ISBN 978-974-231-919-9

NIDA
WISDOM for Change

National Institute of Development Administration (NIDA)

Case Studies

NIDA International Conference for Case Studies on Development Administration 2016

(NIDA - ICCS)

September 2, 2016

At Dr. Somsak - Khunying Patama Leesawadtrakul Auditorium,
2nd FL., Sayam Boromorajakumari Building
National Institute of Development Administration (NIDA),
Serithai Road, Bangkok, THAILAND

Organized by

National Institute of Development Administration (NIDA)
Bangkok , THAILAND

National Institute of Development Administration (NIDA)

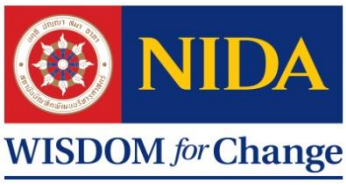
NIDA International Conference for Case Studies on Development Administration 2016 (NIDA-ICCS)

September 2, 2016

At Dr. Somsak - Khunying Patama Leesawadtrakul Auditorium,
2nd Fl., Sayam Boromorajakumari Building
National Institute of Development Administration (NIDA),
Serithai Road, Bangkok, THAILAND

Organized by

National Institute of Development Administration (NIDA)
Bangkok, THAILAND



National Institute of Development Administration (NIDA)

NIDA International Conference for Case Studies on Development Administration 2016 (NIDA-ICCS)

September 2, 2016

At Dr. Somsak - Khunying Patama Leesawadtrakul Auditorium,
2nd Fl., Sayam Boromorajakumari Building
National Institute of Development Administration (NIDA),
Serithai Road, Bangkok, THAILAND

Editors

Associate Professor Dr. Wisakha Phoochinda

Organized by

National Institute of Development Administratio
Bangkok, THAILAND

ORGANISING COMMITTEE

The Conference Advisory Committee for International Conference for Case Studies on Development Administration 2014 consists of:

Vice President for Research and Consulting Services	Chair of the Committee
Prof. Dr. Pablo Collazzo Yelpo	Committee
Prof. Dr. Gary N. McLean	Committee
Asst. Prof. Dr. Suwichit (Sean) Chaidaroon	Committee
Assoc. Prof. Dr. Judhaphan Padunchewit	Committee
Assoc. Prof. Dr. Achakorn Wongpreedee	Committee
Asst. Prof. Dr. Danuvasin Charoen	Committee
Asst. Prof. Dr. Anan Wattanakuljarus	Committee
Asst. Prof. Dr.Vesarach Aumeboonsuke	Committee
Director of Research Center	Committee and Secretary
Secretary of Research Center	Assistant Secretary

Editorial Board

Vice President for Research and Consulting Services	Editor in Chief
Assoc. Prof. Dr. Judhaphan Padunchewit	Editorial Board
Asst. Prof. Dr. Amornrat Apinunmahakul	Editorial Board
Asst. Prof. Dr. Anan Wattanakuljarus	Editorial Board
Director of Research Center	Editorial Board and Secretary
Secretary of Research Center	Assistant Secretary

List of Reviewers

We would like to express our special thanks to the following scholars and practitioners who have devoted their time and effort in helping in the reviewing process.

Name	Affiliation
Chamlong Poboon	National Institute of Development Administration, Thailand
Kannapha Amaruchkul	National Institute of Development Administration, Thailand
Vesarch Aumeboonsuke	National Institute of Development Administration, Thailand
Chuensumon Bunnag	Mahanakorn University of Technology, Thailand
Witchuda Sran-iam	National Institute of Development Administration, Thailand

Preface

The Six NIDA International Conference for Case Studies (NIDA-ICCS) will be held in Bangkok Thailand, September 2, 2016, at NIDA's Bangkok campus. The conference brings together scholars and experts from a wide range of development administration fields to discuss practical and research issues related to teaching case studies.

NIDA proudly invites scholars and experts to send their case study in various fields of development administration relating to the conference theme and sub-themes.

Conference Theme and Sub-Themes

Main Theme: *Case Studies on Development Administration*

Sub-themes in various fields of development administration including:

Public Administration
Economics
Business Administration
Social Development
Environmental Management
Law, Legal Studies
Human Resource Development
Language and Communication
Applied Statistics
Decision Technology
Actuarial Science and Risk Management
Population and Development,
Information System Management and Computer Science
Tourism Management
Sustainability
Corporate Social Responsibility and Ethics
Communication Arts and Innovation

About NIDA

National Institute of Development Administration (NIDA), is established in 1966, is a unique higher education institute in Thailand that offer exclusively graduate degree programs. NIDA was originally established to support national development in Thailand; this objective has now been expanded to encompass regional development in countries outside of Thailand, with the aim of producing advanced degree graduates who can serve in the public, business, and nonprofit sectors. NIDA holds its academic conferences and publish at least two journals regularly—NIDA Development Journal (in both English and Thai) quarterly, and NIDA Case Research Journal (in English) semi-yearly. For more information please visit our website: http://www.nida.ac.th.

Contents

page

Friday, September 2, 2016

Case Study Presentation

Facilities Management in the Café Business – A Case Study: Woo Café & Art Gallery, Chiang Mai, Thailand

Charoenchai Agmapisarn[*]

Abstract

From the cut-throat competitive café business, Woo Café & Art Gallery has emerged as one of the must visit – for its outstanding service and beautiful environment -- tourist venues in Chiang Mai. The Café is housed in a two-story old, white mansion with parking space in front, located in an area convenient for the many art lovers and artists who walks by. The interior, designed by Khun Chatchai Jullatamara, familiarly known as "Chat", is attractive: its fresh atmosphere is created by the many blooms from a variety of flowers and diverse plants set amongst art pieces and art gallery. This atmosphere is consistent with the concept of servicescape, where the impact of physical environment sharpens the customer's perception, enhances the customer's experience, and provides a positive impression of good service. A café is an intensely competitive type of business that must profitably sell its coffee and related café products in carefully differentiated categories.

Woo Café & Art Gallery is an innovative coffee shop, exemplifying how success can be achieved by creatively combining physical environmental design and service encounter to maximize customer interaction. In this case study, Woo Café exemplifies three key categories of servicescape: the ambient condition, the spatial layout and process, and symbols and artifacts.

Keywords: Café, Servicescape, Physical Environment, Coffee, Chiang Mai

[*] Assistant Professor at the Graduate School of Tourism Management (GSTM), National Institute of Development Administration (NIDA), 118 Moo 3, Serithai Road, Klong-Chan, Bangkapi, Bangkok, THAILAND 10240 Email: roenbkk@gmail.com

Introduction

In world-wide cafés, coffee, one of the world's most popular restoratives, is consumed regularly by approximately one-third of the world's population. Coffee had an interesting origin and has a long history with an intriguing mixture of political, financial, cultural, and religious facets. Coffee was first planted in the thirteenth century in the Arab colony, Harrar (now Ethiopia), and in the mid fifteenth century was brought by the Turks to Constantinople. The first café, Kiva Han, was opened in 1457 (Xu, 2003: 80). Today the modern coffee café has become an integral worldwide social gathering venue for many people.

In Thailand, coffee was early claimed as a viable economic crop and was first exported to foreign countries during the King Rama III era. At that time, the coffee plantation was developed primarily as an export business, managed only by noblemen, royal family members, and the King. The "Red Cross Tea Room", located near Sri Kok Praya Sri, was the first recorded Thai café. It was opened by an American woman who sought to raise money to support the Red Cross during World War I and served only on Thursday's between 15.00-18.00. Customers at that time were mostly foreigners, Thai noblemen, and officers. Of all drinks offered, coffee was the least popular drink for Thai persons because of its bitter taste; most Thai people preferred to drink cold water or tea (Ratjaroenkhajorn, 2001).

After that, another well-known café, Kaffee Norasingh, was established by King Rama VI. This café served coffee as well as snacks and other drinks. The Kaffee Norasingh Café held about 100 tables, and offered free music provided by local Thai orchestras. Free entrance to this famous venue was open to the public and was as a gregarious place for Thai socialites and foreigners to gather. On Sundays, patrons dressed formally and together enjoyed talking or listening to the music. Ratjaroenkhajorn (2001: 28) noted that the café, due to its origin, became a symbol affiliated with the "high and medium" class of Thai society and regarded as "new". Coffee was predominantly a drink of the aristocracy, and Thais drank coffee to socialize and gather with other socialites.

Even to the present, coffee has become a part of social culture: it is most consumed by and popular with middle-class people including merchants, writers, artists, students, and bureaucrats, widely available in elegant urban cafes and suburban or rural areas. Conventionally, coffee, called Kafee in Thai, has become a popular drink among Thais. Each coffee is named based on how the coffee is made: for example, hot black coffee is called "O Yua", iced black coffee, called "O Liang", and coffee with milk, named "O Liang Yok Lor".

The coffee drinking culture in Thailand has rapidly increased in popularity, resulting in the rapid expansion of café openings. The café business in Thailand is set in several different venues, such as coffee carts, kiosks, and cafés with comfortable patron seating. To accommodate the growing variety of customer preferences, coffee business owners have coped with high operational costs. Thus, the price of coffee per cup is in response to the market, dictated by operational costs and the willingness of customers to pay.

Within the competitive Thai coffee market, customer trends are shifting towards small and medium sized café businesses, which are recently entering the market. That is to say, café businesses in Thailand continue to expand, even though each new shop must face competition not only from other coffee shops, but also from the competition posed by non-coffee beverage choices, such as soft drinks, green tea, bubble tea, and fruit or vegetable juices. To survive in this competitive market, each new café seeks to provide its customers with new, distinctive themes.

In Chiang Mai, a plethora of cafés are concentrated within Chiang Mai's old city. The notion of café has been conceptualized as providing an ambiguous setting -- an intermediate institution that bridges private and public space. On one hand, it is a private, protected area, yet on the other hand, it is a public space where people can socialize as equals, rather than with differentiations based on their status, age or wealth. Therefore, cafés provide virtual neutrality and customers seek unique value to themselves. In Chiang Mai, some cafés offer a home-like setting, whilst others provide food for purchase, free Wi-Fi, or a workspace, in line with local cultural notions of hospitality and friendly service.

Khun Chatchai Jullatamara

At 10:00 a.m. in the morning on January 29, 2016, after checking to ensure that everything was neat and in its proper place around the garden-like lobby of his café, Khun Chatchai Jullatamara, 43, discussed his plan with his two business partners to set up a new Woo Café & Art Gallery in Taipei, Taiwan. Chatchai, "Chat" to most who know him, is a veteran hotelier who has been working in the hospitality industry for several years. Passionate about his coffee drinking, Woo Café & Art Gallery is the culmination of his dream, his passion, and his diligence. Woo Café & Art Gallery has become one of the in-demand Chiang Mai places where visitors and local people alike pop in.

Woo Café is located at Charoenrajd Road where art galleries are mushrooming. It is housed in an old two-story, white house with parking lot in front, and is divided into three spaces -- coffee shop on the first floor, art gallery on the second floor, and furniture sales are set up in a house-like décor at the back of the house. Chat conceptualized the Woo Café based on his personal lifestyle and reflects his love for art and coffee. Due in large part to his exuberant dedication, Woo Café has become one of the upcoming and local must-visit café favorites in Chiang Mai.

Chat began his work as a part-time hotelier at the Regent Resort Hotel, now the Four Seasons Hotel, with a small paycheck. He moved from first working as a server to a trainer, and then to the highest full-time position. Working in the hotel equipped him with diverse service and hospitality experiences. He noted that, "While I was young and student, I began my hospitality career as a part-time employee at the Regent Resort Hotel, the only prestigious modern hotel in Chiang Mai. During that time, I was paid only twenty baht per hour, but as time passed by, I was offered a position as a full-time employee. After becoming a full-time member of the staff, I worked as a trainer and was responsible for teaching and coaching the new staff. Eventually I was promoted to the head butler in this hotel." Those six years of

experience, coupled with his love for coffee drinking, enlightened him and gave him the idea to open the café business in, his hometown, Chiang Mai.

Chiang Mai is synonymous with rich Thai-Lanna culture and the beauty of the Thai country. The City of Chiang Mai is revered as a laid-back, tranquil place, which foreigners and locals love to visit. Due to its vibrant culture, Chiang Mai has positioned itself as the creative hub of art and relaxing lifestyle in Thailand. Thanon (road) Charoenrajd, Chiang Mai, is a well-known venue where locals, tourists, and art lovers come to find their art objects – paintings, sculptures, home furniture. Khun Chat explained, "Before I came to the decision where to build the café, I discovered that this road (Charoenrajd) has its very special charm, famous for its art, furniture and antiques sales districts. Woo Café is a coffee shop where, after looking for furniture and antiques, shoppers can come for a short break, and enjoy our coffee and lunch." Moreover, Charoenrajd at night-time is the place where the street is crowded with nightlife crowds who come for live music and dining.

Khun Chat is both art lover and coffee connoisseur. He always enjoys drinking coffee whenever a new café opens in Chiang Mai. Although he has no special background as a coffee maker and no special barista training, he has learnt to make coffee, purely based on his experience as a dedicated, conscientious coffee drinker. He explained, "I regularly visit the newly opening café to taste its menu: several types of drinks. I personally love drinking coffee, even though I have no experience on making it or being trained to be a barista. This not only provides me considerable experience of being a good coffee maker, but also broadens my expertise on doing coffee business." Chat has become an expert on coffee and can intuitively predict whether the taste of coffee fits the Thai customer. As another first in Chiang Mai, Chat established Woo Café so that the art and coffee culture could blend and where people could hang out. The results are a new Chiang Mai landmark of art and coffee, with a flowery garden.

Competition in Café Business

It has been said that the café business depicts a pattern of monopolistic competition (Krugman & Wells, 2015), not perfect competition—because it is quite rare (Krugman, The Conscience of a Liberal, 2011). Under monopolistic competition, each café has a relatively small percentage of the total business market, and it has less control over the market price in the overall coffee business. As many cafés are opening in Chiang Mai, each café regulates its own pricing policy without considering the possible reactions of competing cafés. A single café might realize a moderate increase in its sales by lowering its price, yet the effect of this action on competitor's sales may be nearly indistinguishable, perhaps causing no impact. One of vital features in this monopolistic coffee business, as all cafés obviously do, is to differentiate its product without regard exclusively to price.

The product differentiation can be achieved in various ways: In the café business, differentiation in the coffee itself, with unique physical or qualitative differences, is commonplace. Woo Café, for example, offers a range of coffee types, from hot coffee without milk to hot coffee with milk, each called by its distinctive names and served in differently shaped, designed cups. In Chiang Mai, to differentiate their products, several cafés teach their baristas to decorate coffee with various techniques or to garnish the coffee with chocolate powder or some nice edibles: cookies or chocolate. As for Woo Café, one customer from Los Angeles, who visited the café in May 2016, posted on TripAdvisor a description of the food and beverage: "Best iced tea I've ever had--then tried the coconut black tea! Food was delish, wish they would have explained the minced pork was super spicy though! The shop was awesome--so many well-curated finds in there. We couldn't help but re-visit Woo 3-4 times in our 5 day visit to Chiang Mai!" This endorsement is an example of how Woo Café differentiates its products to impress clients, and illustrates methods of profitably coping given the competitive aspect of monopolistic competition in this business.

Second, differentiation by service has become prevalent among cafés in Chiang Mai. In addition to the courteous, helpful, and friendly personnel, many cafés differentiate the services and facilities provided, such as free Wi-Fi, an assortment of newspapers and magazines, and the late opening hours - some cafés operate 24 hours. In this respect, the Woo Café service staff provides services beyond the expectation of their customers. Indeed, a customer who visited in July posted on TripAdvisor, "Staffs here are nice and friendly. My friend is birthday on the night we got to wow cafe to dinner, the staffs help us to write the happy birthday on the plate of our cake and sang the birthday song with us. It's really a very good experience to have a dinner here!" Another comment provided by a July, 2016 visitor stated, "During our last few hours in Chiang Mai we had lunch at Woo Café - it is a shame we did not find this cafe sooner! Woo Cafe is tastefully decorated with plants and home wares, with a nice art gallery upstairs. The waiters and waitresses were very friendly and went above and beyond to ensure we enjoyed our meal." As earlier stated, service differentiation is one of the key successes in café business, and is often applied as a means of successfully coping given the monopolistic competition pattern.

Third, brand name and word of mouth are other means by which owners differentiate their cafes. Reputation relates to the products and relies predominantly on the positive word of mouth exchanged via online website, which are otherwise difficult and pricey to copy. Brand name, in some settings, may be constructed by use of trademarks, packaging, or even celebrity connections. A café, to create its own brand, is more likely to be established by its connection using video sharing or photo sharing, on social networks such as Facebook, Instagram and Twitter. Woo Café has enhanced its reputation and fame via the pervasive online sharing of patron pictures taken in the cafe. The frequent posting strongly advertises the café and has elevated its name recognition, and provides another method of differentiation.

The greater the distinction, the better the position of the café; in this case, the differentiation is not created by price competition. In the case of Woo Café, many customers pay attention to the online comments and the good ratings given by patrons. As one example, a person who visited in July, 2016 commented, "I came here because of its rating at TripAdvisor. Amazed by how much time the owner spent on the decoration and all the maintenance. Honestly very pretty restaurant. Food is good and fresh. We were seated in a nice quiet table. G/F is dinning and upstairs is art gallery. The paintings, art pieces are all impressive, make sure you won't miss that part." Another visitor in July, 2016 wrote on the same travel online website, "Woo Cafe and Gallery is a favorite cafe every time I visit Chiang Mai. It's good to know the standard in terms of food quality and service remained high. I enjoyed dining here with fresh blooms of flowers, great tea and coffee."

A lucrative brand name gained by advertising earned from positive words of mouth on popular public online websites yields an increase in the number of customers and provides greater income to the café. Moreover, this source of advertising is particularly advantageous because it is exceedingly difficult for other competitors to copy.

Additionally, the café business depicts the concept known as "easy entry and exit", one of monopolistic competition attributes. Opening a new café has become a popular business start-up in most major cities, and is readily apparent in Chiang Mai. The café business requires economies of scale characterized by low capital requirements for opening. Thus, a large number of small cafés have mushroomed around Nimmanhaemin Road, one of the most expensive and popular areas in Chiang Mai.

Higher rental costs are a consequence of higher demand. Due to the heightened development in the region, Nimmanhemin has become one of the most expensive areas of Chiang Mai, perhaps higher than some areas in Bangkok. Located on the west side of the City of Chiang Mai in Suthep District, at the foot of the mountain, Nimma (short for Nimmanhemin) has been converted within the past 20 years from a dirt track on the outskirts of town into a chic area and now is a "must-visit" landmark of Chiang Mai. Businesses here often change due to the expensive rental rates and high competition. Cafés here have shifted between hands of owners or sometimes into different businesses. As a distinction, the Woo Café is located in Charoenrajd, where there is less competitive café business.

However, many of these cafés later shut down due to costs of the high rent. Khun Chat explained that many businesses, opening in Nimmanhaemin, particularly the specialty café business, have often not survived; the high turn-over of café businesses in this area occur because many entrepreneurs think that Nimmanhaemin is the ideal location to do business, but the cafes do not generate sufficient profits due to the exorbitant rents. Hence, many café businesses leave the market, which is relatively easy to do. Per the theory of monopolistic competition, there are few impediments for an unprofitable café to hold a going-out-of-business sale and to shut down.

Woo Café & Art Gallery: Servicescape Concept

On 26 October 2015, Woo Café & Art Gallery opened for business. In addition to its carefully selected location and the attractions afforded by other activities and businesses in the artsy neighborhood, Woo Café offers delicious lattes as well as a relaxing area to read. The setting is homey, offering customers a variety of chairs or couches, indoors and outdoors. With its ample space, customers can come with their families. The menu offers a simple selection of coffees, such as cappuccino and latte, as well a selection of oversized homemade cakes. An interesting expression is a miniature cookie, either chocolate or nut flavored, served alongside the coffee. Of course, it's possible to purchase the cookies separately, but as super-sized versions.

The name of "Woo" is derived from "Wow" or "Woo" when people see something with an exclamation of surprise. Indeed, the interior design is intended to amaze first-visit visitors. The Woo Café landscape provides a place for a rendezvous, with a décor of flowers in the vases, overgrown plants that provide shade, and a friendly ambience. Café itself has an uncommon artistic concept. The interior is a European-Thai style environment; a half-timbered house with wooden floors set within a floral décor amidst antique furniture. The outside seating is set within a shaded green garden under a canopy that provides needed shade during the hot summer. The furniture was crafted to fit the interior spaces by one of Khun Chat's business partners, a respected furniture manufacturer. These features provide the café with distinction. As it has been described, Woo Café clearly shows "physical environment" or servicescape concept (Fitzsimmons, Fitzsimmons, & Bordoloi, 2014), expressing all environment settings controlled by café owners to enhance employee and customer actions and the perceptions of high quality service. Servicescape has three combined conceptual characteristics: ambient condition, spatial layout and functionality, and signs, symbols and artifacts.

One patron of the café commented to TripAdvisor on October, 2016, "Woo Cafe is one of my favorite places to chill in Chiang Mai. Conveniently located down by the river close to the Nawarat Bridge, Woo Cafe looks nothing from the outside and you would be tempted to just keep driving by - if you did not know me that there is a hidden gem waiting to be discovered. Eclectic, old-world ambience, outdoor and indoor seating and complete with gallery and gift shop." Although Woo Café clearly embraces the servicescape concept, it still faces several problems. As one visitor commented on TripAdvisor on January, 2016 that "Lovely atmosphere with character, great staff. The food is ok, beautifully presented but lacks flavor. I would go back to have a pleasant drink in a unique atmosphere." Also in April 2015, one patron commented in TripAdvisor that "This place is easy to locate. The atmosphere is very relaxing; there are many lovely displays of plants and flowers. Although the menu is short, there are both Western and Thai dishes. Recommend ordering Thai Tea and the Chiang Mai noodles, they were very quick and tasty. The place was also very crowded, obviously very popular. There was a power cut when we were there, so many dishes were not available. The beef stew we ordered could not be made, so we had to wait over 45 mins for them to make a substitute dish. This is probably a very rare exception though - I doubt power cuts happen often!. The plants were very healthy and beautifully displayed. The decorations inside the shop are also very artistic, and has great style. This made the place very relaxing and calm."

Untold Café Business in Chiang Mai.

"Even the sale of coffee, it is not enough to succeed in coffee business," explained Chat. With regard to the coffee itself, one cup of hot coffee can earn more profits than a cold one because hot plain coffee does not add any extra cost of ingredient, as does just only shot of coffee, milk and hot water, while cold coffee comes with many things adding such as condensed milk, whipped cream and syrup, resulting in lower profit. Thudsanaporn Thummapunya, age 24, head barista said, "Despite of low profit on making one coffee per patron, Thai old style ice coffee has become a signature in Woo Café, which almost every customer orders."

Chat explained that café businesses in reality do not gain great profits if they are selling only coffee because there are many costs that increase to provide expected comfort to the customers -- key elements are free Wi-Fi, free electricity, and cool air-conditioned surroundings. This reduces the profit per cup of coffee when doing café business. But, Woo Café has come up with menu with light snack or lunch to keep business run, as well as the sale of antique and home furniture, showed within the café.

Woo Café provides lunch along with coffee; food choices include, for example, Khoa Yam, a Southern Thai cuisine of rice covered with herbs and special sauces, which is one of the more popular dishes. Food and desserts here have been claimed to be just as tasty as they look. Served in big portions, the dessert looks particularly palatable as many clients have mentioned.

The café decoration is another significant concept providing success for coffee shops. Even Starbucks, one of the major and triumphant cafés in this business under the management of American entrepreneur, Howard Schultz, at first aimed to conceptualize Starbucks as the meeting place for friends and having a bite. The original concept has become a fundamental core of being a successful café. Starbucks makes each café look like a home furnished with soft sofa, book cases, and tables as if customers feel like sitting in their own house. This particularly makes clients feel like they are living in their home where they can meet friends, do works, read books or just relax alone. Khun Chat emphasized that "Having a clear concept makes the café look different and distinctive than others. It can provide the clear picture of who patrons of the coffee business are and what services the café provides."

As an independent coffee shop, Woo Café, followed this concept, but distinguished itself to compete successfully. The interior design features in Woo Café change regularly as every angle of the place must look astonishing, like the scene shot in a magazine. Chat noted that the café's layout is designed as an attraction which customers can see into as they pass, enticing them to visit. The design not only draws in potential customers who pass by, but also has become a destination setting.

Social media, such as Facebook, IG, and Instagram, are nowadays the tools for promoting the café business. Clients, mostly Generation Y, always photograph wherever they go, whatever they do, and post pictures on their social media. Chat comments that "Woo Café becomes more popular since it has opened when everyone posts and talks in their social media." Due to every business linking to digital marketing, clients do know new places through social media and if pictures taken look very attractive, it draws more customers a lot, compared with other marketing channels. Thus, the café's design is good marketing as many patrons want to show their friends where they go, and the unique food they select. Shooting pictures at the Café has become a huge trend among customers; many customers come not only for drinking coffee but to shoot "selfies", placing themselves in the Café, and then displayed on social media.

Art sales, another business sideline, provide an additional source of income for Woo Café. The second floor of Woo Café houses an art gallery, periodically exhibiting the portfolios of famous local artists. The art gallery provided by Woo Café has become one of the chic venues where artists, art dealers and art lovers meet. The art gallery, open from 6 p.m. till midnight, provides another venue to visit. Another attachment of the Woo Café house is a shop where customers can look for home décor and furniture. Khun Chat explained that proving more varieties on sale is a must for doing café business since customers seeking new trends need change.

Woo Café Staff

The staff is a key factor in operating a successful café business. At Woo Café, it is clear that the staff contribute much to its outstanding reputation. Without its hospitable employees, Woo Café would not have become one of the most well-liked coffee shops in Chiang Mai. Woo Café staff are regarded as warm, welcoming and competent. They have been selected and trained according to Khun Chat's standards. From their first day working, the Woo Café crew receives training, learning by doing, working along with experienced staff. This system forces them to learn quickly. Khun Chat reported that, "All new employees work together with experienced staffs. They not only understand the job process quickly but also learn how to work with others harmoniously."

In the recruitment process, personality is the key trait—all new applicants undergo an intense oral interview by Khun Chat and his senior crew to determine whether they are suitable for Woo Café. He wants his staff to work like a family and to feel more relaxed, so that Woo Café can create a cozy and relaxing place.

Khun Chat continues to think like a server, although he is the owner, to ensure that service meets the customer's expectations. The service provided by the owner along with the other café crew amazes customers. Customers are given priority, and receive excellent service coupled with warm hospitableness. This secret foundation of friendliness is revealed – the many employees work as if they are family members because from the first day of work, they have been training and working along with the owner and others. It creates an amiable workplace environment and pleasant atmosphere for patrons.

To Khun Chat, the focused fundamental is that the staff must be well-trained and courteous. Khun Chat added that he, as the straightforward person, provides clear direction and explanation to his staff, seeking to improve service performance efficiently. Standards of conduct are clear - after three warnings, or if any one single cheating behavior occurs, the employee is fired.

The staff earns a fair paycheck, even though gratuity tips are not included in the bill. Khun Chat stated, "We pay our staff fair wages, equivalent compared with other cafés. Many café staff, in general, earn the extra income from gratuity tips included in the bills, but here we make sure our allowance is marginally competitive to our employees." That is, Khun Chat wants to ensure fairness for all of his employees. This leads to a happier workplace and increases productivity among his team. The contented staff is less likely to leave, and are more likely to engage in good citizenship behavior. Thus, his employees are trained to thoroughly understand the concepts of the Woo Café and appreciate the combination of art, coffee and food. Consequently, the staff can genuinely represent themselves as customer-oriented personnel.

Closing Section

As mentioned briefly above, much of Woo Café's successful marketing is derived from the many pictures taken in the café, which are then ubiquitously posted on various social media tools, such as Facebook, Instagram, and Twitter. This is the branding secret behind the huge success in café business. The postings are powerful marketing tools, and invite patrons, even the repeated ones, to share their café experience.

TripAdvisor, one of the most influential hospitality reviews, rates Woo Café as one of the favored cafés in Chiang Mai. In May, 2016, a post by Stephanie said, "This is a great little spot to escape the heat of the day. The drinks and food are well styled and delicious. The rice salad, served deconstructed and with blue and pink rice, was fun to eat and even more fun for the taste buds. The tom yum fried rice with a fried egg was fresh and well-seasoned. The store had beautiful crafts and goods as well ranging from ceramics to vases (reasonably priced for the quality!!). It is located in the artsy Wat gate neighborhood- would definitely recommend the tuktuk ride away from old city to this charming area."

Patrons who visited in November, 2015 commented that, "Excellent experience dining at Woo. We were in Chiang Mai for 5 days and returned 3 times. This is a contemporary cafe with art gallery and a lovely shop with high end local hand crafted wares. We had some sort of rainbow salad with 12+ ingredients and it was delightful. Highly recommended. We also brought home some Coconut black tea and monsoon tea which we have been enjoying immensely. Indoor/outdoor seating and very helpful staff." All aspects of the victorious physical environment combined with good servicescape have pictured Woo Café as one of most hospitable places to visit.

Although there are many on-going tributes posted in honor of Woo Café, some customers publicly complained despite the good servicescape provided. One patron who visited in June 2016 was not satisfied with Woo Café, but still appreciated its environment: "We ate there last night. We walked from the old city. Only a mile but through pretty scary areas. After reading other reviewers and seeing the high rating on TripAdvisor website. I thought it would be great. It was nice to have a/c, the flowers were beautiful, and art interesting. However, our food was just ok and it was the priciest restaurant we ate at in Chiang Mai."

Another complaint in November, 2015 said, "We stumbled into this lovely restaurant from the rain. A very pretty place with bunches of flowers everywhere. Very cold air-conditioning. My husband and I had Thai curries, which were fantastic. Our daughter went through about five things she wanted, all of which were sold out (despite another table getting what she wanted). She settled on spaghetti carbonara. Creamy with some odd? meat in it. About two hours later it returned with a vengeance! She had awful food poisoning for two days. We may not return there." Also, one patron posted in January, 2015 that, "Beautiful setting, Parking is limited, Coffee is poor, Cake is poor. Have heard from people as a popular place but one time is enough." In addition, one customer wrote, "Superb interior, severely overpriced pretentious food, was expecting a gastronomic trip, but was really disappointed."

Although Woo Café has applied the concept of servicescape: using a combination of good physical environment and friendly service-oriented staff to operate the coffee business, it still raises questions concerning what it is customers now look for in café business. Many customers

expect extra services than generally provided by cafés. The servicescape may influence customer's perception, yet in the café business, the patrons' considerable, fluctuating demands reach beyond the physical environmental surroundings provided. These high demands from café customers continue to mount and it raises the question whether servicescape within the café business is a sufficient tool for handling the increasing demands. Such questions remain unanswered, and the industry will need to explore yet additional services that must be provided so that the café can thrive within this intensely competitive business arena.

References

Farnham, J. (Producer), & Farnham, J. (Director). (2014). *Business Boomers, Coffee Shop Hot Shots* [Motion Picture]. The British Broadcasting Corporation. Retrieved May 2, 2016, from http://www.bbc.co.uk/programmes/b040v3ld

Fitzsimmons, J. A., Fitzsimmons, M. J., & Bordoloi, S. (2014). *Service Management: Operation, Strategy, Information Technology* (8th ed.). New York: McGrawHill.

Jullatamara, C. (2016, January 29). (C. Agmapisarn, Interviewer)

Krugman, P. (2011, January 25). *The New York Times*. Retrieved October 23, 2016, from The Opinion Pages: http://krugman.blogs.nytimes.com/2011/01/25/the-demand-side-temptation/?_r=0

Krugman, P., & Wells, R. (2015). *Microeconomics* (4th ed.). New York: Macmillian Learning.

Kunavivattanon, N. (2015, July 20). *Perfect Daily Grind.* (T. Jay, Ed.) Retrieved May 5, 2016, from Perfect Daily Grind: http://www.perfectdailygrind.com/2015/07/evolution-of-thai-coffee-culture-traditional-vs-specialty/#

McConnell, C. R., Brue, S. L., & Flynn, S. M. (2015). *Microeconomics: Principles, Problems, and Policies* (20th ed.). New York: McGraw-Hill Education.

Ratjaroenkhajorn, S. (2001). *Coffeehouse: Meanings in the cultural sphere of Thai consumerism.* Thammasat University , Faculty of Sociology and Anthropology. Bangkok: Thammasat University . Retrieved June 20, 2016

Spicer, A., & Cederstrom, C. (2015, July 21). *Harvard Business Review*. Retrieved July 26, 2016, from Harvard Business Review: https://hbr.org/2015/07/the-research-weve-ignored-about-happiness-at-work

Thummapunya, T. (2016, January 29). (C. Agmapisarn, Interviewer)

Tripadvisor. (n.d.). Retrieved June 1, 2016, from Woo Cafe & Art Gallery: https://www.tripadvisor.com/Restaurant_Review-g293917-d7311313-Reviews-Woo_Cafe_Art_Gallery-Chiang_Mai.html

Warner, J., Talbot, D., & Bennison, G. (2012). The cafe as affective community space: Reconceptualizing care and emotional labour in everyday life. *Critical Social Policy, 33*(2), 305-324.

Woo Cafe & Art Gallery. (2017, July 27). Retrieved July 29, 2016, from TripAdvisor: https://www.tripadvisor.com/Restaurant_Review-g293917-d7311313-Reviews-Woo_Cafe_Art_Gallery-Chiang_Mai.html

Xu, J. (2003). Coffee. *Journal of Agricultural & Food Information, 5*(3), 79-86.

Tools for Sustainable Resource Development: A Case Study of the Environmental Infrastructure in the Mae On Climbing Area, Chiang Mai, Thailand

Matthew Foley *

Abstract

Natural resource recreation areas can be a source of economic stimulus for rural areas. Communities often look to tourism as a way to bring much needed money to local areas. Communities may seek to capitalize on their wealth of natural resources by creating recreation areas to draw tourists. While these areas may provide economic benefits to local, often rural, communities, it is important that these areas are developed sustainably in order to ensure their viability and retain their attraction for tourists. One way to achieve sustainability of natural resource recreation areas is to implement an environmental infrastructure, an infrastructure that promotes sustainability and seeks to lessen the environmental impact in natural recreation areas. Implementation of an environmental infrastructure can facilitate access to natural areas while at the same time limiting the negative effects that tourism has on the area. This study examines the 'environmental infrastructure' put into place in the Mae On climbing area in Chiang Mai Thailand. The environmental infrastructure created in Mae On can be seen as providing both a physical and normative infrastructure for those accessing the area.

Keywords: Sustainable development; infrastructure; environmental infrastructure; natural resource; recreation; tourism; Thailand

* International Affairs Lecturer, Khon Kaen University International College, Khon Kaen, Thailand.
e-mail: Matthew@kku.ac.th

Introduction

Tourism is one of the largest industries in the world and makes up the substantial part of foreign exchange earnings for developing nations (UNTWO, 2003:1). Unfortunately, these benefits often come at the expense of the "ecological sustainability" of areas, especially in mass tourism destinations (Kontogeorgopoulos, 1999:316). Mass tourism is also known to often negatively affect the economies and cultures of host communities (Leksakun-dilok & Hirsch, 2008). In countries like Thailand, where a substantial segment of the economy is driven by tourism, the need for sustainable practices in tourism development is being increasingly realized. (Kontogeorgopoulos, 2014:107). Infrastructure may play an important role in addressing the negative environmental effects tourism has on an area. Identifying successful models of infrastructure development can help local communities create sustainable natural resource recreation areas. The creation of successful infrastructure models may be especially helpful to local areas that do not benefit from government regulation, such as areas outside of national parks or conservation areas.

This study was conducted at a rock climbing area known as Crazy Horse Buttress in Mae On, Thailand. This paper focused on the infrastructure adopted at the Crazy Horse climbing area. 'The aim of this study was twofold, first, to examine and describe the current infrastructure at the Mae On climbing area and second, to investigate whether the infrastructure at the area was perceived by climbers as successful in creating a sustainable natural resource recreation area.

The success of the infrastructure in this area was gauged by the perceptions of climbers accessing and using the area. Interviews and surveys were given to climbers to measure their perceptions of the infrastructure at the study site. In-depth interviews were also conducted with the developers of the site and local government officials to gain a background understanding of its development and goals.

Mae On

Located 35 km from Chiang Mai, the Crazy Horse Buttress has become a popular spot for adventure tourists and residents alike to spend their days scaling up the vertical limestone faces. This area, located in the Mae On district, was initially developed by a group of local climbers in 1998 with support from the local government (B. Waechagit, personal communication). Since its creation, the area has grown in both popularity and size, making it one of the most popular climbing areas in Thailand after Railay in Krabi, Thailand. It is important to note that while the Mae On climbing area continues to be supported by the local government, the area is not located in a national park or conservation area. As such, the area does not enjoy many of the protections such a designation would provide.

The development of a rock climbing area depends on the type of rock found in the area and the types of protective equipment needed by climbers to use the area safely. Some forms of rock, such as granite, can be climbed using traditional protection, such as spring-loaded camming devices that can be placed in the rock and used to attach a rope. Other areas, such as the Mae On climbing area, require bolts to be inserted and secured in the rock as points of protection. In general, developing a climbing area consists of three parts, as follows: 1) preparing the rock for climbing (i.e., clearing loose rocks, debris, and vegetation; 2) placing bolts and anchors in the rock to ensure protection while climbing; and, 3) creating an infrastructure to access the area and serve visitors. Creation of an infrastructure at a climbing area is optional and is usually dependent on the amount of visitors accessing the area, with smaller unpopular climbing areas often having little or no infrastructure in place.

Much of the infrastructure in Mae On was developed by Chiang Mai Rock Climbing Adventures (CMRCA), a locally based guiding company, often in collaboration with the local government and local climbers (J. Morris, personal communication, December, 29, 2014). Until recently, there were two guide operators in the area (the Peak and CMRCA), but the Peak discontinued operations in the area leaving CMRCA as the sole manager of the area (B. Waechagit, personal communication, August, 8, 2015). CMRCA continues to manage the area and often works with local climbers to host events, such as Crag Cleanup Days and tree plantings during which the area is cleaned and infrastructure is repaired (Tree planting, n.d.).

Literature Review

Natural resource recreation areas can be a source of economic stimulus for rural areas. Communities often look to tourism as a way to bring much needed money to local areas. Alternative forms of tourism, such as adventure tourism, that utilize natural resources for recreational purposes are increasingly “promoted as an environmentally safe way for rural communities to generate income from natural resources” (Kline, 2001:1). Adventure tourism is usually classed as an alternative form of tourism and is defined “as a trip that includes at least two of the following three elements: physical activity, natural environment and, cultural immersion” (UNTWO: 2014:1).

Adventure tourism is often developed on a smaller scale than traditional mass tourism, with a greater focus on sustainability. It is argued that alternative forms of tourism, such as adventure tourism, often result in fewer negative environmental impacts because they are usually smaller in scale than traditional tourism (Kline, 2001:9). Also, because adventure tourism relies on a pristine natural environment to attract adventure tourists, development of natural resources for recreation are often accompanied by strong incentives for conservation (UNWTO, 2014:35). The sustainability and small scale of adventure tourism makes it a viable alternative to traditional natural resource-based development, especially in rural areas (Kline 2001:9). In some cases, adventure tourism offers an opportunity to replace extractive natural resource-based forms of development with new economies based around the natural resources themselves. In other cases, adventure tourism may provide opportunities for local communities to open new areas in a managed and sustainable way.

While tourism has the potential of offering economic growth, this growth does not come without costs. While all forms of tourism inevitably have some affect on their destinations, traditional mass tourism has long struggled with a negative reputation due to the negative environmental and social impacts that often accompany its development. While this criticism may not always apply, there is an emerging consensus that many of the problems associated with mass tourism arise from a lack of adequate planning, management, and infrastructure (Neto, 2003:12). While adventure tourism has the advantage of being smaller in scale and, thus, easier to manage, caution should still be exercised. It is problematic to assume that alternative tourism and small scale development offer a panacea to the problem of sustainability, because, as it has been correctly noted, "many forms of alternative tourism, such as ecotourism, are located in highly sensitive and vulnerable environments, some of which cannot withstand even moderate levels of use, and which often have little or no infrastructure to deal with development" (Butler,1999: 13). While it is true that tourism occurring in highly sensitive areas has a higher chance of leading to environmental degradation, implementing a stringent development plan can offset potential negative effects. This highlights the important role that infrastructure can play in the sustainable development of tourism areas, regardless of whether they are large or small.

While studies have shown that development of natural resource recreation areas can provide economic benefits to local and rural communities, it is important that these areas are developed sustainably. This brings us to an important question – what exactly is sustainable development? Sustainable development has become a ubiquitous phrase that permeates many fields of academic literature. While there have been numerous attempts to define this commonly used concept, arriving at a universal definition seems impossible given the fact that "the very success of the term lies in the fact that it is indefinable and thus has become all things to all interested parties" (Butler, 1999: 11).

The most common definition given to sustainable development comes from the Brundtland Report, which stated that sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987: 43). While this definition forms the basis of what is considered sustainable development, scholars, especially in the field of tourism, have sought to provide more robust definitions in an attempt to discern aspects or characteristics that accompany sustainable development. However, without a universal concept to which we can anchor the concept of sustainable development, scholars have often resorted to focusing on certain aspects that are believed to aid in creating sustainable practices. As a result, the definition of sustainability among scholars has varied from stakeholder participation (Reed 2008), to the importance of infrastructure (Eber 1992; Kline 2001) to the political, social, economic, ecological, and cultural contexts of sustainability (Henry and Jackson 1996; Bramwell 1996).

Environmental Infrastructure

This research highlights the importance that infrastructure plays in creating and developing sustainable structures in natural resource recreation areas. For this study, the term 'environmental infrastructure' is used to define the framework of infrastructures, both hard and soft, that have contributed to sustainable practices at the Chiang Mai climbing area in Mae On. Environmental infrastructure has been defined as "any capital asset that utilizes environmental resources to provide a community service" (Environmental Infrastructure, n.d.). The term is usually associated with hard infrastructures created by governments or municipalities to deliver public goods, such as drinking water, wastewater, storm-water, and other services in an environmentally sustainable manner (Environmental Infrastructure, n.d.). For the purpose of this research, this definition has been re-conceptualized to include not only the hard infrastructures developed to ensure environmental protection, but also the soft infrastructures that were involved in creating normative frameworks for those accessing the area. Reimagining the term environmental infrastructure shifts the focus away from infrastructures that are created sustainably to structures that contribute to the environmental sustainability of an area, moving infrastructure away from its traditional role as a passive structure and assigning it a new role as an active agent.

The environmental infrastructure present in Mae On consists of both hard physical structures and soft normative infrastructures that work symbiotically to form an overall sustainable structure. The physical or hard infrastructure includes an access road, a parking area, trail networks, garbage receptacles, water stations, public restrooms, signage, and an information kiosk. These structures fulfill various roles integral to protecting the natural environment and limiting environmental degradation by those accessing the area. A dedicated parking area provides added convenience and influences visitors not to park in environmentally sensitive areas. Located in the parking area are garbage collection sites that encourage responsible waste management. A water station is also located in this area, which encourages the use of reusable bottles by visitors. Public restrooms are also located in the parking area. Trails have been created that are clearly marked to limit visitors from walking off the trail, which reduces encroachment into the surrounding forest.

While these physical structures on their own serve to protect the natural environment, they are not the only structures utilized in this area. Normative structures that outline important rules of behavior within the area help to support the physical structures and the area's overall sustainability. These normative structures can be seen as being as important as the physical infrastructure, because they encourage behavior that promotes the proper use of the physical infrastructure. The lack of a strong normative infrastructure to guide behavior will undermine the usefulness the physical infrastructure.

The normative structures seen in Mae On consist of two types, including those related to the environment and those related to local culture. Located in the center of the parking lot is the information kiosk. This kiosk communicates rules and standards required of those accessing the area. The kiosk also provides a guide for accessing local culture in the area and provides information about other cultural destinations in the Mae On area. Signage posted throughout the climbing area serves to reinforce the importance of proper garbage disposal. CMRCA also provides additional information about accessing local culture, and guidelines for cultural behavior in a published guidebook of the area (Morris & Uppakham, 2004)

Methods

This research adopted a mixed methodology consisting of on-site observation, surveys, and in-depth interviews. The use of multiple data sources allowed for data triangulation to enhance the dependability of the findings (Lincoln and Guba, 1985). In-depth interviews were conducted with two groups – the developers of the area and climbers who use the area. The developers of the area were interviewed to obtain background information and to gain knowledge about their area development goals. Two climbers were selected for interviews. Open-ended questions were used to obtain a greater understanding of their experience using the area. Additionally, a group of 62 climbers were surveyed at the area between December 2014 and September 2015. Surveys were conducted during both high and low season to capture a wide variety of survey participants. Participants were given questions using a Likert scale survey that focused on the environmental infrastructure at the study site. The survey measured climber perceptions of the environmental infrastructure at the study site. Climbers were asked to provide background information, including age, visitor status (tourist or local resident), number of visits to the area, money spent locally, and their preference to use or not use local services.

The questionnaire consisted of 26 questions in total, 12 of which focused on the infrastructure of the area. The other questions elicited additional information that may be used in a follow-up study. Of the 12 questions that were used, 7 elicited demographic and behavior information and 5 related to respondent perceptions of the environmental infrastructure of the study area. The Data was analyzed using Microsoft Excel 2010 (Microsoft Corporation, Redmond, WA, USA).

Results and Discussion

In total, 18 residents and 45 tourists were surveyed for this study. The average age for residents visiting the area was 35.67 and 32.53 for tourists. Residents had higher rates of visitation with 86.94 times visited while tourists had an average of 5.71 times visited. Tourists spent the most per visit with an average of 526.61 baht while residents on average spent 338.24 baht per visit. (Table 1)

Table 1

Resident & Tourist Demographic (Average)

	Resident	Tourist
Tourist or Resident	18	45
Age	35.67	32.53
Times visited	86.94	5.71
Amount spent per Climber (baht)	338.24	525.61

Participants were found to have a positive overall perception of the infrastructure at the Mae On climbing area. For respondents in the resident group, 68.5% and 19.5% of respondents strongly agreed and agreed with the questions relating to overall infrastructure, respectively. Neutral and disagree opinions were reported by 10% and 2% of respondents, respectively. For respondents in the tourist group, 48% and 34.8% of respondents strongly agreed and agreed with the questions relating to overall infrastructure, respectively. The remaining 16% reported a neutral opinion. No participants in either group reported strong disagreement (Table 2 & 3).

Table 2

Resident perceptions regarding the positive aspects of the infrastructure at Mae On in percent

	Resp. 1	Resp. 2	Resp. 3	Resp. 4 (%)	Resp. 5 (%)	No Resp.
Question 07	0	6	11	33	50	0
Question 09	0	0	0	28	72	0
Question 10	0	0	5	17	78	0
Question 15	0	0	6	11	83	0
Question 23	0	6	16	11	67	0
Question 26	0	0	22	17	61	0
Average	0	2	10	19.5	68.5	

Table 3

Tourist perceptions regarding the positive aspects of the infrastructure at Mae On in percent

	Resp. 1	Resp. 2	Resp. 3	Resp. 4	Resp. 5	No Resp.
Question 07	0	0	4	51	44	1
Question 09	0	0	8	16	76	0
Question 10	0	0	11	24	64	1
Question 15	0	0	7	51	42	0
Question 23	0	0	44	31	22	3
Question 26	0	0	22	36	40	0
Average	0	0	16	34.8	48	

Table 4

Question Response Average (out of 5)		
Status	**Residents**	**Tourists**
Question7	4.28	4.4
Question9	4.72	4.67
Question10	4.72	4.53
Question 15	4.78	4.36
Question23	4.39	3.77
Question26	4.39	4.18

The results from tables 2, 3 and 4 are analyzed in order of question.

Question 07- Signs and Literature at the climbing area help raise environmental awareness- This question received the lowest percentage of strongly agree with only 50% of residents surveyed answering 5, 33% answered agree, 11% answered neutrally, and this question also had one of the highest amount of participants disagreeing at 6%. Of the tourists surveyed 44% answered 5, 51% answered 4, and no respondents were neutral or disagreed. The response average out of 5 points was 4.28 for residents and 4.4 for tourists.

Question 09- Designated trails, parking and toilets at Crazy Horse help minimize the environmental impact- In this question 72% of residents responded with 5, and 28% responded with 4, none of the residents chose neutral or disagreed for this question. Of tourists 76% chose 5, 16% agreed and 8% were neutral. The response average out of 5 points was 4.72 for residents and 4.67 for tourists.

Question 10- CMRCA encourages minimum environmental impact at the climbing area- In this question 78% of residents chose 5, 17% chose 4, and 5% were neutral with no participants disagreeing. 64% of tourists chose 5, 24% selected 4, 11% were neutral. The response average out of 5 points was 4.72 for residents and 4.53 for tourists.

Question 15- Crazy Horse has been developed in an environmentally sustainable way- This question had the highest percentage of strong agreement in the study with 83%, 11% also agreed, while 6% were neutral. Of the tourists surveyed, only 42% strongly agreed, 51% agreed and 7% were neutral. The response average out of 5 points was 4.78 for residents and 4.36 for tourists.

Question 23 Information and literature provided by CMRCA has helped raise my cultural awareness- Of the residents surveyed 67% strongly agreed, 11% agreed, 16% were neutral, and 6% disagreed. This question had the lowest percentage of strongly agree at 22%, 31% agreed, and 44% were neutral making it the highest neutral response for the survey. The response average out of 5 points was 4.39 for residents and 4.77 for tourists.

Question 26- Signs and information has helped to create a positive experience at Crazy Horse- Residents responded with 61% for strongly agree, 17% with agree, and 22% as neutral, which was the highest neutral score for the residents. 40% of tourists strongly agreed, 36% agreed, and 22% were neutral. The response average out of 5 points was 4.39 for residents and 4.18 for tourists.

Other Survey Results

Participants filling out surveys were also able to add comments at the end of the survey. A majority of the comments pointed to a positive perception of the area and its infrastructure but some did not. Table 5 shows the additional comments written on the surveys along with the survey reference number. A total of 12 comments were documented, 7 of which expressed positive feelings about the area, 2 were mixed, 1 was addressing other topics, and 2 expressed problems with the current infrastructure. The positive comments highlight positive perceptions of the area including infrastructure, development and overall cleanliness of the climbing area. The 'mixed' comment addressed the lack of directional signage to the climbing area and praises the water station located in the parking lot. One commonality that is found in both the 'other' and 'critical' comments is the problem of inadequate signage concerning local information. As mentioned earlier in this paper, this information is presented in the central information Kiosk in the parking lot. This kiosk includes a map of the area, local businesses, local accommodation options, and additional tourist attractions in the area. The kiosk also lists the rules for the area, which include a ban on camping. There is also additional information in the guidebook for the area (Morris & Uppakham, 2004).

Table 5

Additional Survey Comments

Perception	Comments and Survey Number
Positive	Its nice to see that the main focus on developing a crag is where cultural and environmental awareness are important. 3b
Positive	After visiting climbing area in Spain that are not used responsibly (e.g. garbage, feces everywhere) crazy horse buttress is amazing in terms of facilities that help minimize the environmental impact. 42
Positive	Crazy Horse is much cleaner than other areas where I often climb. There is not feces or garbage. 1d
Positive	It is very nice to crazy horse and I see environmentally thoughtful area. Nice to have signs to explain and raise awareness. I wonder about the teaching of environmental awareness in climbing course. 41
Positive	The toilet and water are very good. 15
Positive	CMRCA is providing an important model and example of a sustainable, environmentally informative, sensitive and economically intentional climbing community. 4
Mixed	A sign with English out the highway turn off would be very helpful. The water is so greatly appreciated. 3
Other	More accommodation provided near the crag helps to reduce environmental impact because of reducing the consumption of fuel to drive there from Chiang Mai everyday. 2
Critical	There could be more CMRCA info. The local influence is not that strong, only tourist climbers. 1
Critical	Lack of maps, signage about? Has made it hard to use local business, especially for camping. 45

Discussion

Survey results indicate an overall positive perception of the area, highlighting the success of the environmental infrastructure in this area, especially when compared with other climbing areas (table 5). It is possible to conceive that a similar model of environmental infrastructure could be replicated in other natural resource recreation areas. Recreation areas for mountain biking, rafting, kayaking and other adventure sports could be developed and promoted as a way to stimulate local economies while still achieving environmental sustainability.

As can be seen from this study, adventure tourists often visit the site repeatedly, resulting in stable revenue for the economy. This study also attempted to ascertain the amount of money spent locally by climbers visiting the area, to ensure the amount was not subject to leakage. The results showed that an average of 526.61 baht for tourists and 338.24 baht for tourists was spent locally per visit (Table 1). This amounts to a substantial source of revenue for the local Mae On community.

Unfortunately, this study was not without limitations While the elements of infrastructure that have been analyzed here may be replicable, others may not. As opposed to other climbing areas, the Mae On climbing area only has one operator, CMRCA. This has allowed CMRCA to exercise centralized managerial control over the area. While in this study, it has shown to be effective in creating a sustainable natural resource recreation area; it may not be as easily replicated in areas with multiple stakeholders.

This study also faced limitations in collecting and analyzing data. The sample size for this research was 63 participants, but the overall population accessing the area is unknown because there is no reliable data tracking climbers visiting the site. Tracking climbers is difficult because climbers do not have to register to enter the area and there is no onsite registration at the area. Previous studies of the rock climbing area in Railay, Thailand, utilized a larger population size of 111 participants (Hyslop, 2009). While this number is larger it should be taken into account that the Railay climbing area is known to be a larger, more popular climbing area than the Mae On area (The Other Thailand, 2010). A larger sample size would ensure that the data collected could result in more robust conclusions. There were also limitations to interpreting the data, especially in the case of the question of times visiting the area. For the amount of times visited, the question was asked in an open-ended format, resulting in different responses, some of which, were hard to quantify. While most climbers put their number of visits, some residents put lengths of time, which had to be averaged into number of visits. This could be remedied by creating a closed question structure. Finally, while all surveys were conducted face to face, there were instances in which, the participants did not fully understand the questionnaire because of language differences or other factors. This problem could be resolved by creating clearer surveys in future research.

Conclusions

The growth of tourism, especially in developing nations shows no signs of abating. As tourism operators, local communities, and local governments are always looking for ways to increase their revenue streams, making the need for sustainable development even more pressing. Participants surveyed in this research agreed that the environmental infrastructure enacted this site contributed to the overall sustainability of the area. The environmental infrastructure model presented in this study could be replicated in other natural resource recreation areas, including those not related to climbing. This is especially useful for the development of areas that lie outside of national parks or conservation areas. Most importantly, this research shows that development of sustainable areas can contribute to local economies without sacrificing the environment in the process.

Acknowledgements

The author gratefully acknowledges all the people that assisted with this research, without which, it would not have been completed. The author would like to especially thank Josh Morris from CMRCA, the local administrators of Mae On and climbers who gave up their time to assist with this research.

Teaching and Learning Objectives of this case:

This case study offers insights several areas relevant in the field of development and local administration, including: development, tourism, local administration and sustainability. From a developmental standpoint this research shows the importance planning can have on creating sustainable structures that, in this case, are used for tourism. Important questions asked in this study are:

1) What is sustainability? And how can it be measured?
2) How can planning help create infrastructures that promote sustainability?
3) What is the importance of normative structures in creating sustainability?
4) How can local governments replicate this model in other areas, even those not specifically related to climbing?
6) Could this infrastructure be adopted in pre-existing areas?

References

Arragon Ware, M. (2010, March 11). The Other Thailand. *Climbing.com*. Retrieved August 8, 2015.

Butler, R. W. (1999). Sustainable tourism: A state-of-the-art review. *Tourism geographies, 1*(1), 7-25.

Global Report on Adventure Tourism: Am reports: Volume nine. (2014). Madrid: World Tourism Organization.

Hawkins, D. E., & Khan, M. M. (1998). 11 Ecotourism opportunities for developing countries. *Global tourism*, 191.

Hyslop, C. M. (2009). *Sustainable tourism understanding development goals for rock climbing businesses in Krabi Province, Thailand* (Unpublished master's thesis).

Kline, J. D. (2001). *Tourism and natural resource management: a general overview of research and issues*. US Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Kontogeorgopoulos, N. (1999). Sustainable tourism or sustainable development? Financial crisis, ecotourism, and the'Amazing Thailand'campaign. *Current Issues in Tourism, 2*(4), 316-332.

Kontogeorgopoulos, N., Churyen, A., & Duangsaeng, V. (2014). Success factors in community-based tourism in Thailand: The role of luck, external support, and local leadership. *Tourism Planning & Development, 11*(1), 106-124.

Leksakundilok, A., & Hirsch, P. (2008). Community-based ecotourism in Thailand. In J. Connell & B. Rugendyke (Eds.), Tourism at the grassroots: Villagers and visitors in the Asia-Pacific (pp. 214–235). London: Routledge.

LGD: Environmental Infrastructure. (n.d.). Retrieved June 21, 2016, from http://www.cscd.gov.bc.ca/lgd/pathfinder-environment.htm

Lincoln Y.S., Guba E.G. (1985). Naturalistic Inquiry. Beverly Hills: Sage Publications Inc.

Morris, J., & Uppakham, K. (2004). *A guide to rock climbing in Northern Thailand*. Chiang Mai, Thailand: Nopburee Press.

Neto, F. (2003, August). A new approach to sustainable tourism development: Moving beyond environmental protection. In *Natural resources forum* (Vol. 27, No. 3, pp. 212-222). Blackwell Publishing Ltd.

Nguangchaiyapoom, S., Yongvanit, S., & Sripun, M. (2012). Community-based tourism management of Ban Prasat Non Sung district, Nakhon Ratchasima province, Thailand. *Humanities & Social Sciences, 29*(3), 191-207.

Reed, M. S. (2008). Stakeholder participation for environmental management: a literature review. *Biological conservation, 141*(10), 2417-2431.

Thai Cultural Considerations. (2013). Retrieved June 21, 2016, from http://www.thailandclimbing.com/thai-cultural-considerations/

Tree Planting at Crazy Horse Buttress - Chiang Mai Rock Climbing Adventures. (n.d.). Retrieved June 21, 2016, from http://www.thailandclimbing.com/courses/tree-planting/

Water, Trash, Toilets. (2013). Retrieved April 18, 2015, from
http://www.thailandclimbing.com/water-trash-toilets/

World Commission on Environment and Development. 1987. *Our Common Future.* New York: Oxford University Press.

Vehicle Routing and Scheduling Problems Research Based on Nantian Logistics Company

Xie Fahui[1]
Thammanoon Hengsadeekul[2]

.

Abstract

Modern logistics is the third important source in generating greater business profits for the enterprise apart from material cost reduction and labor productivity in product. Moreover, it is also the important way to reduce business operation cost and to enhance the market competitiveness of enterprises' products. Vehicle is one part of the most important business activities of logistics enterprises, and the vehicle routing problem (VRP) is the core issue that related to logistics distribution efficiency and cost control.

This paper is about VRP in the logistic company, and it is based on genetic algorithm (GA). GA is an algorithm with characteristics of global optimization and parallelism. It can make up the defects of traditional optimization methods. The mathematical model of the VRP for GA and an improved genetic algorithm is proposed for the VRP in this paper. Author adopted the natural number sequence of coding method for VRP, the roulette wheel selection method for individual selection, and auto-adaptive probability system for different crossover probability and mutation probability according to the value of the individual fitness in the process of the crossover and the mutation. It improved the existing ability of the excellent individual, guaranteed the whole healthy of the evolution. This algorithm can find the optimal or nearly optimal solution for the vehicle routing problem effectively, which is proved by a number of numeration provided by this paper.

Keywords: Modern Logistics, Vehicle Routing Problem, Genetic Algorithm.

[1] Graduate Student, School of Logistics and Supply Chain,
Naresuan University Muang, Phistnulok, Thailand, 65000
e-mail: xiefahui2014@gmail.com

[2] D.Eng., Lecturer, School of Logistics and Supply Chain,
Naresuan University 4th FL. Electrical & Computer Engineering Building, Muang, Phisanulok, Thailand, 65000
e-mail: thammanoonh@gmail.com

Introduction

Vehicle is one part of the most important business activities of logistics enterprises, and the vehicle routing and scheduling problem is the core issue that related to logistics distribution efficiency and cost control. Making vehicle routing and scheduling carefully is so vital that whether company can reduce the cost, make quick response to customers' demands, improve service quality and gain more customers' satisfaction or not. Besides, to select the appropriate transportation vehicle routing can not only reduce the distribution scope, but also reduce fuel cost and vehicle consumption, and then it will improve the income of logistics, and it can bring benefits to the company. So the next emergency problem is how to make a good vehicle routing and scheduling. And another problem needed to be concerned is the vehicle routing and scheduling algorithm.

According to the problem of the relative importance of space and time characteristics, researcher (Raff, S., 1983) boiled the vehicle routing problem down to Vehicle Routing Problem (VRP) and Vehicle Scheduling Problem (VSP). It is generally believed that regardless of the time request, only according to the space position to make arrangement called VRP; when considering time requirements, called VSP. In order to regulate the full text of the language, and also have not a conceptual confusion, this research unified problem to be VRP.

Problem description

1. Vehicle routing problem (VRP)

Usually, VRP can be described as follows. Assuming that distribution center O deliveries goods with the most m cars for n demand points, the load of each vehicle is bi (i=1, 2, 3,…, B), the demand of each demand point is di (i=1, 2,…, D), from point i to point j for shipping cost is Cij, from demand point i to distribution center O for shipping cost is Cio or Coi (i, j=1, 2,…, n), the load capacity of vehicle can meet the demand of any arbitrary point. So, VRP is how to arrange the vehicle and make the total transportation cost to be minimal under the condition of no overload and meeting the requirement of each demand point

2. Vehicle routing problems of Nantian

As identified by the business owner, the VRPs at Nantian logistic company are:

(1) Company cannot forecast the customers' demand accurately because demands are stochastic.

(2) Cannot arrange vehicles well for the first problem.

(3) For above two cannot(s), transportation vehicle cost of Nantian in some degrees will increase and the benefit space will decrease on contrast.

For vehicle routing efficiency, a company must have an appropriate vehicle routing and scheduling to meet their customers' requirements.

Observation of the operation process at Nantian logistic company reveals that unreasonable vehicle scheduling phenomena are causing the problems, therefore the GA is applied, as it focuses on reducing all unreasonable activities.

Objectives of the study

1. Viewing of the transportation problems of Nantian logistics enterprise, to improve and optimize the company's transportation routes and vehicle scheduling.
2. To save transportation costs and gain more benefits for Nantian logistics.

Nantian logistics profile and information

Nantian logistic company was established in early 2001, which is given priority to storage and transport business, and located in the Qianlong logistic park in south China city in Nanning, Guangxi, China. In addition, its registered asset is 3 million RMB and its business scope is mainly in the Guangxi province. Its business has developed rapidly, and so do its assets. It is a strong and comprehensive logistics company in Guangxi province. But on the transportation vehicle routing arrangement, Nantian still mainly relies on experience, and lacks of scientific and effective planning methods, so that its transportation cost is a little higher.

At present, it has more than 500 employees and more than 200 vehicles (including dump trailers, big trucks, small trucks, car trucks, commercial vehicles and trolley); area of storage over 20,000 square meters; trading network covering the whole 12 cities of Guangxi province except Wuzhou city and Hezhou city. In Nanning city, Nantian has more than 40 collecting points; it has a good city distribution network. Besides, it has built Liuzhou, Hechi, Bama and other more than 41 regional fine routes. Main transportation problems of Nantian logistics can be shown in figure as follows (Figure 1):

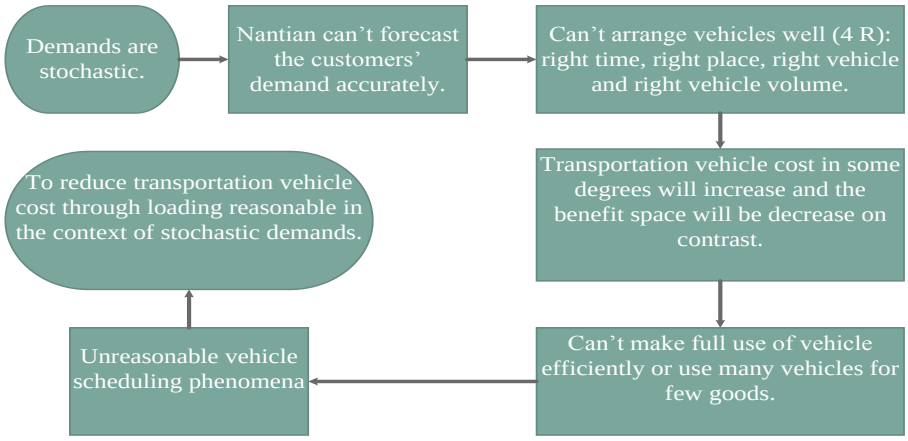


Figure 1: Main transportation problems of Nantian logistics

Source: Case writer based on interview

Literature review

Vehicle routing problem (VRP)

The VRP consists of designing optimal delivery routes from a central depot to a set of geographically scattered customers, subject to various constraints, such as vehicle capacity, route length, time windows, precedence relations between customers, etc. (Li Jun and Guo Yaohuang, 2001). The earliest study about VRP was done by Dantzig and Ramser (Dantzig, G.B. and Ramser, J.H., 1959). When they researched the project of gas transportation route optimization problem from Atlanta refineries to the gas station, VRP was proposed.

Constituent elements of VRP has goods, vehicles, logistics center, customers, transportation network, constraints and objective function, so that VRP can be divided into different kinds of VRP (Lang Maoxiang, 2003). According to the characteristics of the known information to do classification, VRP has deterministic VRP and uncertainty VRP. The uncertainty VRP can be further divided into stochastic VRP (SVRP), fuzzy VRP (FVRP) and dynamic VRP (DVRP).

Vehicle routing problem algorithms

VRP, after being brought up, the study of VRP algorithm is the research emphasis and difficulty, and has proposed many algorithms for solving VRP. The algorithm mainly divided into two categories: precision algorithm and heuristic algorithm (Raff, S. 1983).

Main problems of research on vehicle routing problem

(1) About the heuristic improvement study is not enough. (2) Research is not enough for the multi-objective VRP. (3) Research on SVRP was not enough. (4) Research on the application of VRP was not enough.

So, this article will focus on the research of stochastic VRP which is a part of uncertainty VRP with genetic algorithm, and then put the research into practical company.

Uncertainty vehicle routing problem

Before making the vehicle routing plan and the actual transportation process, not all of the objective conditions are invariable, it will always meet some uncertain factors, and the most common factor is the traffic congestion and vehicle malfunction. In many cases, data can’t accurately obtain before supplying service, such as the customer's demand quantity, the number of customers, customer request service time, vehicle speed, etc. Researching the uncertainty of VRP problem has significance for guiding the actual operation of enterprise, so we need to do further research on VRP problems with uncertain factors on the basis of traditional deterministic VRP theory and method.

Uncertainty VRP stems from the inadequacies of grasping information of path planner. According to the attribute information can be divided into accurate information, information subject to a certain probability distribution function, fuzzy information and real-time dynamic information four types, uncertainty VRP after corresponding to three types of information, namely SVRP, FVRP and DVRP.

Main problems of research on uncertainty vehicle routing problem

Considering the time window factors and the introduction of uncertainty increases the complexity of VRP problems, this sort of question for study is not enough. In the VRP with fuzzy appointments and fuzzy time window, the existing literatures are the average of customers' satisfaction as the purpose, without considering the distribution of customer satisfaction, so some individual customer satisfaction is low. VRP with stochastic time and the fuzzy demand of existing research is generally based on the fuzzy or stochastic simulation methods to optimize the mean of the objective function, but its algorithm is lack of flexibility. In view of the DVRP, many researches are the study of using real-time optimization algorithm of an insert or batch of thought, not consider the calculation of load and the urgency of the customer requirements.

VRP with uncertain factors, not only need to consider one or more of the traditional VRP goals, but in the research of fuzzy appointments, VRP with fuzzy time window to consider customer satisfaction targets at the same time, most of the existing literature uses the method of linear weighted or penalty function method, transformed into a single objective method is difficult to measure the quantitative relation among different dimensions. Therefore, we need to adopt the way of other multi-objective optimization to solve the problem of trade-offs amid multiple targets, and in this way to optimize VRP problem with uncertainty is still little.

Existing literature in the research of the VRP with uncertainty is to establish an optimal model under uncertainty factors, preliminary optimization method and the real-time optimization algorithm, etc., many models ignore the real-time optimization scheduling strategy research, and lack the perspective of real-time dynamic of modeling and optimization.

Due to the fuzzy demand and random time these dynamic and uncertain factors, the existing information is insufficient, so that it is a difficult task to make the preliminary optimization for vehicle routing planning difficult. Besides, time window has strict requirement for the delivery time, forcing scheduling algorithm should meet the requirements with rapid response, but also should have a certain ability to adapt to uncertainty factors.

Genetic algorithm (GA)

In recent years, global convergence analysis of GA has made breakthrough progress. Goldberg and Segrest (1987) firstly analyzed a very simple performance of GA with Markov chain; Eiben etc. (1990) proved an abstract global convergence of GA based on keeping the best individual with Markov chain; Fogel (1990) analyzed the asymptotic convergence of GA that has no mutation operator; Suzuki (1998) analyzed the convergence behavior of GA with the characteristics of the state transition matrix of Markov chain; Qi and Palmieri (1994) has carried on the strict mathematical analysis for floating-point coding GA based on Markov chain, But the analysis is just based on group infinity this hypothesis; Rudolph (1998) proved that the standard GA convergence is less than the global optimal solution with homogeneous Markov chain, but the global convergence of GA will be improved with reserving the best individual selection mechanism. The GA has fast convergence speed, and strong global optimization ability to avoid prematurity, and has a reasonable standard of downtime.

GA is an adaptive global random search method, which get inspiration and enlightenment from the law of the evolution. Due to the overall search strategy of GA and optimized calculation does not depend on the characteristics of gradient information, so it has a very wide range of application scope, especially suitable for dealing with the complicated nonlinear problem that traditional search method cannot solve.

And we can also summary the characteristics of GA and its steps according to the above literature review.

1. The characteristics of GA

(1) GA works on the code set of the problem parameter, rather than on the parameter itself. The processing object of GA is chromosome. Therefore, it requires changing the basic parameters of optimization problem into a fixed priority symbol of chromosomes.

(2) GA searches from the initial group, rather than searches from a single point. Many traditional optimization methods are derived from searching the single point of space, to determine the next point through certain transformation rule. This kind of point to point search method firstly find may not be the optimal peak in multimodal optimization problems. But the optimization process of GA begins with point set, and its initial population is randomly selected in the search space. So, the probability to achieve the optimal peak is greater than the probability of point to point method.

(3) GA only uses the fitness function in the process of searching information, without derivative and other auxiliary information. For different types of optimization problems, traditional methods require different forms of auxiliary information, no any optimization methods is able to meet the requirements of all kinds of problems. GA abandons the use of the auxiliary information in the optimization process, has extensive adaptability.

(4) GA uses probability transformation rule to adjust the search direction, not certain rule. No unified relationship among the generation of groups. But using probability transformation rule doesn’t mean that this kind of method belongs to the category of random algorithm, it just uses a random transform as a tool to adjust the searching process to tend to areas of continuous improvement of the objective function.

(5) Compared with traditional methods, the superiority of GA mainly displays in: firstly, GA has strong search ability and a large probability to find the globally optimal solution under the action of genetic operators; Secondly, because of its inherent parallelism, large-scale optimization problems can be effectively dealt with.

2. Steps of the simple GA

(1) To structure chromosomes those meet the constraint conditions.

(2) Randomly generate an initial population.

(3) To calculate the fitness of each chromosome. Fitness is the sole indicator to reflect the good and bad level of the chromosome. GA is to find the largest fitness of chromosomes.

(4) To generate sub-population with the replication, crossover and mutation operator.

(5) To repeat step (3), (4) until the termination condition is satisfied.

Like this, to repeat step (3) to step (5) again and again, make the population evolution generation by generation. Finally, get the most adaptive individual fitness value and the most optimal solution of the problem, the flow chart is shown in figure 2.

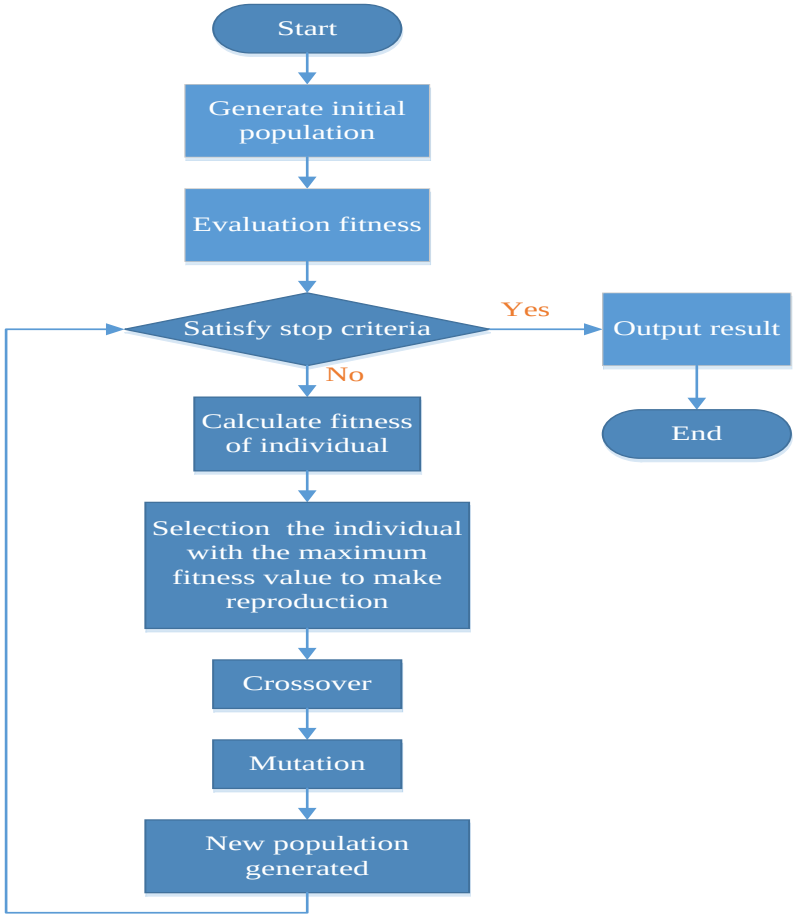


Figure 2: GA flow chart

Source: Case writer based on literature review

Vehicle routing problems solved by genetic algorithm

J. Lawrence is the first person who put the genetic algorithm into VRP research and made an effective result for VRP with time window. But traditional GA is a large range, coarse-grained optimization algorithm, Barnier combined it with constrain satisfaction problem (CSP) so as to reduce the search space and reduce the complexity of objective function and genetic constraints. Currently GA can already solve large-scale problems (LIU, Y. Z., and Xuan, H. Y., 2005).

How does this article differ from those in literature? And how does it contribute to the field?

Most published research for the VRP focused on the development of heuristics. Although the development of modern heuristics has led to considerable progress, the quest for improved performance still continues. Genetic algorithm has been used to handle many combinatorial problems, including certain type of VRP. This study focuses to describe a GA that we have developed for the VRP, that we can know this approach can be competitive with other modern heuristic techniques in terms of solution time and quality. The generate problems of vehicle routing and scheduling in logistics enterprises and using the GA to optimize VRP will be shown in this study. But, the traditional GA has a defect of premature convergence. Aiming at this issue, this study improves the standard GA in terms of chromosome encoding, the adaptive operator mechanisms and dealing with its defect. At last, improving the computational convergence and overcoming the premature phenomena to optimize VRP.

The case study tries to solve vehicle routing problem existed in Nantian Logistics. After analyzing the problem in the company, proper method is adopted to reduce the transportation cost and increase benefit space. The method proposed in this case study, to some degree, can solve the problem of Nantian Logistics and be beneficial for other logistic company as well.

Methods

Here will present the methodology of this study, including roadmap, methods and design of improved GA. The detail of each topic is described below.

Roadmap

The research method of this article, on the whole, is to do the literature research, algorithm design, model building, algorithm implementation, case application and evaluation, and finally with a discussion of the result.

In order to have a more intuitive understanding for the research methods, the following (Figure 2) is the research roadmap.

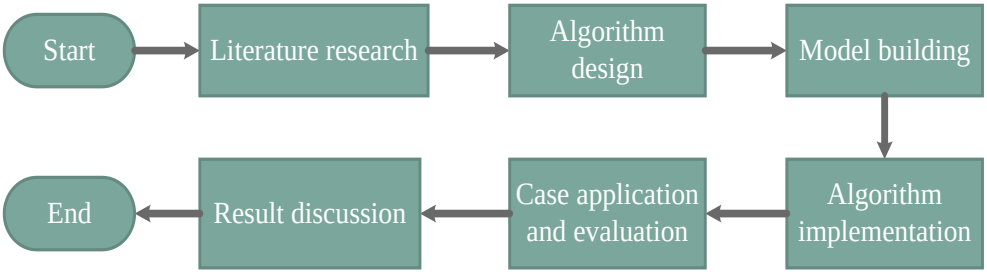


Figure 3: Research roadmap

Source: Case writer based on study structure

Methods

1. Case study

This study researches the VRP based on case study. In the case study part, firstly introduce the information and transportation problems of the participant (Nantian logistic company) to understand the details of the case. And then carry out the implementation of GA. Finally, we can see an effective and efficient vehicle scheduling in Nantian.

2. Participant—Nantian Logistics Company

Nantian logistic company is a transportation enterprise in Nanning, Guangxi, China, which has relatively mature logistics transportation system in Guangxi. The reason why to choose Nantian is that writer study undergraduate course at Guangxi University and also has a chance to know this company. Although the author now study graduate course in Naresuan University, Phistnulok, Thailand, for the language problem, to choose Nantian. In addition, the transportation problem of Nantian is matched to the problem of this study.

3. Method of data collection

Data is obtained through observation and interview. The writer has an on-the-spot investigation of the Nantian logistics company to talk with the manager and staff of the company, and also with observation to understand the operation and vehicle routing of Nantian. Most of the data are obtained by interview manager of Nantian. It is of authority and persuasiveness.

4. Method of data analyzing

After getting enough data information, the next step is to apply these data into the algorithm. In this study, to analyze data is coded first and then analyzing according to date with application software VC++.

Design of improved GA

1. The overall process of design

In this study, the detailed process of solution based on the design of GA is shown in the figure below: (1) initial population is obtained by random function, and also with the first generation of the individuals; (2) calculate the fitness value of each individual; (3) record the largest individual fitness value, genetic code and function value of the most contemporary fitness; (4) determine whether the evolution generation meet the requirement, and then to stop counting and output result if meet requirement, otherwise to continue to evolve; (5) to choose the next generation of individuals with the roulette wheel method according to the fitness value; to cross individual according to the crossover probability; (6) after cross individuals, to mutate according to the mutation probability, eventually to form a new population, and then return step (2). The overall process design is shown in figure 4.

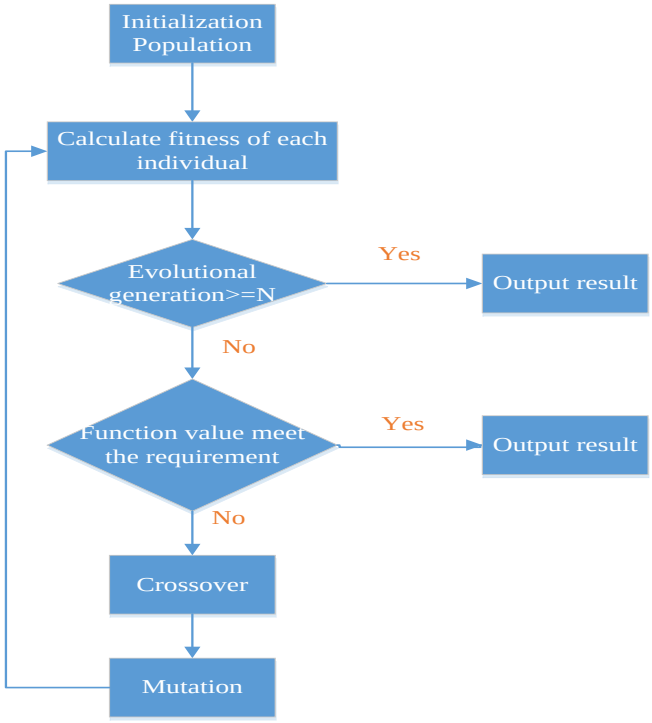


Figure 4: Overall process design

Source: The case writer

2. Produce initial population by constructing individuals

Coding with natural numbers, that is, each individual (marked as i) is a full permutation of natural numbers from 1 to n, where each natural number corresponds to the demand number in the distribution system. The order of each natural number in each individual is the actual delivery order of all transport vehicles, transport vehicles are running start and end of distribution center, where each vehicle starts from the distribution center, and return to the distribution center after finish distribution task.

3. The calculation of fitness

Calculate the corresponding feasible solution (the feasible vehicle routing and the required number of vehicles) for each individual respectively, according to the demand of each point and vehicle loading capacity.

4. The judgment of cycle stop

To determine whether reach to stop evolution condition, such as meet the requirement of the number of iterations, or the result meet certain requirements, if so, end the cycle and select the individual that has the largest fitness value and then output its corresponding path to be as the optimal solution of original problem; Otherwise, enter into the next step.

5. Choosing, crossover and mutation

With the roulette wheel selection method to choose the individual enter the next step of crossover and mutation.

In each generation population, with a certain crossover probability to cross and reorganize the individual, the crossover probability is adaptive probability, and its formula is as follows:

$$Pc = \begin{cases} Pavg - \dfrac{(Pavg - Pmax)(f - favg)}{fmax - favg}, & f \geq favg \\ pavg, & f < favg \end{cases}$$

Pc is the crossover probability of individuals i1 and i2 in the population;

Pavg is the basic crossover probability in the population;

Pmax is elite crossover probability used when the individual fitness value is bigger than average in the population;

f is the bigger individual fitness value between individual i1 and i2;

favg is the average fitness value of the population;

fmax is the largest fitness value in the population.

In this way can effectively strengthen the genetic ability of excellent individual and protect it enter the next generation. For individual whose fitness value is lower than the average, to adopt the bigger crossover probability can increase the eliminate probability of the weak individual. But at the same time, it can ensure that the best individual will not possess complete dominance in the early evolution, and also reduce the probability of the emergence of the locally optimal solution.

Mutation of species is of much less likely, so the mutation operation in the GA is only a supplementary role. The mutation probability of every generation is adopted adaptive mutation probability to improve the individual mutation.

$$Pm = \begin{cases} pmavg - \dfrac{(pmavg - pm\ max)(fm\ max - fm)}{fm\ max - fmavg}, & fm \geq fmavg \\ pmavg, & fm < fmavg \end{cases}$$

Pm is the mutation probability of individual i1 in the population;

Pmavg is the basis mutation probability of the population;

Pm max is elite mutation probability used when the individual fitness value is bigger than the average value in the population;

fm is the fitness value of individual i1;

fmavg is the average fitness value of the population;

fm max is the biggest individual fitness value of the population.

At the same time, adopt the reverse mutation for the individual of natural number coding. Specific process describes as follows: randomly generated an individual temp = "1,2,3,4,5,6,7,8,13,12,11,10,9" and two mutation point 2 and point 6, namely the temp = "1, |2,3,4,5,6|,7,8,13,12,11,10,9", to reverse the mutation section to get a new individual temp="1, |2,3,4,5,6|,7,8,13,12,11,10,9"→ temp ="1,|6,5,4,3,2|,7,8,13,12,11,10,9". And then return to calculate fitness value.

6. Program design

It is unable to complete the evolution and computation of the genetic algorithm only by manual calculation. First of all, the amount of calculation of GA is very large, it is determined not only by the GA itself, but is determined by the characteristics of combination explosion and complexity of the specific operation of vehicle routing problem itself; Secondly, GA needs a lot of random numbers to calculate in the process of calculation, random number that is obtained by artificial method cannot meet the needs of the GA; Finally, the solution of the VRP has its real economic significance, thus not only has requirement for the final result to be good and right, also asked that the calculation speed is faster. In terms of computing speed, compared with the artificial calculation, program calculation has obvious advantage.

Program design of this paper uses the Microsoft VC++. In the process of designing: (1) Produce initial population with the application of the random number, and the population size is limited to 50, that is, each generation population exists in relatively independent individual. (2) Calculate the fitness value of the individual, and then select the individual with the largest fitness value, change the fitness value as a function value, compared with target expectations, stop and output result if the function value is less than the target expectation, or continue. (3) Choose two individuals randomly and generate a range of random number between 0 and 1, used for comparing with crossover probability. Two individuals to carry out the crossover, if this random number is lower than cross probability, otherwise do not crossover. The location of the cross is random. (4) Choose one individual according to the fitness value size and the order from big to small, generate a random number between 0 and 1, used for comparing with mutation probability. To carry out the mutation, if this random number is lower than mutation probability, otherwise do not mutate. (5) To judge the evolution generation of process meets the requirement or not, and the set of this study is 100 generations. Stop evolving and output the optimal result if reach 100 generation, otherwise return to step (2).

Case study

Simple theoretical analysis is not enough to prove the results' actual validity of this research, therefore, in this part, the writer will use a case study to do the practical calculation, and test results of this study by comparing with the original method of course. Case is a logistics transportation company's actual business operation case, the data are derived from the specific operational practice, so it has strong persuasive.

Analysis of the company problem

The company got the cost of transport routes is 341 for a demand plan with saving matrix method, but through the GA solution in this paper, we get the cost of transport routes is 209, it is below the cost of the original plan. Thus, it can be seen, the result to calculate with the method of this paper is better than the result to calculate with the company's method. Specific analysis is as follows:

Nantian logistics company now has 9 types of trucks with load capacity is 70 m^3, 60 m^3, 50 m^3, 43 m^3, 30 m^3, 16 m^3, 90 m^3, 120 m^3 and 140 m^3 respectively. One month, Nantian received orders for 11 customers whom come from 11 cities in Guangxi, respectively. So it will deliver goods for 11 points. And the company believes that the total transportation cost is related to the total kilometers of trucks. That is to say, the distance between two points is highly relevant to the total transportation cost. So the company decided to assign the delivery task of different customer to each truck, and design route for each truck, to reduce the total distance. To make the location of distribution center as the origin of coordinates, the position and demand of the 11 customers' are shown in the table 1 below.

Table 1 The coordinates and the demands of customers

	X	Y	Order size
Distribution center	0	0	
Customer 1	-17	6	2576
Customer 2	-14	0	1688
Customer 3	-16	5	2680
Customer 4	-9	-10	2000
Customer 5	12	-16	2437
Customer 6	20	-4	3748
Customer 7	22	17	2117
Customer 8	13	12	4274
Customer 9	9	8	2028
Customer 10	-2	15	2435
Customer 11	-3	17	2319

Note: The order size in this table based on data August 2015 of Nantian logistics.

If we ignore the order size of customers and the load capacity of vehicles, only for routing selection has total $11! \times C_{10}^{3}$ = 4.790016×10^{9} kinds of schemes. It is unable to complete tasks with the simple exhaustive method to find the shortest path. Besides, the problems will be more complex and the computation will be increased exponentially, if the order size of customers and the load capacity of vehicles the two constraints are to be considered.

Nantian got the solution with the saving matrix method, the optimal solution is shown in table 2. Its distance-square matrix is shown in table 3. The result of total scheduling is 341.

Table 2 The delivery schedule of Nantian with the saving matrix method

Truck	Capacity (m^3)	Travel journey	The length of the travel
1	70	DC-1-11-DC	53
2	60	DC-4-DC	26
3	50	DC-3-DC	34
4	43	DC-7-DC	56
5	30	DC-10-DC	30
6	16	DC-9-DC	24
7	90	DC-5-6-DC	54
8	120	DC-8-DC	36
9	140	DC-2-DC	28

Table 3 The distance-square matrix for delivering goods of Nantian

	DC	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C8	C 9	C 10	C 11
1	18	0										
2	14	7	0									
3	17	1	5	0								
4	13	18	11	17	0							
5	20	36	31	35	22	0						
6	20	38	34	37	30	14	0					
7	28	41	40	40	41	34	21	0				
8	18	31	30	30	31	28	17	9	0			
9	12	26	24	25	25	24	16	16	6	0		
10	15	19	19	17	26	34	29	24	15	13	0	
11	17	18	20	18	28	36	31	25	17	15	2	0

Appling GA to the company

To calculate with the GA here, the settings are as follows: encoding scheme uses the natural number sequence encoding; set population size to be 50, set the algebra of the evolution to be 100 generations; set the crossover probability $Pavg = 0.95$ and $Pmax = 0.6$, set the mutation probability $Pmavg = 0.05$, and $Pmmax = 0.01$; selection method is the roulette wheel selection method; the judgment method of stopping is double judgment that can set the desired optimal result, such as set for 341, and once run to get the optimal value that is less than or equal to 341 to stop evolution and output result; at the same time can set evolution algebra, such as set for 100, so if there is no optimal value less than or equal to 341, the evolution to the 100th generation also stop evolving, and then output the optimal result in these 100 generations. According to the above settings to do calculation and will get the final solution, get the optimal path arrangement is 209, is shown in table 4.

Table 4 The optimal path with genetic algorithm

Truck	Capacity (m^3)	Travel journey	The length of the travel
1	70	DC-9-7-DC	56
2	60	DC-5-DC	20
3	50	DC-3-1-DC	36
4	43	DC-10-DC	15
5	30	DC-11-DC	17
6	16	DC-4-DC	13
7	90	DC-2-DC	14
8	120	DC-6-DC	20
9	140	DC-8-DC	18

According to the data of table 1 and table 3, it can be proved that data of table 4 is feasible and reliable, and also proved that the method adopted of this study is better than the saving matrix method adopted by the Nantian company.

The optimal value judgment parameter for stopping judgment conditions in operation is set to be 341, the evolution algebra judgment parameter is set to be 100, and other settings are unchanged. To run ten times, the result is shown in table 5.

Table 5 Ten times run results comparison table

Time	1	2	3	4	5	6	7	8	9	10	Average
Result	209	258	277	209	209	307	275	209	265	341	255.9

In table 5, only the optimal value 307 of the sixth belongs to automatically stop that evolution algebra reach 100 generations in these 10 times' operations, the optimal values of the remaining nine times are not greater than 341 belong to automatically stop that the optimal values accord with the condition. Moreover, the result of four times obtained the optimal value 209 among these 10 times, they are 1, 4, 5, 8 times, respectively. The average of these ten times is 255.9 and it is also lower than the optimal value 341 of the company.

Conclusion

This article has built up the mathematical model of VRP through the systematic research for GA, and then found out the solution of VRP based on GA. Through the case analysis, proved the solutions of this study can solve the VRP in logistics transportation. It proved that the solution of GA is adopted in this study the corresponding transportation cost is far less than the cost which is obtained by saving matrix method.

GA is a kind of calculation method which imitates the natural evolution. It has good convergence and operability on calculating the VRP. VRP belongs to Non-Deterministic Polynomial (NP) problems in the calculation, deducing from this, can we believe that the GA can also play a role of its advantages in other issues of NP computation.

But GA also has its defects. Firstly is the uncontrollability of evolution, we can eliminate the individuals that are not applicable to our needs through the calculation of fitness in the process of evolution, but keep the excellent individuals, and finally the new individuals are obtained by crossover and mutation. That is very similar to the way of evolution of the nature. But GA in the process of evolution, can't guarantee that the next generation must be better than the previous generation individuals, the whole trend of evolution is the volatility curves on the side of the optimal value. In this study, in the process of case analysis, has made the population evolution ten thousand generations, and repeat 10 times, the optimal value of the best individual of the ten thousandth generation is local optimal value, not the global optimal value. In the process of calculation of these 10 times, the global optimal value appeared is obtained as early as in the fifth generation, and is obtained at the latest evolution of the 345th generation. Therefore, simply rely on natural evolution for the calculation of the optimal value is meaningless. Secondly, the initial generation of GA has obviously impacted on the whole population in the evolution of the individual, but individuals of the initial generation of the traditional GA are obtained by adopting random numbers, it's more obvious for the uncontrollability of evolution of the GA.

For the defects of GA, this study argues that we should change the defect the traditionally rely on random numbers to produce initial population by giving priority to population initialization to use GA saving method. That is, combine the GA and saving matrix method, to carry on the preliminary estimate with saving matrix method, and gets a local best solution or an approximate local best solution, and then the new individual is obtained through mutation. Different mutation positions and ways can get different individuals, and this part of individuals has obvious robustness than individuals that are obtained by randomly generated. At the same time, to get a population by mixed the random parts of individuals with the mutation parts of individuals. Thus we can speed up the convergence of the GA.

Crossover and mutation are the essence and the focus of GA. Through crossover and mutation can we get much better new individuals to promote the evolution of the whole population, but also can reduce the fitness values of excellent individuals after crossover and mutation, then appear the phenomenon that offspring is worse than parents. In this study, the author with the way of adaptive evolution to adopt different crossover probability and mutation probability for individuals that have different fitness values, respectively. The crossover probability and mutation probability of individuals with bigger fitness value are reduced to give its proper protection. On the contrary, for individuals with lower fitness values, we will adopt larger crossover probability and mutation probability to get the new individuals. The fact proved that, using the adaptive evolutionary way can speed up the convergence speed of evolution.

VRP in logistics transportation related to the cost of transportation vehicle. Good vehicle routing plan can effectively reduce the transportation cost, improve the efficiency of transportation. This study proves this point through case analysis.

Future research

The number of customers of the case is still small in this study, so it has no obvious advantage to use saving GA, even may also reduce the speed of the calculation, but it will show a clear advantage when calculating the complex problems that have more customers. Saving GA has been just a kind of thinking, we can also combine GA with other algorithms, such as simulated annealing method and ant colony algorithm, etc. It can effectively improve the convergence speed of GA and reduce the calculation time of the complicated problem to use hybrid algorithm.

Exhibit 1 Map of Guangxi

Exhibit 2 Transportation route

Exhibit 3 Truck of Nantian

Exhibit 4 Package of goods

Exhibit 5 Distribution center of Nantian

References

Dantzig, G. B., and Ramser, J. H. (1959). The truck dispatching problem. Management Science, 6 (1), 80-91.

Eiben, A. E., Aarts, E. H., and Van Hee, K. M. (1990, October). Global convergence of genetic algorithms: A Markov chain analysis. In International Conference on Parallel Problem Solving from Nature (pp. 3-12). Springer Berlin Heidelberg.

Fogel, D. B., and Atmar, J. W. (1990). Comparing genetic operators with Gaussian mutations in simulated evolutionary processes using linear systems. Biological Cybernetics, 63 (2), 111-114.

Goldberg, D. E., and Segrest, P. (1987, July). Finite Markov chain analysis of genetic algorithms. In Proceedings of the second international conference on genetic algorithms (Vol. 1, p. 1).

Li Jun and Guo Yaohuang. (2001). Logistics distribution vehicle scheduling theory (pp. 1-134). Beijing: China supplies press.

LIU, Y. Z., and Xuan, H. Y. (2005). Summarizing Research on Models and Algorithms for Vehicle Routing Problem. Journal of Industrial Engineering and Engineering Management, 1, 027.

Lang Maoxiang. (2003). Distribution vehicle scheduling problem. Logistics technology, (Vol. 3, pp. 62-64).

Qi, X., and Palmieri, F. (1994). Theoretical analysis of evolutionary algorithms with an infinite population size in continuous space. Part I: Basic properties of selection and mutation. IEEE Transactions on Neural Networks, 5 (1), 102-119.

Raff, S. (1983). Routing and scheduling of vehicles and crews: the state of the art. Computers & Operations Research, 10 (2), 63-211.

Rudolph, G. (1998). Finite Markov chain results in evolutionary computation: a tour d'horizon. Fundamenta Informaticae, 35 (1-4), 67-89.

Suzuki, J. (1998). A further result on the Markov chain model of genetic algorithms and its application to a simulated annealing-like strategy. IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics), 28 (1), 95-102.

Cross Border Cooperation Planning in Asia: Understanding and Designing in the Busan-Fukuoka Borderland

Jonghyun PARK[*]

Masahiko FUJIMURA[**]

Abstract

The purpose of this paper is to discuss the likelihood of emerging cross border metropolis in East Asia, by analyzing cross border cooperation planning in the Busan-Fukuoka borderland. The data were collected through 34 semi-standardized interviews with the former mayor, political elites and stakeholders who were familiar with cross border cooperation issues and processes. In 2009, both cities attempted to promote an innovative planning for regional growth with the concept of Cross Border Metropolis between Busan and Fukuoka (CBM-BF). The concept follows its main strategic goals of strengthening synergy effects and improving international competitiveness between them, reinforcing the vision that they created a supra-national economic region leading Northeast Asia. These strategic goals were expected to be committed to promoting socio-economic cohesion and sustainable development in both cities. It follows its main four basic directions for cross border cooperation (CBC) with nine specific strategies. The following five aspects can be the most significant factors for both cities in promoting the concept of CBM-BF. (1) There is geographical proximity between two cities, (2) both have been keeping long standing partnership linkages, (3) the collaboration programs have already been implemented in a wide range of fields, based on the formal and informal agreements, (4) both Busan and Fukuoka have developed as cores in each of their national urban systems, ranked as second and sixth largest cities respectively, and (5) the strong political conviction of the former mayor *Hur Namsik* in Busan encouraged both cities to reach the agreement to promote CBM-BF projects. Afterwards, he has predominantly underlined the transnational integration and economic convergence. Albeit stakeholders failed to set up a specific action plan with strong legally binding, jurisdictional and sovereign agreements like EU, he made an effort to come up with a new idea for sustainable urban development, the concept of CBM-BF. Formalized specific initiatives of the CBC between two cities definitely could open a new horizon for globalization in non-capitals in Asia facing a plethora of problems.

Key words: Cross border metropolis, Busan, Fukuoka, Regional integration, Asia

[*] Professor, Hosei University, Graduate Schools of Economics, pakugen69@hosei.ac.jp
[**] Special Researcher, Hosei University, Graduate School of Project-specific Global and Regional Research Institutes, Hosei University

Introduction

Border regions have been receiving increasing scholarly attention since the 1980s. The acceleration of the globalization of economic as well as cultural exchanges, and the consolidation of supranational integration mechanisms such as the European Union (EU) or the North American Free Trade Area (NAFTA), have led to the increasing permeability of state borders in certain regions of the world (Sohn 2014). Over the past 20 years, the development and strategic positioning of a large number of European border cities have undergone profound changes. The globalization of economic and cultural exchanges as well as European Union (EU) integration and enlargement processes have altered the traditional roles and functions played by national borders. From being barriers to flows, hampering economic, social development and borders have become interfaces that favour contact and exchange (O'Dowd 2002; Sohn & Giffinger 2015).

In the age of globalization, dramatic spatial restructuring spurs the emergence of cross-border regions and new forms of regional integration (Bunnell et.al. 2006; Otgaar et.al. 2008; Perkmann 2003; Shen 2014). Regional integration in boundary areas is a comprehensive process involving economic, political and social dimensions of integration (Shen 2014).

According to Sohn (2014), the concept of a cross-border metropolis first appeared in the academic literature at the beginning of the 1990s. Herzog (1990) used it to describe the newly emerging cross-border urban spaces that were considered to be a specific product of globalization, in discussing the emblematic case of San Diego–Tijuana. Over the past 20 years, through the combined effects of strengthening the formal mechanisms of regional integration and establishing a flexible accumulation regime, the development of cross-border urban configurations has spread to numerous regions otherwise characterized by cultural differences and varying levels of social organization and economic development (Nugent 2012). In cross-border metropolitan regions, the concentration of industries, service activities and capital has gone hand in hand with a sharp increase in the cross-border flows of workers, goods and information, leading to a greater economic, cultural and political interdependence (Sohn 2014). Significant regional economic integration has taken place in many cross border regions, such as Basel, Copenhagen–Malmö, Geneva and Lille in Europe, Detroit–Windsor, El Paso–Ciudad Juarez and San Diego–Tijuana in North America, and Hong Kong–Shenzhen and Singapore–Johor–Batam in Southeast Asia, are among the most obvious instances of this urbanization of border areas (Chen & Ho 1994; Grundy-Warr et al. 1999; Shen 2003; Sparrow 2001; Bunnell et al. 2006; Sohn 2014).

In addition, previous studies on regional integration have focused a discussion on Europe and North America (O'Dowd 2002; Sohn 2014; Sohn & Giffinger 2015) and In Southeast Asia, Hong Kong and Singapore provide further examples of the cross-border cooperation(CBC) (Jessop & Sum 2000; Sparke et al. 2004; Chen 2005; Sohn 2014), with case study of Hong Kong-PRD region, Hong Kong-Shenzhen region (Sit 1998; Lin & Tse 2005; Chen 2007; Yang 2005; Shen 2004, 2014).and Indonesia-Malaysia-Singapore growth triangle region (Bunnell et al. 2006).Despite the wider context of the substantial growth in cross border research in recent years, there has been a dearth of academic empirical research into CBC, more specifically into models that non-capital cities have promote in East Asia.

With this mentioned, we have conducted empirical research with face to face field work and survey of quaternaries. In this paper, we aim to articulate what both cities designed as a cross border cooperation planning in the Busan-Fukuoka borderland in order to discuss the likelihood of forging cross border metropolis in East Asia.

Brunet-Jailly (2005) suggested a comprehensive framework with four important analytical lenses: (1) Market forces and trade flows; (2) policy activities of multiple levels of governments on adjacent borders; (3) the particular political clout of borderland communities; (4) the specific culture of borderland communities. (Shen 2014). In this paper, leaving complex relations among social, economic and institutional of cross-border integration with those four aspects as a next theme, especially added a more detailed analysis concerning (2) policy activities of multiply levels of governments, it would be investigated How both cities started to cross border cooperation projects and which kinds of projects are planned in both municipalities level. To achieve this, it is necessary to look into cross border strategies of each programs and the correspondent approved projects driven by both cities.

Furthermore, a valuable set of qualitative and quantity information was obtained through several field surveys and local newspapers. This encompassed formal and informal interviews with previous Mayer, executives and hands-on workers of the CBM-BF steering committee in both cities. The conversations were secured in 34 structured interviews in Busan and Fukuoka authorities from April in 2015 to March in 2016. We have conducted the field surveys with following questions and topics: (1) what can serve as a momentum of promoting CBM-BF; (2) before the release of the concept of CBM-BF, what cooperation projects have been implemented; (3) what are the barriers and outcomes; and (4) what are the detailed programs, progressing strategies, perspectives in their long-term vision and goals with regards to CBM-BF.

Following this background, the second part articulates what both cities planned for regional integration and describes the outlines of the concept of CBM-BF. The third part discusses the backgrounds of releasing the agreement of CBM-BF. Finally, the article analyses the likelihood of a cross border metropolis in East Asia.

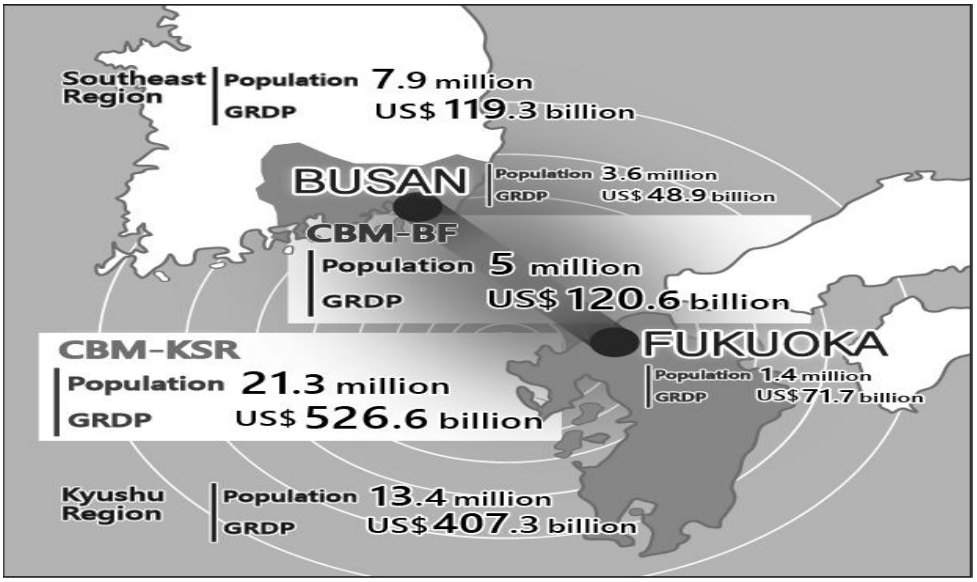


Figure 1: The outlines of CBM-BF and CBM-KSR

Source: authors' compilation modified by the materials of Busan and Fukuoka

Busan, second largest city of approximately 3.6 million residents, is located on the southeastern tip of the Korean peninsula. The size of Busan is 769.82km², which is only 0.8% of the whole landmass of the Korean Peninsula. Fukuoka, provincial city of Fukuoka Prefecture, is situated on the northern shore of the island of Kyushu in Japan. It is the most populous and largest city on Kyushu Island. As of October 2015, Fukuoka is Japan's sixth largest city with 1.54 million people, having passed the population of Kobe, Kawasaki and Kyoto.

The outlines of cooperation initiatives of CBM-BF

In 2009, the mayors of Busan and Fukuoka made a joint public declaration on the configuration of the CBM-BF, in order to support and reinforce socio-economic cohesion between both cities. Bilateral agreements have exceedingly been paid attention to in public, as there was no precedent for CBC planning autonomously driven by local governments, which constituted the first time in history for Korea and Japan.

According to face to face interviews, in April 2009, based on the outcomes of a working level meeting, Busan and Fukuoka Economic Cooperation Council (ECC) suggested 101 substantial initiatives prospected by BDI and KERC, municipal government-affiliated research institutions. The basic constructs were deliberated and adjusted through the working level meetings over 15 times.

In the secondary ECC meeting on Aug 28, 2009, both entities determined 4directions, 9 promoting strategies and 23 detailed initiatives comprised of 64 cooperative projects, based on the four fundamental directions of cooperation projects. They decided that the projects be phased forward. Cooperative projects were supposed to be implemented by ECC and Cooperative Project Promotion Committee (CPPC) who handle practical initiatives. In this section, we analyzed the outlines of detail plans of CBM-BF.

Four directions consisted of (1) Facilitating future-oriented business cooperation, (2) Taking advantage of the talent and the cultivation of human resources, (3) Creating a common daily life sphere and (4) Making joint recommendations to both central governments.

Based on those four directions, nine promoting strategies were set up: (1-a) fostering the environment of cooperation between entrepreneurs, (1-b) nurturing promising and growing industries, (1-c) accelerating bilateral investments, (1-d) collaborating on tourisms and convention events, (2-a) nurturing young talent, (2-b) harnessing the participants' capabilities, (3-a) creating a sustainable environment for the area of interaction, (3-b) facilitating the flow of physical distribution and human migration and (4-a) proposing the institution and funding related plans.

Furthermore, 23 detailed initiatives were assigned in respective divisions of authorities in both cities and stakeholders agreed to implement in a wide range of fields: (1-a-1) establishing business offices dedicated to economic cooperation in both cities, (1-a-2) supporting interactions between small and medium-sized enterprises, (1-a-3) promoting interactions between wholesale markets such as fish-markets, (1-a-4) developing joint brands between Busan and Fukuoka; (2-a-1) helping business and individual actors learn and comprehend about their counterpart's cultures and languages, (2-a-2) promoting youth exchange was also offered. Both cities planned to share the purpose of developing the potential key persons to accelerate the interaction between themselves from an early stage. In short term, there were four projects. (2-a-3) Activating the university student exchange programs, (2-b-1) supporting internship programs, (2-b-2) cooperating with corresponding professional workforce, (3-a-1) continuing to hold commemoration events within the Korea-Japan Friendship Year, (3-a-2) consolidating promotional systems for the CBM-BF, (3-b-1) fostering the environment that enables tourists to use electronic money, (3-b-2) expanding transportation that connects the two sides, (3-b-3) adding signs and names in their counterpart's language, (4-a-1) proposing the institution and funding related plans.

The backgrounds of the concept of CBM-BF

In this section, we focused on the reasons why both cities reached a decision to make a joint public declaration for CBM-BF.

The following five aspects can be the most significant factors for both cities in promoting the concept of CBM-BF. (1) There is geographical proximity between the cities, (2) both have been keeping long standing partnership linkages, (3) the collaboration programs have already been implemented in a wide range of fields, based on the formal and informal agreements, (4) both have formed as cores in each of their national urban systems, ranked as second and sixth largest cities respectively, and (5) the strong political conviction of former mayor *Hur Namsik* in Busan encouraged both cities to reach the agreement to promote CBM-BF projects .

Especially, the long-term relationship between both cities' authorities has played an important role in forging CBM-BF. With respect to CBC projects in both cities, two main periods can be defined: ex- ante and ex- post cross border metropolis programs period.

In the ex-ante cross border metropolis programs (before 2008), both cities have been pushing ahead with cooperation on several agreements with long term perspective, such as the Agreement of Administration Exchange in 1989, the Fundamental Agreement of the Promoting of Economic Exchange in 1999, the Agreement of Friendship Exchange between Municipal Assemblies in 2004 and the Sister City Affiliation in 2007.

Furthermore, cooperation projects have been promoted in a diversity of fields such as tourism, culture, economics and sports, approximately 18 years after the signing of the Agreement of Administration Exchange. A number of projects have been implemented. For instance, the Mutual Dispatching of Municipal Official Program in 1990, Environment Cooperation Program in 1991, Asian-Pacific City Summit Participating Program in 1994, Co-researched Ancient Cultural Properties Program in 1996, Joint Attraction of Tourist Cooperation Program in 2000 and Water Supply Service Administration Cooperation Program in 2000. Moreover, small and medium sized cooperation projects have been promoted in a wide array of fields not only in private sector but also in administration level. Meanwhile, familiarity as well as trust regarding their counterpart could be accumulated and solidarity could be developed.

Since both centralist countries hinder local and regional authorities to autonomously promote international cooperation, the fact that both cities represented regional cores in each national urban system is also significant for conducting CBC projects driven by local governments.

In addition, the former mayor of Busan had an enthusiastic conviction in CBC programs. He aspired to realize cooperation projects and to take part in many events regarding the cooperation programs. Due to scale economies of both cities, it was anticipated to create a ripple effect throughout economic integration and cohesion.

According to face-to-face interviews with the former mayor, he emphasized many times that Busan has geographical proximity with Fukuoka rather than Seoul. Before achieving political power, he seemed to have recognized the significance of geographical proximity in economic cohesion and consequently he decided to implement CBM-BF projects. Throughout his term, he has shown adamant willingness to collaborate not only in bilateral CBC projects but also in tripartite ones. He participated in many international collaboration events. For instance, he was interested in the implementation of the concept of the International Tourism Belt consisting of Busan, Fukuoka and Shanghai and committed to drive collaboration projects.

Since around 2007, as the Korean government and official institutions have paid attention to economic integration across county boundaries in domestic level and actively imposed a number of policies, cooperation and cohesion based on metropolitan region as an axis of regional cores have been booming in Korea. Thereabout, the former mayor *Hur Namsik* started taking into consideration regional growth strategy in Busan, utilizing globalization as one of the strategies. He made up his mind to promote collaboration with Fukuoka in a wide range of fields. Consequently, he consulted Fukuoka side about CBM-BF and it was accepted. In other words, he has played a decisive role in crystalizing the concept of CBM-BF. It derived from his recognition regarding geographical proximity of both cities and his familiarity with Fukuoka.

Discussion and Conclusions

In 2009, the mayors of Busan and Fukuoka made public a joint declaration on the configuration of cross border metropolis, in order to support and reinforce socio-economic cohesion between the two cities. Bilateral agreements have exceedingly been paid attention to in public, as there was no precedent for cross border cooperation planning autonomously driven by local authority, which constituted the first time in history for Korea and Japan.

The purpose of this study is to introduce the concept of CBM-BF promoted by both local authorities and background of its proposal.

Furthermore, a valuable set of qualitative and quantitative information was obtained through several field surveys and local newspapers. This encompassed formal and informal interviews with the former mayor in Busan, executives and hands-on workers and steering committee involved in CBM-BF projects. The conversations have been secured in 42 structured interviews in Busan and Fukuoka since April 2015.

With respect to CBC projects in both cities, two main periods can be defined: *ex- ante* cross border metropolis programs and *ex- post* cross border metropolis programs period. On the one hand, in the former, small and medium sized cooperation projects have been promoted in extensive fields, not only in private sector but also in administration. Meanwhile, familiarity as well as trust regarding their counterpart could be accumulated and solidarity could be developed. On the other hand, in the latter, the concept of CBM-BF was proposed with four fundamental directions and nine strategies. Based on those, 64 projects as promising bilateral collaborations were issued. Especially, the enthusiastic conviction of the former mayor of Busan, who aspired to realize cooperation projects and to keep solid relations, has played a decisive role in crystalizing the concept of CBM-BF.

With regards to academic contribution, this study may pave the way for research on the feasibility of CBC promoted by non-capital cities and peripheral regions. There have been a number of issues and literature on CBC in Asia, more specifically in Southeast Asia such as IMS-GT, IMT-GT, and EAGA, which have been covered. Despite the wider context of the substantial growth in cross border research in recent years, there has been a dearth of academic empirical research into CBC, more specifically into models that non-capital cities have promoted in East Asia.

The vast majority of those models have equivalent contexts. Respective models have been driven by central governments and institutions. In addition, most Asian countries and major cities have aspired to take initiatives for their respective countries in the main industries that would lead to economic growth, so that they initiated economic collaboration in growing and creative industries, such as IT, finance, fashion, design, automotive, etc. However, it would be totally unrealistic to consider that all countries and cities could achieve successful collaborations in all of these industries.

In this regard, it is noteworthy that adjacent transboundary cities in East Asia, Busan and Fukuoka formalized the CBC in 2009, since both cities are non-capitals and are ranked second and sixth largest cities in Korea and Japan respectively and they formulated cooperation projects without the involvement of central governments. This became known as the concept of CBM-BF. In future studies, more researchers should find case studies of CBC programs promoted by non-capital cities and peripheral regions.

However, it was uncovered that there are a lot of limitations and agendas to improve and promote further cooperation between non-capital cities. The concept of CBM-BF has not yet established any strong legally binding, jurisdictional and sovereign agreements like in the EU. However, compared to other cooperation projects, it can be considered as a model that maintains a far more substantial friendship agreement covering a wide range of domains. Institutional strategy that non-capital cities can provide are still too limited, so that their priority should be to find out how they can overcome those problems.

In addition, skill and knowledge of professional officials from both cities has not been sufficient to devote to implementing the projects. Albeit both authorities have dispatched official servants to each other city for one year, it is in fact difficult for them to fully accomplish all projects. Since much of their time has been spent to learn their counterpart's language, when they were almost accustomed to grasp the other's systems, they had to return to their respective office. For every year, the cycle has been repeated, so that they could not commit to conducting CBM-BF projects. In addition, since each project has been respectively allocated to engaged divisions and the servants undertook CBM-BF projects as one of their many duties, all stakeholders could not be successful with managing the projects and in some cases they had never experienced working with Japanese counterparts and were even without deep-seated knowledge of Japan. Moreover, in Busan, the servants in charge of respective projects tend to be changed every 6 months on average and subsequently it affected them not to apportion their time to propel their respective CBC projects.

Albeit CBM-BF can be considered as a significant and symbolic case to serve as a momentum for non-capital cities to develop sustainable regional growth policy and strategy and provide a key catalyst to boost extensive private sectors to take it into consideration, to launch collaboration projects or to join suggested programs, both cities have been confronted with compensating the defect mentioned above.

Solid border regions must play a significant role to develop and assist a sustainable regional growth planning in peripheral regions and non-capitals. In this regard, we should observe their progress through further research and analyze detailed process of CBC evolution and issues of the overall magnitude of the expected integration effects. These academic agendas will be conducted for a significant theme in future research.

References

Brunet-Jailly, E. (2005). Theorizing borders: an interdisciplinary perspective. *Geopolitics*. 10(4): 633-649.

Bunnell, T., Muzaini, H., & Sidaway, J. D. (2006). Global city frontiers: Singapore's hinterland and the contested socio-political geographies of Bintan. *International Journal of Urban and Regional Research*. 31(1): 3-22.

Chen, E. K. Y., & Ho, A. (1994). Southern China growth triangle: an overview. In M. Thant, M. Tang & H. Kakazu (Eds.), *Growth triangles in Asia: A new approach to regional economic co-operation* (pp. 29-72). Oxford University Press, Hong Kong.

Chen, X. (2005). *As borders bend. Transnational spaces on the Pacific Rim*. Rowman & Littlefield, New York.

Chen, X. (2007). A tale of two regions in China: rapid economic development and slow industrial upgrading in the Pearl River and the Yangtze River Deltas. *International Journal of Comparative Sociology*. 48(2-3): 167-201.

Grundy-Warr, C., Peachey, K., & Perry, M. (1999). Fragmented integration in the Singapore-Indonesian border zone: Southeast Asia's "growth triangle" against the global economy. *International Journal of Urban and Regional Research.* 23(2): 304-328.

Herzog, L.A. (1990). *Where North meets South: Cities, space and politics on the US–Mexico Border.* Center for Mexican American Studies. University of Texas, Austin.

Jessop, B. & N.L. Sum (2000). An entrepreneurial city in action: Hong Kong's emerging strategies in and for (inter)urban competition. *Urban Studies*. 37(12): 2287–2313.

Lin, G. C. S., & Tse, P. H. M. (2005). Flexible sojourning in the era of globalization: cross-border population mobility in the Hong Kong-Guangdong border region. *International Journal of Urban and Regional Research*. 29(4):867-894.

Nugent, P. (2012). Border towns and cities in comparative perspective. In T.M. Wilson & H. Donnan (Eds.), *A companion to border studies* (pp.557-572). Wiley-Blackwell, Chichester.

O'Dowd, L. (2002). The changing significance of European borders. *Regional and Federal Studies*. 12(4): 13–36.

Otgaar, A., van den Berg, L., van der Meer, J., & Speller, C. (2008). *Empowering metropolitan regions through new forms of cooperation*. Abingdon: Ashgate.

Perkmann, M. (2003). Cross-border regions in Europe: Significance and drivers of cross-border cooperation. *European Urban and Regional Studies*. 10(2): 153–171.

Shen, J. (2003). Cross-border connection between Hong Kong and mainland China under "two systems" before and beyond 1997. *Geografiska Annaler Series B:Human Geography*. 85B (1):1-17.

Shen, J. (2004). Cross-border urban governance in Hong Kong: the role of state in a globalizing city-region. *The Professional Geographer*. 56(4): 530-543.

Shen, J. (2014). "Not quite a twin city: Cross-boundary integration in Hong Kong and Shenzhen" Habitat International. 42:138-146.

Sohn, C. (2014). Modelling Cross-Border Integration: The Role of Borders as a Resource. *Geopolitics.* 19(3):587–608.

Sohn. C. & Giffinger. R. (2015). A Policy Network Approach to Cross-Border Metropolitan Governance: The Cases of Vienna and Bratislava. *European Planning Studies*. 23(6):1187–1208.

Sparrow, G. (2001). San Diego-Tijuana: not quite a binational city or region. *Geo-Journal*. 54(1): 73-83.

Sparke, M., J.D. Sidaway, T. Bunnell & C. Grundy-Warr (2004). Triangulating the borderless world: geographies of power in the Indonesia–Malaysia–Singapore growth triangle. *Transactions of the Institute of British Geographers*. 29(4):485–498.

Yang, C. (2005). An emerging cross-boundary metropolis in China: Hong Kong and Shenzhen under 'two system'. *International Development Planning Review*. 27(2):195-225.

National Institute of Development Administration (NIDA)
118 Serithai Road, Klongchan, Bangkapi, Bangkok THAILAND

http://conference.nida.ac.th/iccs2016