The Site Selection Analysis for CCTV Installation in Sriracha Municipality Chonburi Province

การวิเคราะห์หาพื้นที่เหมาะสมสำหรับการติดตั้งกล้องโทรทัศน์วงจรปิดในเทศบาลเมืองศรีราชา จังหวัดชลบุรี

Supajira Kaewkomut (สุภจิรา แก้วโกมุท)* Dr.Wutjanun Muttitanon (ดร.วัจนันท์ มัตติทานนท์)**
Dr.Kritsanat Surakit (ดร.กฤษณัส สุรกิตย์)** Dr.Areeya Rittima (ดร.อารียา ฤทธิมา)***

ABSTRACT

Closed Circuit Television (CCTV) is a device that is very important in a security system used by recording events and data in Real Time to be useful to the police in the planning and monitoring traffic circumstances and the escape route of the perpetrator. Currently, found that barriers to use some such. The installation is not proper angle obstacles a number of CCTV cameras is not enough space. This study was to analysis suitable for installing CCTV cameras in Sriracha Municipality, Chonburi Province. Using GIS Software an application of GIS. By the spatial data community, an area with dense population and the royal road accidents are frequent. A major factor in determining the proper installation of CCTV cameras, the result will be something that helps to support the decision making process for choosing a CCTV camera installed in Sriracha Municipality, Chonburi Province.

บทคัดย่อ

ปัจจุบันกล้องโทรทัศน์วงจรปิด (CCTV) เป็นอุปกรณ์ที่มีความสำคัญมากในระบบรักษาความปลอดภัย โดยนำมาใช้บันทึกภาพเหตุการณ์และแสดงข้อมูลแบบ Real Time เพื่อเป็นประโยชน์กับเจ้าหน้าที่ตำรวจในการใช้วางแผนงานจราจร และเฝ้าดูติดตามพฤติการณ์และการใช้เส้นทางหลบหนีของผู้กระทำผิด โดยในปัจจุบันพบว่ามีอุปสรรคต่อการใช้งานอยู่หลายประการเช่น จุดติดตั้งไม่เหมาะสมมีสิ่งกีดขวางมุมภาพ, จำนวนกล้อง CCTV ไม่เพียงพอกับพื้นที่ การศึกษาครั้งนี้ได้ทำการวิเคราะห์หาพื้นที่เหมาะสมสำหรับการติดตั้งกล้อง CCTV ในพื้นที่จังหวัดชลบุรี โดยใช้โปรแกรม GIS ซึ่งเป็นการประยุกต์ใช้ระบบสารสนเทศภูมิศาสตร์ โดยนำข้อมูลเชิงพื้นที่ พื้นที่ที่มีความหนาแน่นของประชากรและเส้นทางถนนหลวงที่มีการเกิดอุบัติเหตุบ่อยครั้ง มาเป็นปัจจัยหลักในการพิจารณากำหนดจุดติดตั้งกล้อง CCTV ที่เหมาะสม ผลที่ได้จะเป็นสิ่งที่ช่วยสนับสนุนกระบวนการการตัดสินใจเลือกพื้นที่สำหรับติดตั้งกล้อง CCTV ในพื้นที่จังหวัดชลบุรีต่อไป

Key Words: GIS, Site selection analysis, Risk analysis

คำสำคัญ: ระบบสารสนเทศภูมิศาสตร์ การวิเคราะห์หาพื้นที่ การวิเคราะห์ความเสี่ยง

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* *Student, Master of Science, Program in Technology of Information System Management, Faculty of Engineering, Mahidol University*

** *Lecturer, Department of Civil Engineering, Faculty of Engineering, Mahidol University*

*** *Assistant Professor, Department of Civil Engineering, Faculty of Engineering, Mahidol University*

Introduction

Chonburi Province continues to enjoy economic and industrial growth as a major tourist city where population and tourist trends increase annually with greater density of buildings, higher cost of living and more traffic congestion These factors are the driving force of social problems due to a higher number of accidents and crimes such as robbery, disputes, assault, abduction, rape, murder, drug trafficking and traffic accidents, etc. Some areas, including those with heavy congestion, enclosed or non-visibility areas, abandoned communities, areas with inadequate lighting, etc. are considered high-risk areas. When compared to the number of government officials, the area and population ratios are found to be vastly different. Consequently, monitoring is insufficient to cover all areas. In some cases, the absence of witnesses and evidence results in difficulty arresting the culprit, thereby resulting in problems affecting the safety and property of citizens. Despite efforts to control these factors, crime is not likely to be reduced because the solution and implementation is difficult and time consuming due to the requirement of accurate and timely data.

Closed Circuit Television (CCTV) involves recording events and displaying image data in real time delivered directly to the control center to facilitate the work of police officers and security. Traffic planning monitors and tracks the circumstances of offenses and the offenders' escape routes. It also provides photo or video evidence to prove the guilt or innocence of the accused persons in court cases to prosecute offenders and clearly predicts the likelihood of future incidents (Nakraikhing, 2002). However, images from CCTV cameras installed in certain areas continue to encounter several problems such as image contrast as well as obstructed or obscured camera angles. Moreover, improper installation of CCTV cameras does not provide sufficient space.

Aware of the aforementioned problems, the researcher's aim was to evaluate the installation of CCTV cameras at the points in the Geographic Information System (GIS), which is an effective system for managing databases and mapping systems. Used to link the different positions on the map, geographical information systems also have the ability to search and process information. By providing basic information to analyze and integrate the relation of each factor, the desired results are obtained (Suriyachay, 2010). As a result of such concepts in GIS applications, space can be analyzed for the installation of CCTV cameras to analyze the physical community as well as the roads and highways of the study area. The findings of this research can be applied to the decision to determine the proper installation of CCTV cameras in Sriracha Municipality, Chonburi Province.

Objective of the study

To study and analyze the risk areas for the occurrence of traffic accidents in Sriracha Municipality, Chonburi Province.

To analysis and find suitable areas for the installation of CCTV and the adjustment of camera angles.

Methodology

A step of research methodology is shown in Figure 1.

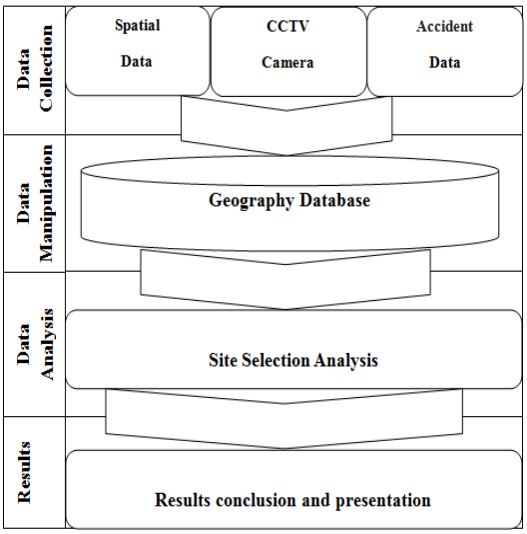


Figure 1 Steps of research methodology

Data Collection

Collecting the necessary information related to this research. Are as follows:

Spatial data: places and highway routes in Sriracha Municipality, Chonburi Province. The data was collected from Google maps and highway maps.

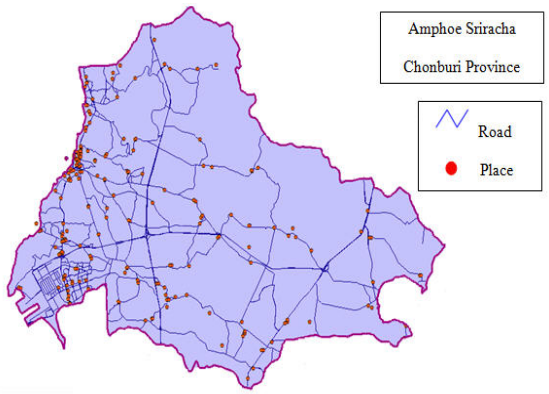


Figure 2 Show the Road Network in Amphoe Sriracha as GIS

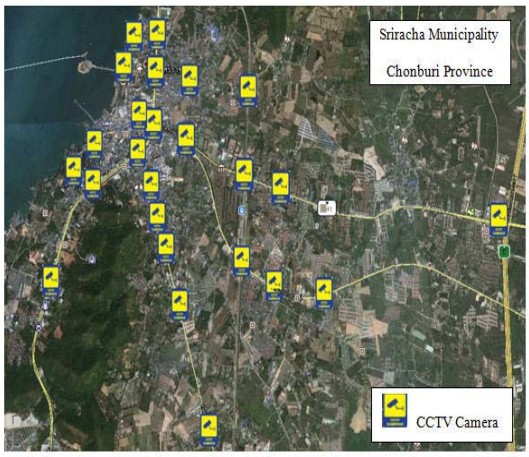


Figure 3 Show the Road Network and CCTV camera Installation in Sriracha Municipality as Satellite data

CCTV Camera: CCTV camera installation data for cameras already installed in the area with angles from the CCTV camera and data from the Chonburi Provincial Administrative Organization.

Accident data: statistical data on the number of accident and the location of accident sites in the areas on traffic routes in Amphoe Sriracha, Chonburi Province. The data was reported by the Accident Data Center, Thai Road Safety Collaboration during 2013.

Table 1 Statistical data on the number of accident in Amphoe Sriracha, Chonburi Province 2013

Month	Amount of car accident	Amount of wounded people	Amount of dead people
January	16	6	1
February	7	2	2
March	89	20	6
April	63	23	1
May	106	48	1
June	102	33	5
July	113	19	1
August	163	28	1
September	113	16	4
October	104	18	3
November	118	29	1
December	131	37	2
Total	1125	279	28
Average per year	93.75	23.25	2.33

Source: THAIRSC (2013)

Data Manipulation

The attribute data for some of the database for the attribute data acquired were created by using Microsoft Excel and saving as a database file then importing into GIS software as an event theme while some were directly created in GIS software. All of the landmarks such as villages and roads were used as point and line formats referring to actual locations.

These data were used to analyze the location coordinates road of accidents into GIS software in order to determine suitable locations for the installation of CCTV. The data were entered into to the form and converted into a map; the steps of analysis will be handled for the remainder of the process.

Data correction for spatial analysis and all related data in the Sriracha Municipality, Chonburi Province needs to be corrected in the GIS application.

Data Analysis

The main data analyzed for this study was spatial data, highway routes, CCTV camera data at installation sites in the areas and data on frequently occurring accidents in Sriracha Municipality, Chonburi Province.

Data from Sukhumvit Rd. at the area in front of Darasamut School Sriracha An interval of 5.8 kilometers at Soi Ao Phai for was divided into sections of 0.5 kilometers each by using a fixed method by limiting sections every 0.5 kilometers.

The incidence rate and frequency of accidents for each section was calculated based on the terms that needed to be shown such as road conditions, intersections, nearby community areas and weather conditions.

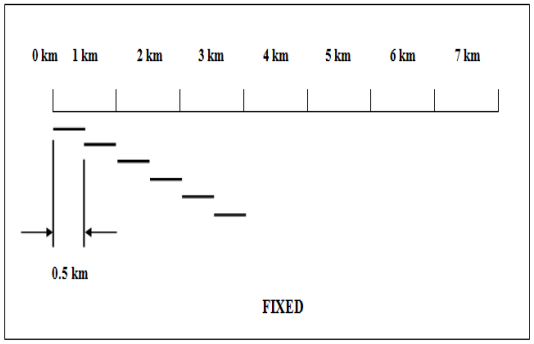


Figure 4 Fixed Section Road Divisions

The results obtained by the collection of accident data and the sites of frequent accidents on highways much less sort of accident that occurred in the area. Were entered into the GIS program and the results were displayed in the form of maps showing the data distribution of the sites where accidents frequently occur.

Table 2 Level of accident

Level	Amount of accident	Definition	Symbol
3	21 up	High	
2	11 - 20	Medium	
1	1 - 10	Few	

Analysis of data from a camera installed, or the installation of the CCTV should be installed CCTV cameras or editing.

The results from the assessment of road risk areas and the conditions of the surrounding areas were analyzed and sites were chosen for the installation of CCTV cameras in order to obtain proper angles for clear photograph images with sufficient space.

Results conclusion and presentation

The conclusion of this research shows summarize of research and the suggestion by using descriptive method to explain and present the result.

Results

Site selection for CCTV installation, result is presented as the following session:

Risk areas

Defining risk to the statistics of the traffic accidents making the road section of 500m. The data statistics of accidents in the area Sriracha Municipality during 2013 from Thai Road Safety Collaboration (THAIRSC) is an agency of the accident from Compulsory Insurance claims data from Road Accident Victims Protection Co., Ltd. the roads with high accident rates and traffic congestion are the most risk areas. It shows the amount of accidents in each section.

This map shows the distribution areas of highway accidents are frequent in the area of Sukhumvit Rd. at the area in front of Darasamutr School Sriracha An interval of 5.8 kilometers at Soi Ao Phai. CCTV camera already installed on 6 positions, but in the accident area from the middle up, with a total of 3 positions and 5more for not installing CCTV cameras in such area communities, entrance habitats or village and the roads are hilly curves.

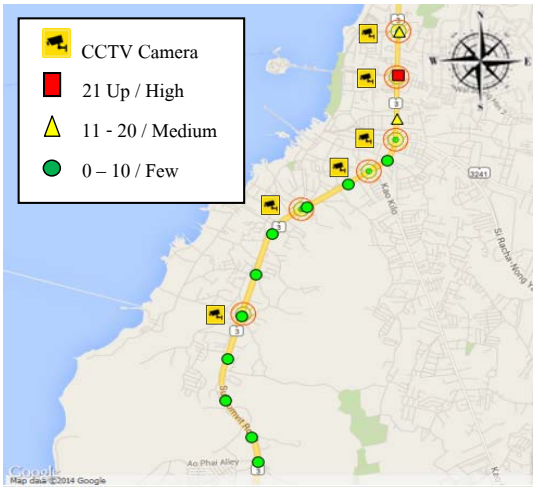


Figure 6 Shows the installation of CCTV cameras and frequent accidents.

Site Selection Analysis

This map shows the proper installation of CCTV cameras in Sriracha Municipality by analysis of assessment data, statistics databases accident area frequently. The results of the research should have discretion whether to install CCTV cameras as the number 3 positions.

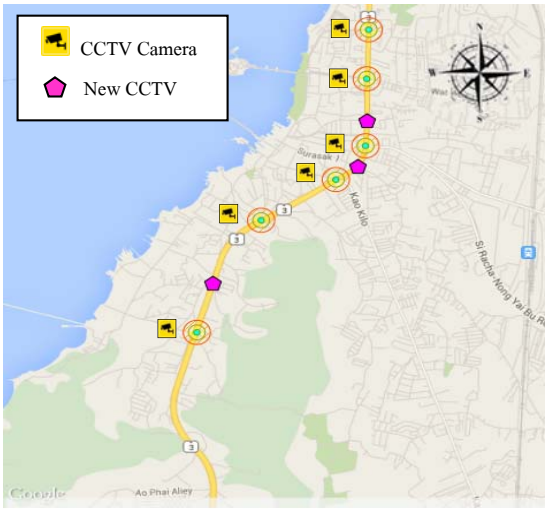


Figure 7 Shows the proper installation of CCTV-cameras in Sriracha Municipality

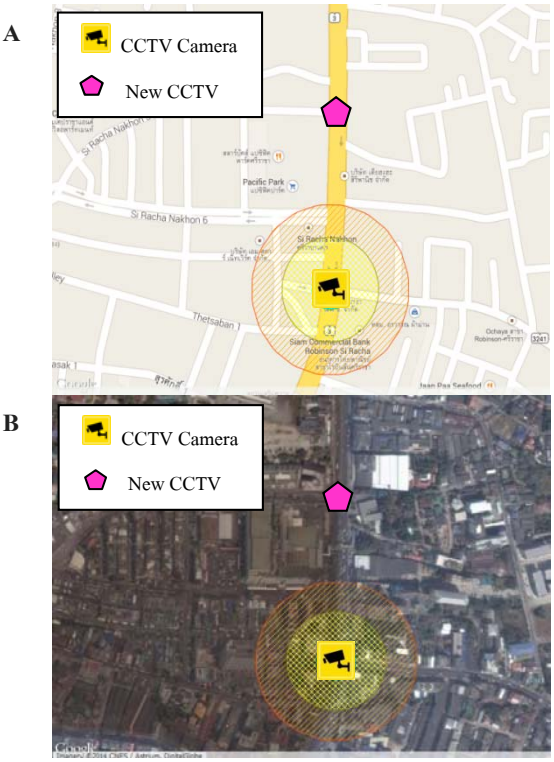


Figure 8 Show Location 1 (Robinson Sriracha) for installing additional CCTV Camera accident statistics based on the information from Figure 6 that the accident statistics for 11-20 per year and have high traffic congestion**.** But in this area is not installed CCTV Camera. Google Street maps (A) and Google Satellites maps (B).

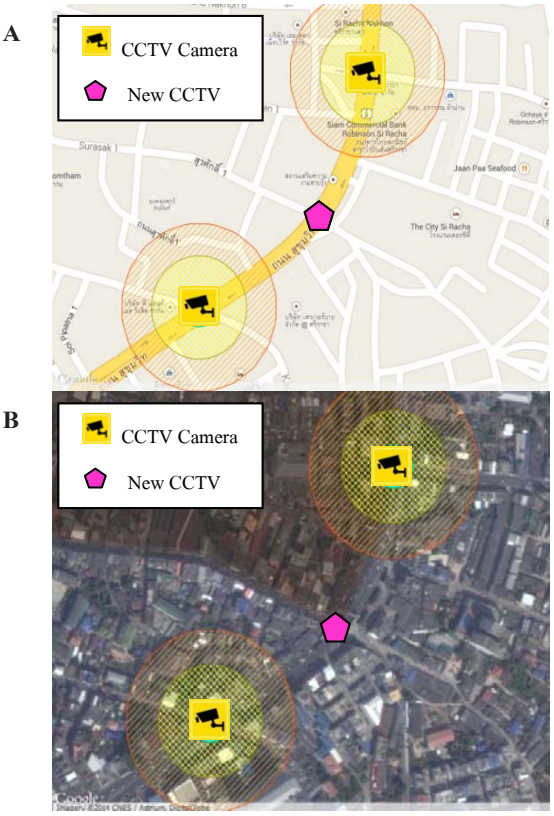
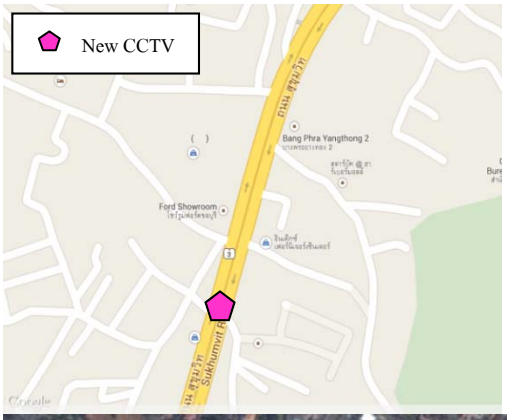


Figure 9 Show Location 2 (Crossroad Surasak) area for installation of CCTV Camera additional assessment of spatial information. The area is a crossroad with traffic congestion and road diversion is very dense. Google Street maps (A) and Google Satellites maps (B).

A



B

Figure 10 Show Location 3 (U-turn Sriracha Village) area for installation of CCTV Camera for further evaluation of spatial information. The area at risk of an accident is often the road curved path with a U-turn, road to the village. Google Street maps (A) and Google Satellites maps (B).

Discussion and Conclusions

This study the site selection analysis for the installation of CCTV cameras before installing the need to gather spatial data, survey areas, population density, accident statistics, road and will need to be interviewed experts or police. To recognize the need for the use of CCTV cameras and the information to be recorded in GIS using GIS Software is used to analysis the density and distribution of population and location of the accident site often. The result is the ability to assess risk in the area. To help support the decision to install CCTV cameras in the area to get the position and angle that is useful to the police or security monitoring trustee of the public. And can track the circumstances and the escape route of the perpetrator. The images can be used as evidence to prosecute and assist in the site selection for the installation of CCTV cameras.

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