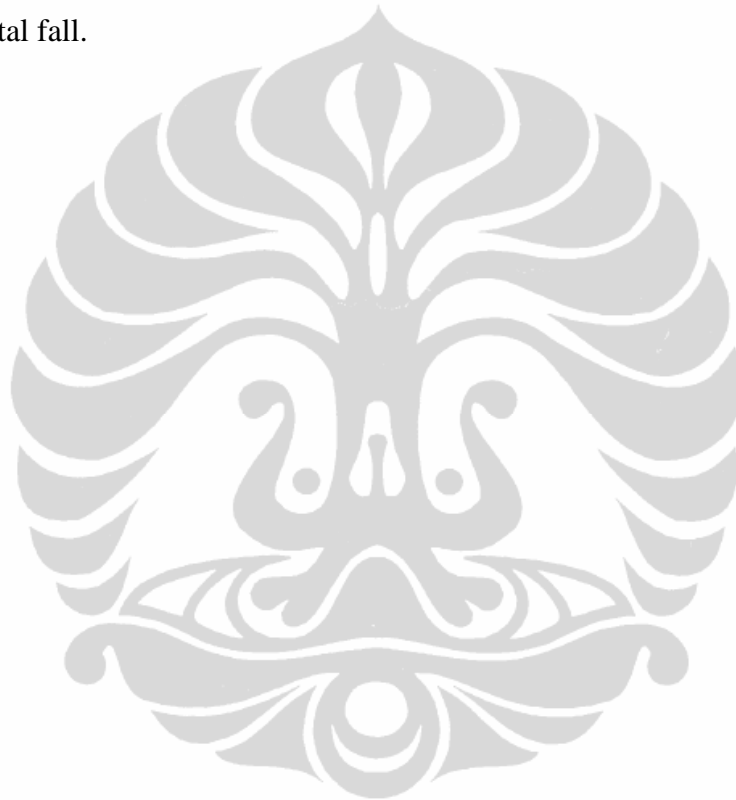


Table 3.14 Source of injury for electrical shock

SOURCE OF INJURY			
Code	Information	Detail code	Detail information
1	High voltage wire	11	Overhead power line
		12	Underground power line
		13	Railway power line
		19	Other
2	Electrical equipment	21	Switchboards, switches, fuses
		22	Transformers
		23	Electricity rail connector
		29	Other
3	Electrical wires	31	Missing Insulation
		32	Damage or aging insulation
		33	Insulate tools handles with missing or damage insulation
		39	Others
4	Lighting equipment	41	Lighting fixture
		42	Light wires
		49	Others
5	Vehicle and mechanical Equipment	51	Heating, cooling, and cleaning machinery
		52	Metal, wood working, special material machinery
		53	Paper production and printing machinery
		54	Textile, apparel leather production machinery
		55	Pumps
		56	Mixer and blender
		57	Heavy vehicles
		59	Other construction equipment
6	Power hand tools	61	Welder
		62	Electric drill
		63	Electric sander
		64	Chipping hammer/crusher/jackhammer
		65	Electric saw
		66	Bold threaded
		69	Others
7	Energized object	71	Ladder
		72	Metal material
		73	Scaffold
		74	Signboard
		79	Other conductive objects
8	Flammable, combustible, and explosive material		
9	Unknown		

Table 3.15 Example of source of injury for electrical Accident

Case number	Code	Information	Detail code	Detail information
1	1	High voltage wire	11	Overhead

Table 3.16 Source of injury for fatal fall

Source of fatal fall	
Code	Information
1	Structure and construction facilities
2	Hand-tools construction
3	Loading and unloading machinery
4	Material and supplies
5	Powered machinery
6	Cargoes
7	Vehicle
8	Non-classified or media

Table 3.17 Example of source of injury for fatal fall Accident

Case number	Code	Information	Detail code	Detail information
1	1	Structure and construction facilities		

(NIOSH, 2002; OSHA, 2002; McCann et al., 2003)

3.5. Connecting Database to Program Editor

Database will be created in php MyAdmin database engine. Since the researcher use PHP-based for the website programming, XAMPP (X-Apache-My SQL-PHP-Perl) is used for the web server and library provider to connect between our PHP-based sites and MYSQL database. XAMPP is a free and open source cross-platform web server package.

Program editor for creating accident database information system is Adobe Dreamweaver. Adobe Dreamweaver 8 is web development tool which allows users to work both visually and in code. It has the reputation of allowing newbie developers to become productive very quickly.

Steps of connecting database accident information to the program editor:

1. Installed XAMPP into user's computer, then click XAMPP control panel, then click start in apache and My SQL.
2. Find host or computer where we put our database, user and password for accessing database. As an example if database installed in user's computer, then the name of the host is localhost. And if database installed in server computer, then the name of the host is server computer IP Address.
3. Afterward, Connecting some information from database by php language `mysql_connect($host, $user, $password)`. Where "\$host" is the name of the host. "\$user" and "\$password" are user and password for accessing database.
4. Interface of the program will appears by Open the web browser, in this case the researcher use Mozilla Firefox, then type "`http://localhost/main.php`".
5. Database can be seen at "`http://localhost/phpmyadmin/accident.php`".

3.6. Program Validity and Reliability Test

Program instead with 30 fatality cases to make sure that the program can be used properly with the inspector. The validity tests are explaining below:

1. Installing to new computer these program with steps below:
 - a. Install XAMPP into the new computer.
 - b. Write "`localhost/phpmyadmin`" in web browser .
 - c. Create new database and named "accident".
 - d. Import file "`accident.sql`" then click "go".
 - e. Copy "accident" folder to directory C: XAMPP/ htdoc.
 - f. Access accident analysis program with `http://localhost/accident/`.
2. Open "`localhost/phpmyadmin`" and open "inspector" table, insert inspector name and password then click "go".
3. Open `http://localhost/accident` then Type user name and password and click submit.
4. Click "input new data" and Insert some example of fatal fall accident or electrical shock accident, then Save.

5. Try to add with new accident information that not exist yet in the current data base.

