

SOFT INFRASTRUCTURE IN TOURISM DEVELOPMENT

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ABSTRACT

This study aims primarily at investigating the importance of soft infrastructure in tourism development for the case of an island economy namely Mauritius. The study in the first place assesses the level of perceived and actual satisfaction of the present state of the different types of soft tourism infrastructure and the allied services provided by tourism stakeholders in Mauritius and address the identified gaps. In order to address the study objectives, a rigorous survey analysis among 1741 international tourists at the departure lounge of the Sir Seewoosagur International Airport of Mauritius was carried out. The respondents placed significant emphasis on the different elements of the soft infrastructure dimension, where many of the elements falling under this dimension were rated with a high mean score. In particular the visitors rated communication, both internet and telephone services, and security to be most important. Significant gap has been found in the categories of 'Health' and 'Security'. This indicates that the tourists ascribe high importance to the soft infrastructure dimension. The link between the respondent profile and the key variables which influence the tourist choice of the island as a destination are found to be equally important for most of the international tourists. However, these were deemed to be more critical for tourists travelling with family members. Although the survey instrument attempted to measure any gap between on the one hand, the importance of the infrastructure dimension and on the other hand, the level of satisfaction with the infrastructure dimension, overall the results do not show any statistically significant gap among the different elements of the infrastructural dimension. The study dwells into further analysis by engaging into an econometric framework related to a Probit Model, using the data collected, to gauge the effect of soft infrastructure on tourist intention to repeat or recommend the destination. The results confirm that soft infrastructure is found to be sensible to tourists, although relatively less sensitive as compared to tourism and transport and hotel infrastructure.

Keywords: Tourism development, soft infrastructure, Mauritius

1 Background

A number of researchers, including Gunn (1988) and Inskeep (1991), have cited the infrastructure base of a country as a potential determinant (in addition to classical ones such as income in origin country, cost of travel and distance among others) of the attractiveness of a tourism destination. It is a fact that tourist attractions form a powerful component of the supply side of tourism—enticing, luring and stimulating interest in travel—however, it should be highlighted that they constitute only one component of the necessary tourism infrastructure. Investment in supporting businesses (e.g., hotels, transportation companies), soft infrastructure (e.g., local community colleges, universities, and trade and professional associations) and hard infrastructure (e.g., roads, airports, marinas, water and sewer lines, and telecommunications) definitely play key roles in

developing a successful tourism destination. Their interdependence dictates a need for a strategic wide-angle approach to tourism infrastructure development.

Thus, infrastructure in the wider sense forms an integral part of the tourism package for instance road infrastructure enhances accessibility of tourists to different parts of the destination country while sound airport infrastructure ensures that tourists experience a comfortable transition from the plane into the borders of the destination country and vice versa. As such communication infrastructure allows quick and cheap communication between the origin and destination country as well as providing maximum information about the destination thereby reducing uncertainty, fear and asymmetric information. Other infrastructure related to security, medical, waste water and energy among others are also believed to result in more reliable services and thus enhancing the attractiveness of the destination.

The tourism sector is one of the most important economic pillars of the Mauritian economy (approx 18% of GDP). After the EPZ sector, the tourism sector has been an important contributor to the development of the economy with tourists' earnings reaching around Rs 4.5 billion in the year 2013¹. Tourist arrival for the year 2013 was 1,294,387 and total passenger arrival is essentially by air (96.2%) by air and 3.8% by sea.² Indeed, in addition to hard infrastructure, the authorities in Mauritius have long recognised the importance of sound infrastructure in promoting tourism development in the island, especially given the fact that majority of our tourism is high end tourism and more than 65% of the island tourist is from Europe, psychologically used to decent level of infrastructure support. The island's networks of roads and communication together with the waste water and energy infrastructure among others have been subjected to massive investment and expansion since the mid 80s. The development of tourism in Mauritius relies on the development of appropriate infrastructure, which services a tourist's needs and encourages investment by the private sector in competitive tourism product. This is particularly true as tourism is expected to take a very important place in the Mauritian economy. To confirm this objective, the Government has decided to reach 2 million tourist arrivals per annum by 2020 and a new strategy of development has been defined namely related to opening of the sky; marketing action plan to develop new markets; ambitious programme of building with the increase in the number of rooms and the launching of numerous Integrated Resort Scheme; and the organization of international cultural events. It is believed that in addition government should also not oversee the potential role of support infrastructure and services which is believed to be crucial as well, especially in the attraction of high end tourism and in the promotion of the green tourism.

However, this study is primarily designed to investigate the importance of soft infrastructure in tourism development, an infrastructure type largely ignored in the literature. The study also assesses the perceived satisfaction of the actual state of these infrastructure and the services they provide and the perceived gap is subsequently discussed.

¹CSO Mauritius (2013), Economic and Social Indicators on International Travel and Tourism.

² CSO Mauritius, Digest of International Travel and Tourism 2010.

Univariate descriptive statistics is used to profile the respondents in terms of their socio-demographic variables. Given the nature of the data, mainly non-parametric tests are used to address the research objectives. These include cross tabulations, Pearson chi-square test, Mann - Whitney tests, Kruskal – Wallis tests and factor analysis, a data reduction techniques to group the number of variables used to measure the soft infrastructural dimension. Given that the questionnaire is designed in such a way to capture the importance and satisfaction level of the tourist, a gap analysis is also used to measure if there are any significance differences among the variables of interest. The study further uses an econometric approach based on a Probit framework to model if SOFT infrastructure is a likely predictor of the probability of repeat and recommended tourism.

The rest of this research is structured as follows: section 2 discusses the theoretical underpinnings and empirical works related to the infrastructure-tourist nexus, section 3 presents the research methodology and analyses the results and section 4 concludes and provides useful recommendations.

LITERATURE REVIEW

Tourism is a rapidly growing phenomenon and has become one of the largest industries in the world. It is one of the vital drivers of development and an important source of job creation for a number of countries. Mauritius is one of the best examples to be cited whereby, over the past decade, the tourism sector has become one of the most important economic pillars. Tourism represents also a promoter for diversifying economies, as new tourism infrastructure development lead to the establishment of other industries (Beer, Maude and Pritchard, 2003). While tourists attraction is one of the important components which lure tourists to travel, the presence of primary tourists facilities (accommodations, hotels and restaurants), secondary tourists facilities (Shopping and recreation areas, entertainment facilities) and tertiary facilities (health services & care, safety & emergency services) also play an important role in attracting tourists to a destination.

Key Players in the Tourism Industry

While there is no doubt about the importance of investing in infrastructure to expand tourism activities, there are certainly different perspectives on how this can effectively be accomplished. The role of both the public sector and the private sectors need to be defined in order to cater for a sustainable tourism. Investment in infrastructures is often influenced by political constraints and incentives, market characteristics (visitors' taste and preferences), the ability of the destination to promote itself and political stability. Developing countries, such as Mauritius, need to understand the role of investment in tourism infrastructure and how to ensure that national policies can support the sustainable development of tourism infrastructure. Often, this requires the elimination of institutional and financial obstacles that impede investment and make them counterproductive.

The expansion of tourism anywhere is strongly related to the development of suitable infrastructures ranging from public to private infrastructure and tourism related infrastructures. It has been agreed that a country's infrastructure is one of the underpinnings for economic activities. Delmon (2006) states that "Poor

infrastructure impedes a nation's economic growth and international competitiveness".³ Tourism is in fact dependent on infrastructure and the absence of it will critically undermine the marketability of the tourism product. Infrastructure like accommodation, restaurants, attractions and tours are primarily provided by the private investor while others such as power, water, transport, health, and telecommunications, which represent basic services, are supplied by the government. The provision of infrastructure by the public sector, in the long term, is mainly for the following two reasons: firstly to provide adequate, convenient, safe facilities and services at competitive price to meet the basic needs of the population and secondly to provide support facilities for the productive sectors and act as catalyst for development in desired areas.

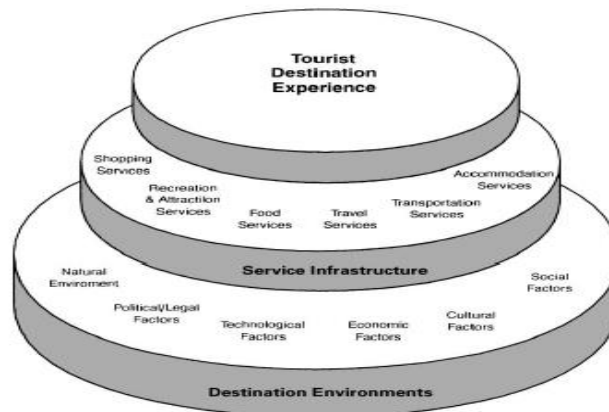
Gunn (1988) denotes the tourism product as a complex consumptive experience that results from a process where tourists use multiple of services (information, relative prices, transportation, accommodation, and attraction services) during the course of their visit. Other economic and political conditions and structural features are also important factor shaping many tourist experiences and contribute to the nature of the destination product. Murphy et al (2000) related this type of product to supply and a demand analysis and described how various components of the destination interact with travelers during their trip.

Smith (1994) was among the first to acknowledge the role of service infrastructure in creating a product experience. He argued that 'service infrastructure is housed within the larger macro-environment or physical plant of the destination'. He stressed on the fact that the level, use, or lack of infrastructure and technology in a destination (for example transportation in general, water and power supply, use of computer technology and communications among others) are also visible and determining features that can enhanced the visitors' trip experience. They posited that tourists' overall impression develops their image of a destination after their visitation and that infrastructure may play an important role in that respect.

Crouch and Ritchie (2000) interestingly summarised (refer to figure below) the various factors that together make a tourist destination experience attractive. They highlighted the importance the service infrastructure layer in tourist destination experience.

³ The World Bank (2006).

Figure 1: The Tourist Destination Experience



Source: Crouch and Ritchie (2000)

The tourist destination product is also better understood in the context of comparative and competitive advantage. Refer to figure 1, adapted from Crouch and Ritchie (2000), which depicts a global picture of the determinants of a destination's competitiveness. The authors argued that factor conditions are important determinants of attractiveness as tourists travel to a destination to receive the destination experience. Every element has been categorised under core attraction and supporting elements. We focus on the supporting factors and resources component. The destination's general infrastructure services in this category in fact represent one of the most important factors. The tourism phenomenon relies heavily on public utilities and infrastructural support. Tourism planning and development would not be possible without roads, airports, harbors, electricity, sewage, and potable water. The infrastructural dimension is thus a necessary element for tourism development and the above factors are all basic elements for attracting visitors to a destination. Generally, infrastructure has not been included in empirical works as they are expected to be available at a destination and has not promoted as an attraction factor (see Smith, 1994 and Crouch and Ritchie 2000).

Tourism Infrastructure Development

It becomes imperative for a country to invest in for sustainable tourism development. This requires investment in the development of amenities and basic infrastructures along with all tourist infrastructures by both the public and private sector. The Australian Travel and Tourism Forum (ATTF)'s 2007 study emphasises that tourism related infrastructure and products attract and encourage tourism to Australian destinations. Consumption by visitors generates major economic activities external to tourism infrastructure. Infrastructures can be in terms of airport, road, tourism related infrastructure, tourist site infrastructure, utility infrastructure and soft infrastructure.

Soft infrastructure

Soft infrastructure is an important aspect in promoting a destination. In effect, soft infrastructures which include health, banking and security services are termed as tertiary tourist facilities and services. The existence of hospitals, clinics, trained doctors, and security aspects in terms of police stations help towards increasing

tourism by reducing the risks of travel. Security remains the most critical aspect as small levels of banditry, violent conflict, or a history of attacks on tourists will severely deter tourism. Health infrastructure is especially important for groups travelling with children, the elderly, or the disabled.

Specialised medical services included in health infrastructure offer health guarantee to the tourists in the country. It is a fact that international clinics around the country, as well as doctors' offices in hotels, provide tourists a guarantee of safety and health during their visit. While certain tourists visit destination just for pleasure, others often visit for medical reasons. One such example is India which invested in its health infrastructure leading to a boom in the health tourism of the country. Furthermore, countries like Malaysia have been investing a lot in the soft infrastructure with the aim to promote medical tourism. In fact several studies like Gauci et al. (2002) and Cleverdon (2002) highlighted the importance of health services in nurturing and promoting the tourism sector. In today's era of globalisation, tourists believe more in banking facilities than carrying cash on him. Hence developed banking system is a factor which definitely impacts upon choosing a destination. Investment in this particular field could help to trigger an increase in the number of tourists' arrival in the country. A study by the Rajasthan Tourism Development Corporation (2005) in the districts of Rajasthan in India showed that all major destination places are equipped with nationalised and private banks offering 24 hour ATM facility and money transfer facility to provide convenience to tourists and general public as well. This was one of the reasons why tourists were more interested in visiting that particular place.

Importance of Soft Infrastructure

While Inskeep (1991) have recognised the importance of infrastructure as a major attractiveness of a tourism destination, Alegre and Cladera (2006), Crompton (2003); Bigné et al. (2001), Yoon and Uysal (2005) have pinpointed the relevance of infrastructure as a determinant factor for the tourists' satisfaction. Furthermore, Mistilis (1999) put forward the vital role of public infrastructure and other components of the supply side of tourism such as development of airline and accommodation facilities for the growth of the tourism industry. This section outlines studies pertaining to the importance of infrastructure, in particular soft infrastructure, to the tourism sector.

Situational conditions are grouped mainly under destination location and security & safety. Mckercher (1998) noted that the destination location which is distant assuming same product is offered is more likely to be less competitive than those which are more proximate. Moreover, the safety and security within a destination is a qualifying element of a country's tourism sector. Crotts (1996) underlined the elements of safety and security as: political instability, probability of terrorism, crime rates, transportation safety, corruption, quality of sanitation, prevalence of disease, quality of medical services, and availability of medication. Sonmez and Graefe (1998) revealed that future risk and safety anxiety are stronger forecasters of not choosing one or more destinations

RESEARCH METHODOLOGY

The data for this study was collected as part of a comprehensive survey⁴ to investigate the importance of infrastructural dimensions in tourism development, taking into account different tourist originating countries. The study goes on in also assessing the perceived satisfaction of the actual state of these infrastructure and the services they provide and the perceived gap is subsequently discussed.

In identifying the importance of infrastructure in a destination selection, we employed rigorous survey analysis. The survey is meant to assess both the importance and actual level of satisfaction with respect to a highly disaggregate form of infrastructure (as compared to the econometric analysis which discusses rather the *aggregate* level of infrastructure). The study goes further in assessing the perceived satisfaction of the actual state of these infrastructure and services they provide and the perceived gap. An assessment of such infrastructural gaps would yield interesting policy implications. Data for this study was covered during the months of February 2012 and March 2012. An “Importance-Satisfaction” model was used for the requirement of this particular study.

Both the literature review and in depth interview with stakeholders in tourism have given greater insights into the role and importance of infrastructure in the tourism sector of Mauritius. Consequently, the researcher was equipped to begin the survey of the Mauritian population.

Thus a study with “Importance-Satisfaction” questions relevant to the tourism sector was used for this purpose. With the view to reach out tourists coming from different parts of the world, the questionnaires were set out in two languages namely: English and French. The self-administered questionnaire has mainly two sections: the first one assesses the level of importance that tourists assign to different infrastructure while the second part assesses the level of satisfaction with the existing tourism infrastructures. Within each category of the facility listed, there were several components related to the tourism infrastructure. Variables investigated in the questionnaire were as follows:

1. General Information-Factors influencing your choice of Destination
2. Airport Infrastructure(waiting areas, airport administration, airlines cargo, duty free shops, rental car services)
3. Road Infrastructure (road quality, road security, public transport)
4. Hotel infrastructure (service quality, shopping malls, restaurants, casinos)
5. Tourism Infrastructure (heritage sites, museums, wild life)
6. Utility Infrastructure (telephone, internet, water and electricity system)
7. Soft Infrastructure (health and banking)

Tourists were asked about each facility/component of infrastructure to rate it on the scale of 1 to 5, for both “importance” of infrastructure and that on the level of “satisfaction” as per their assessment of the facility/component. Besides questions on “Importance-Satisfaction”, data on general background information

⁴MRC funded study on “Does Infrastructure matter in Tourism Development”, 2012

of the tourists - demographic as well as profile of tourist being interviewed was collected. The variables collected were as follows:

- Gender
- Age
- Nationality
- No. of people accompanying you on this trip
- Length of stay
- Number of times you have visited Mauritius before
- Place of residence during trip
- Country of origin and nationality

The study is based on an “Importance-Satisfaction” model. Tourists will state their opinions on both the level of importance of the types of infrastructure and their relative satisfaction. From the difference between the level of importance and satisfaction of the existing infrastructures and services, an “Importance-Satisfaction gap” will be generated to model the gaps in the infrastructures and services which will be needed to enhance the destination attractiveness of Mauritius to its tourists and at the same time contribute positively to its tourism sector.

In choosing the tourist sample at the SSR International airport, the following were taken into consideration:

- Male and Female profile
- The country of origin of the tourists
- The language spoken
- Collections of data were extended over afternoons and evenings during the months of February and March 2013
- The different mix of tourism
- Tapping different days of the week

Based on the tourist arrival population size (the last 5 years from 2007-2012 tourist arrival trends in Mauritius) ranging from 850,000 to 975,000 a sample size of 1721 tourists was taken so that meaningful results can be achieved. Krejcie & Morgan (1970) further reports in their research paper that most researchers suggest that a margin error of 5% along with a confidence interval of 95% should suffice. A Non-probability sampling method was chosen as some elements of the population under study had no chance of being approached: given only French and English questionnaires were designed, some tourists were therefore left out of the targeted population

Prior to the survey, permission to access the departure waiting lounge from the end of February 2012 to end of March 2012 were obtained from the Civil Aviation Department based at the SSR International Airport and the Ministry of Tourism and Leisure in Mauritius. A team of 7 persons made up of 5 students of the University of Mauritius and 2 Research Assistants were selected to carry out the survey. Members of the team were all able to fluently communicate in English and French *with the international tourists at the SSR International Airport.*

There were a total of 1721 questionnaires which were filled in by the tourists. All the filled in questionnaires were first received at the Project Supervisor's office. They were then classified in batches according to the survey days. After their thorough scrutiny, they were inputted in the SPSS 17.0 software. The data were validated before tabulated.

4. Data Analysis

Descriptive Analysis

This part of the analysis deals with the profile of the interviewed tourists. The foreign visitors were asked a series of questions about their level of satisfaction about the country, how they got to know the island and whether they will recommend Mauritius as a tourist destination to their families among others. Thus part of the analysis will therefore give an insightful picture of the various infrastructural attributes and dimensions which; given the particular profile of the tourist, affect satisfaction and choice of destination.

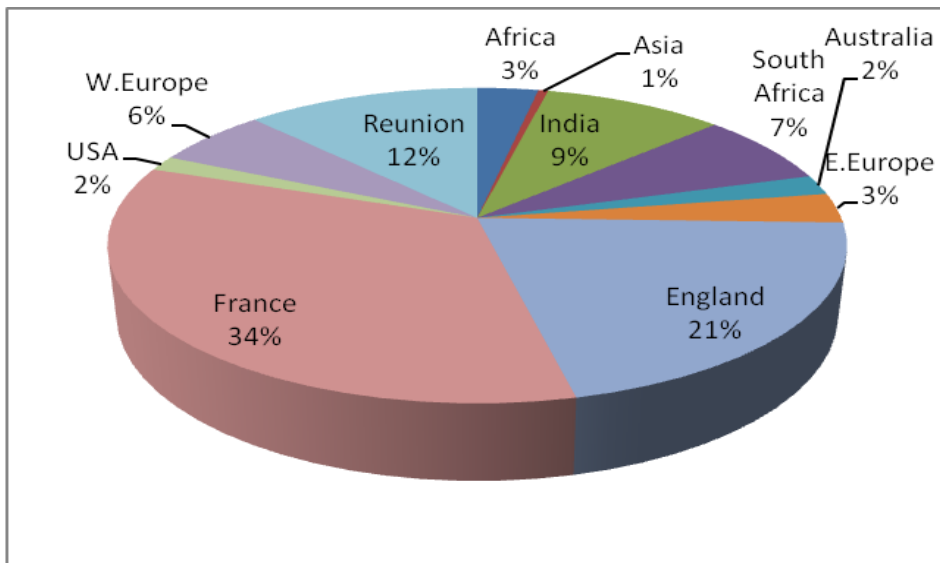
The table 1 below shows background characteristics of tourists.

Table 1: Percentage distribution of foreign tourists by background characteristics

| Background Characteristics | Percent | Background Characteristics | Percent |
|--|---------|---|---------|
| 1. Age Group | | 2. Length of Stay | |
| <18 | 4.0 | Less than 1 week | 21.6 |
| 19-30 | 32.7 | 1-2 weeks | 66.7 |
| 31-40 | 29.3 | 2-3 weeks | 6.2 |
| 41-60 | 23.4 | >3 weeks | 5.3 |
| >60 | 10.6 | 5. Place of residence during your trip | |
| 3. First Visit | 57.2 | Hotel | 56.7 |
| 4. Source of Information | | Bungalow | 29.1 |
| Internet | 20.9 | Friend or relative place | 8.3 |
| Electronic Media | 9.5 | Other | 5.5 |
| Word of Mouth | 33.4 | 6. Gender | |
| Travel Agency | 21.4 | Male | 49.2 |
| Other | 14.3 | Female | 50.8 |
| Total number of tourists interviewed = 1721 | | | |

From table 1, we can conclude that the majority of tourists were mainly between the age group of 19-30. Above 50% of the tourists were at their first visit and 66.7 % stayed on the island for 1-2 weeks. Furthermore, most of the tourists learnt about Mauritius through the word-of-mouth communications and most of the tourists interviewed were residing in beach hotels of Mauritius. From Figure 11, it can be concluded that most of the tourists interviewed were mainly from France with 34%, 21% were from England, 12% from Reunion Island and the remaining 33% were from USA, Australia, India and South Africa amongst others. Furthermore it can be seen that both genders were more or less equally interviewed.

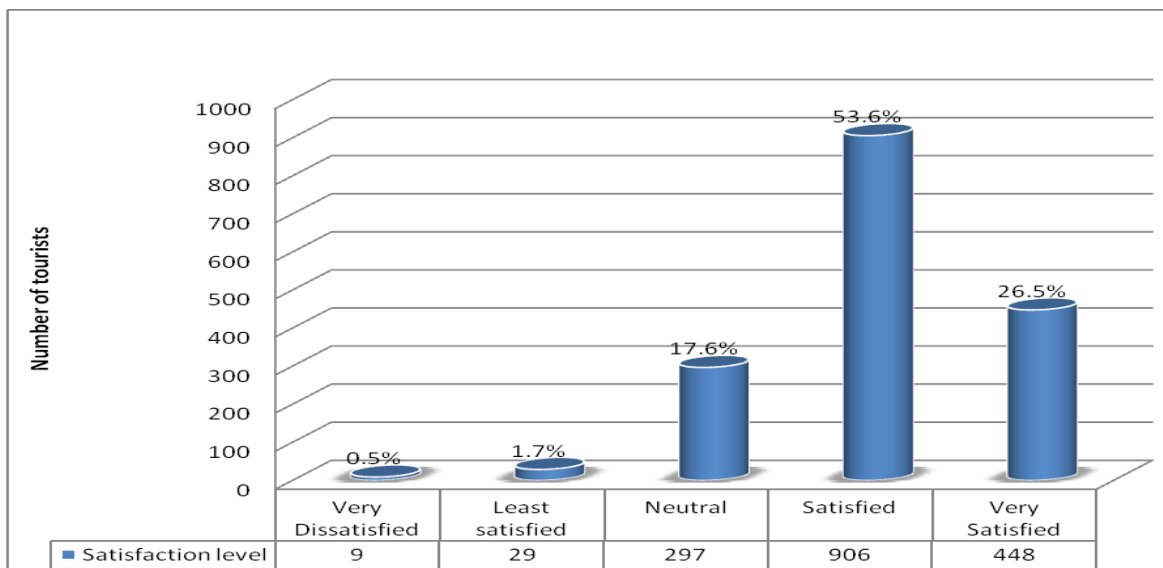
Figure 2: Percentage distribution of foreign tourists by country of residence



Overall level of Satisfaction

From the data collected, the overall level of satisfaction level of the interviewed tourists with Mauritius as a visitor destination was assessed. Figure 2 provides a pictorial display of the different outputs. It is found that 53.6 % and 26.5% tourists are ‘satisfied’ and ‘very satisfied’ respectively with Mauritius as a visitor destination, with nearly 80% of the visitors having recorded a positive note. Very few tourists are unsatisfied with their stay on the island. This means that, as a tourist destination, Mauritius is able to satisfy the requirement of the tourists to a very large extent.

Figure 3: Level of Satisfaction

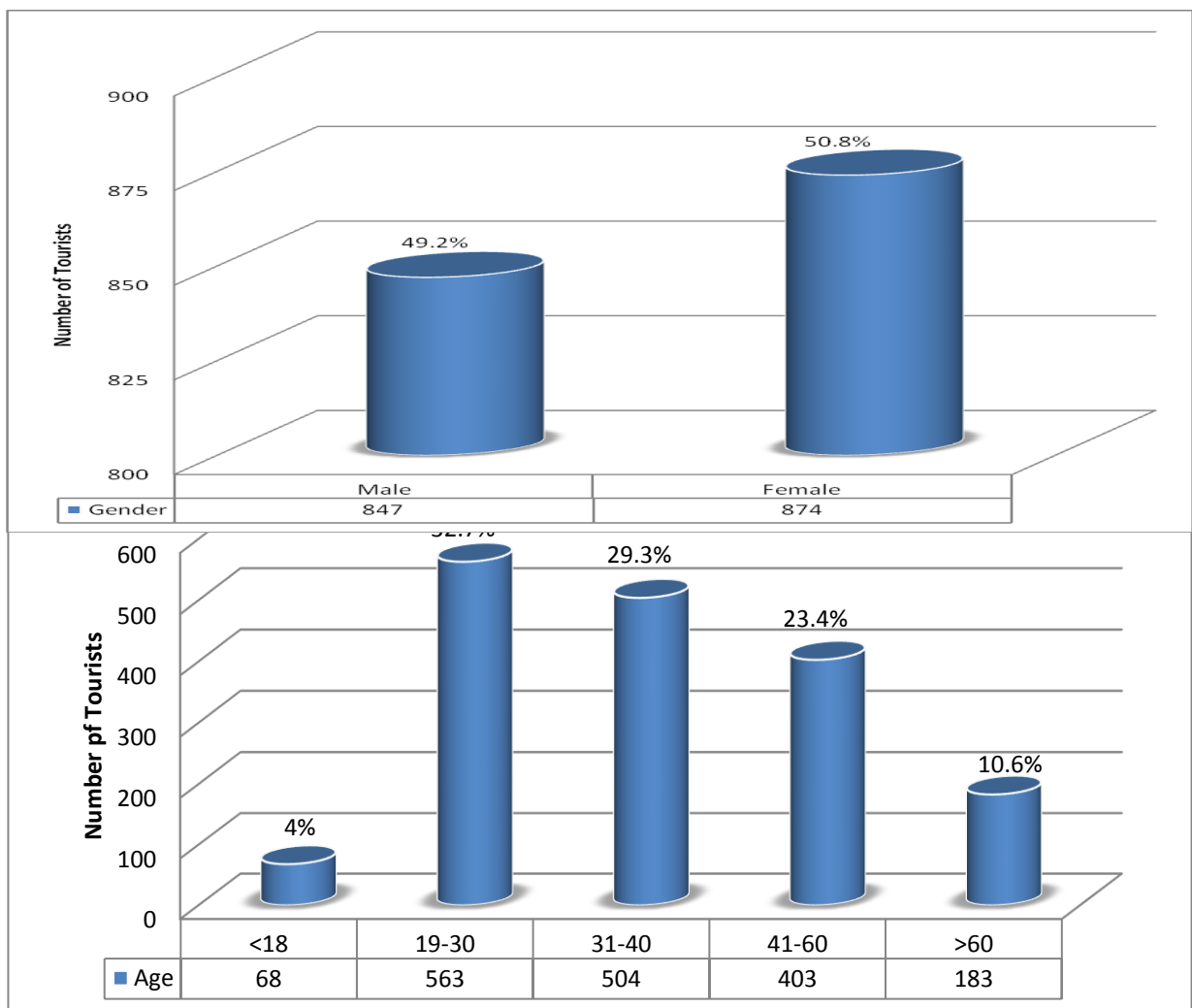


**Total number of respondents = 1689 out of 1721 (representing 98.1% of the sample)*

Age group and Gender

For a survey to be successful it should encapsulate both types of gender and also the age group should be roughly well distributed. The result shows that both male and female equality are achieved - this is illustrated in Figure 3. Similarly, when analysing the age group of the respondents, it is found that most of the foreign visitors are aged between 19 and 60 years: yet tourists between the age group of 19-30 are higher as compared to the other age groups. It can be seen from Figure 3 that the age groups below 18 and above 60 years are underrepresented – this may indicate that retirees and families prefer to choose other destinations than Mauritius for vacation purposes.

Figure 4: Age and Gender



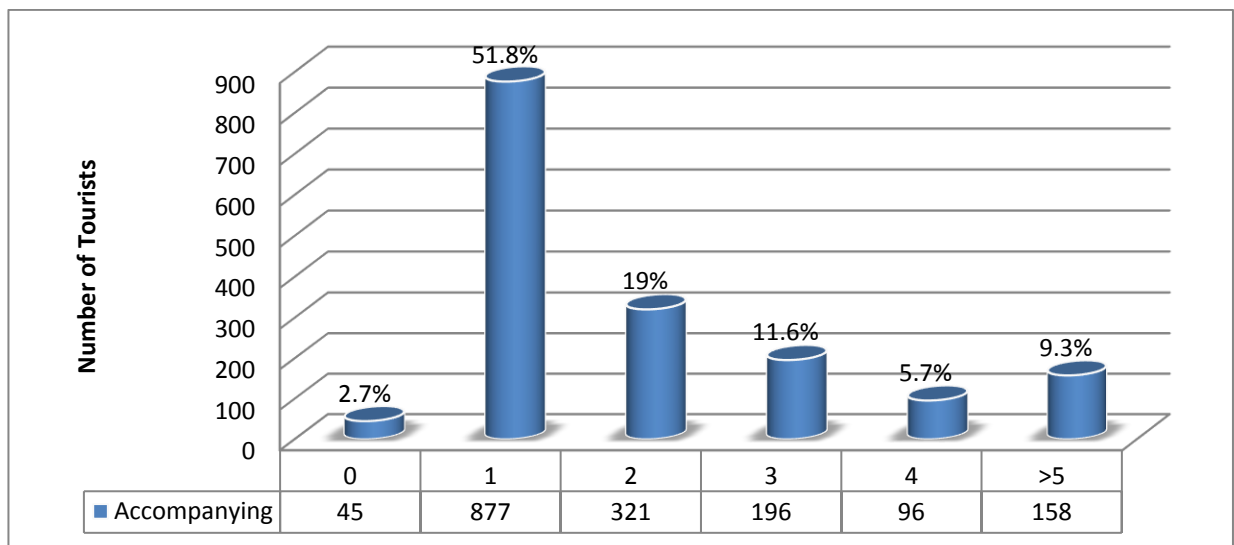
*Total number of respondents = 1721 out of 1721 (representing 100% of the sample) for the variable "Gender".

*Total number of respondents = 1721 out of 1721 (representing 100% of the sample) for the variable "Age".

Number of people accompanying

According to the data collected, most of the respondents are accompanied by only one person, representing 51.8% of the total respondents. From the survey, it can be observed that mainly couples visited the island of Mauritius. Only 2.6 % of visiting tourists are single, essentially because the main purpose of their visit is business-related.

Figure 3: Number of tourists accompanying

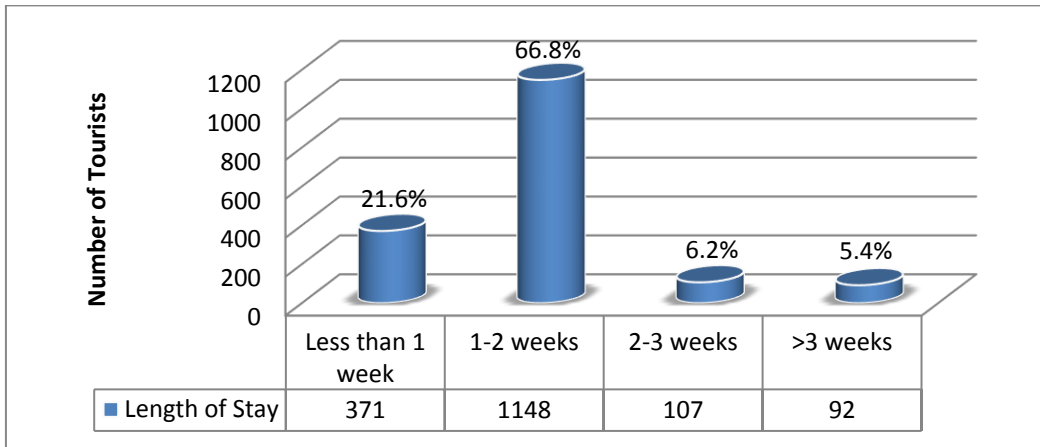


**Total number of respondents = 1693 out of 1721 (representing 98.4% of the sample)*

Length of Stay

About 66.8% and 22% of the interviewed tourists are on the island for a period of 1 to 2 weeks and less than 1 week respectively. Few of them stay on the island for a period of more than two weeks – one can conclude that most of the respondents came for holidaying.

Figure 4: Length of Stay

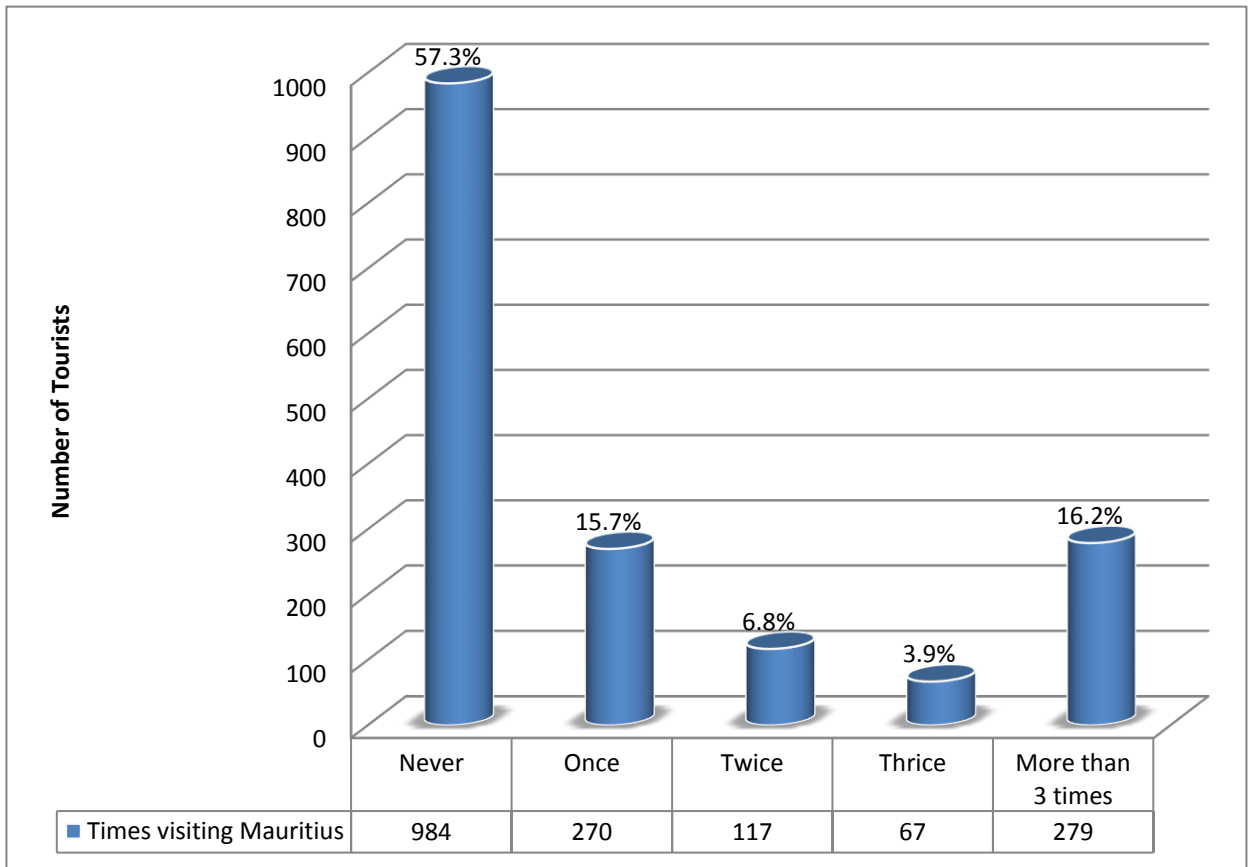


*Total number of respondents = 1718 out of 1721 (representing 99.8% of the sample)

Number of Visits

Figure 4 shows that 57.3% of the tourists visited Mauritius for the first time and 42.7% are at least here once before. This means that Mauritius is able to attract repeated tourists through good publicity, be it from word of mouth or through intensive marketing campaign. Given that Mauritius is viewed as a destination of frequent visits for certain tourists, the main concern of the authority must be oriented towards converting those first time comers into repeat or frequent visitors. In fact, the phenomenon of repeat tourism is undeniably a subset of appropriate factors: good infrastructure; tourism facilities and services among others. Good quality infrastructure is likely to attract tourists more often although John *et al.* (2000) revealed that repeat tourists were influenced mostly by regular visit to friends or family and ease of travel.

Figure 5: Number of Visits



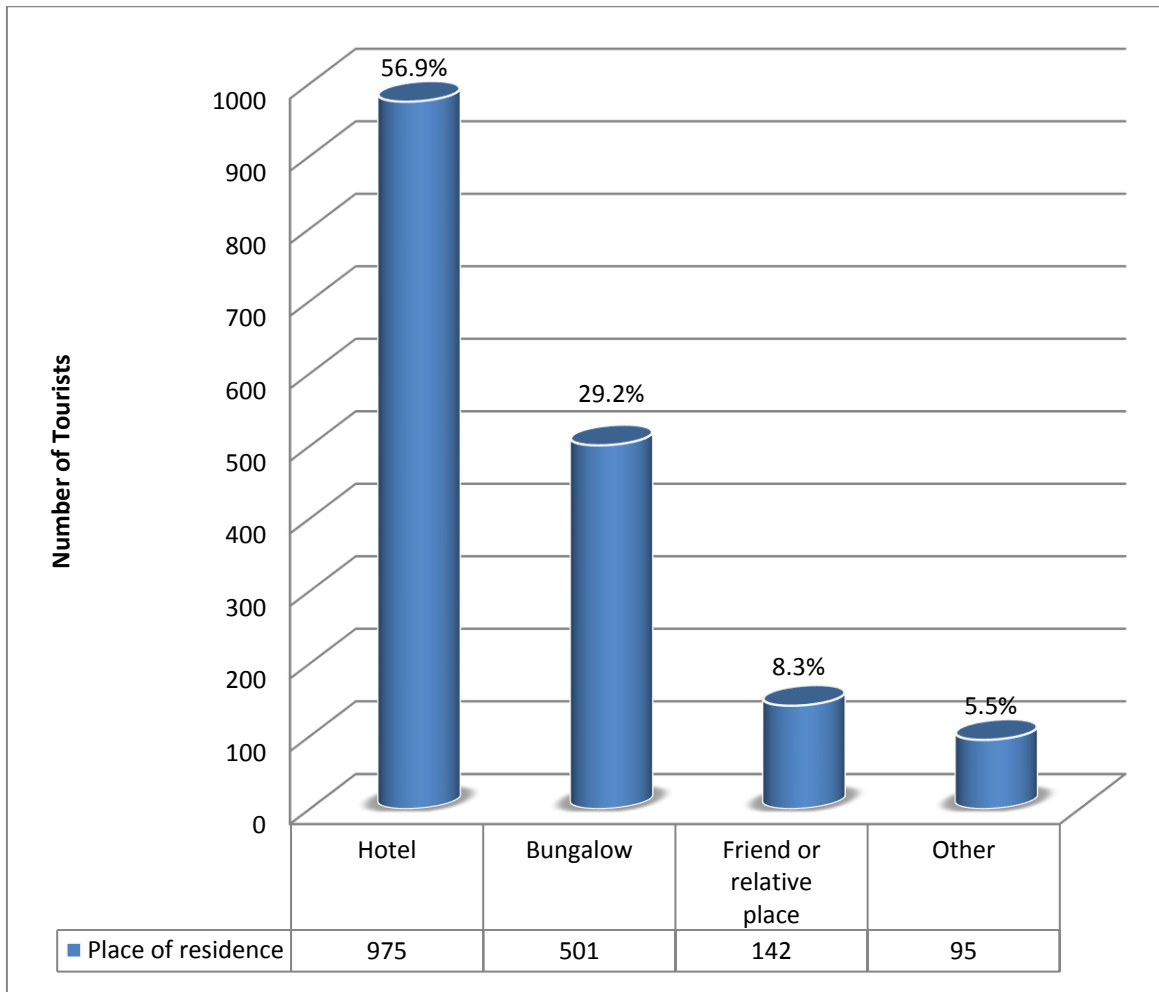
**Total number of respondents = 1717 out of 1721 (representing 99.8 % of the sample)*

Place of residence during stay

As might be expected, foreign visitors prefer beach hotels to other types of accommodation: 56.9% of the tourists choose hotels as residence during their stay on the island compared to 29% who favour a bungalow; the rest find it more convenient to stay at their friends/relatives place or in some other types of lodging. According to the Ministry of Tourism, Leisure & External Communications, the % of tourists choosing hotels as accommodation since 1998 to 2009 for example has always been above 75%⁵.

⁵ Source: “Handbook of Statistical Data on Tourism 2008” and “Survey of Outgoing Tourists 2009”, Ministry of Tourism, Leisure & External Communications.

Figure 5: Place of Residence



**Total number of respondents = 1713 out of 1721 (representing 99.5% of the sample)*

Country of Origin and Nationality

Based on the survey results, most of the respondents are from France and Great Britain representing 33.4% and 20.5% respectively. These two countries are followed by Reunion Island with only 11.9%. It is also observed that the Indian market is a promising one representing a share of nearly 10%. On the other hand, the African continent as a whole corresponds to 10% of the market share given a 7.2% to South Africa alone. In fact according to statistics from the Ministry of Tourism, the main tourist market of Mauritius has always been dominated by Great Britain, France and Reunion Island. Conversely by examining the Nationality it is found that most of the interviewed tourists are of French nationality - this is true since tourists from the Réunion Island are of French nationality. Secondly, most of the tourists are British while tourists of Asian nationality are really low as compared to the others.

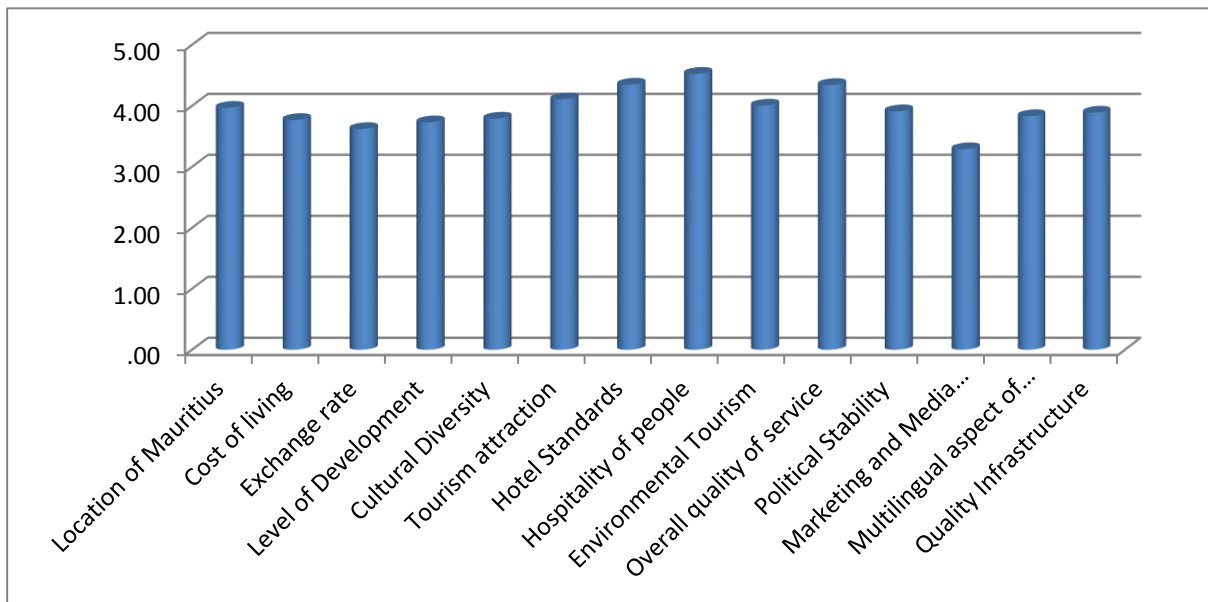
Importance-satisfaction gaps in tourism infrastructure

All the 1721 respondents were asked to assign scores on the scale of 1 to 5 on the degree of ‘importance’ they attach to the different components of proposed utilities. Moreover they were asked to assign scores to the existing current level of ‘satisfaction’ with the utilities.

This part of the analysis discusses the degree of gaps which currently exist between the “*importance-satisfaction*” scales of different components of each utility. The main idea behind this kind of analysis is that the components having large gaps between “*importance*” and “*satisfaction*” needs to be identified so that by improving them, the level of tourist satisfaction can be increased to make their visit more satisfying and also may help to increase the flow of tourists in future.

First and foremost, among the proposed “*General Factors*” that influence tourists’ decision, the score of ‘*Hospitality of people*’ is the highest at an average of 4.53 followed by ‘*Hotels standard*’ and ‘*Overall quality of service*’ at an average of 4.35 and 4.34 respectively. This means that most tourists find the hospitality of people to be a very important variable in choosing their travel destination. The study also confirms the important role of tourism attraction in the tourism equation with a reported score of above 4. Furthermore from the analysis, it can be seen that most of the components proposed under this category are considered to be important since all the mean score are above 3.

Figure 6: Importance Mean Scores – General Factors

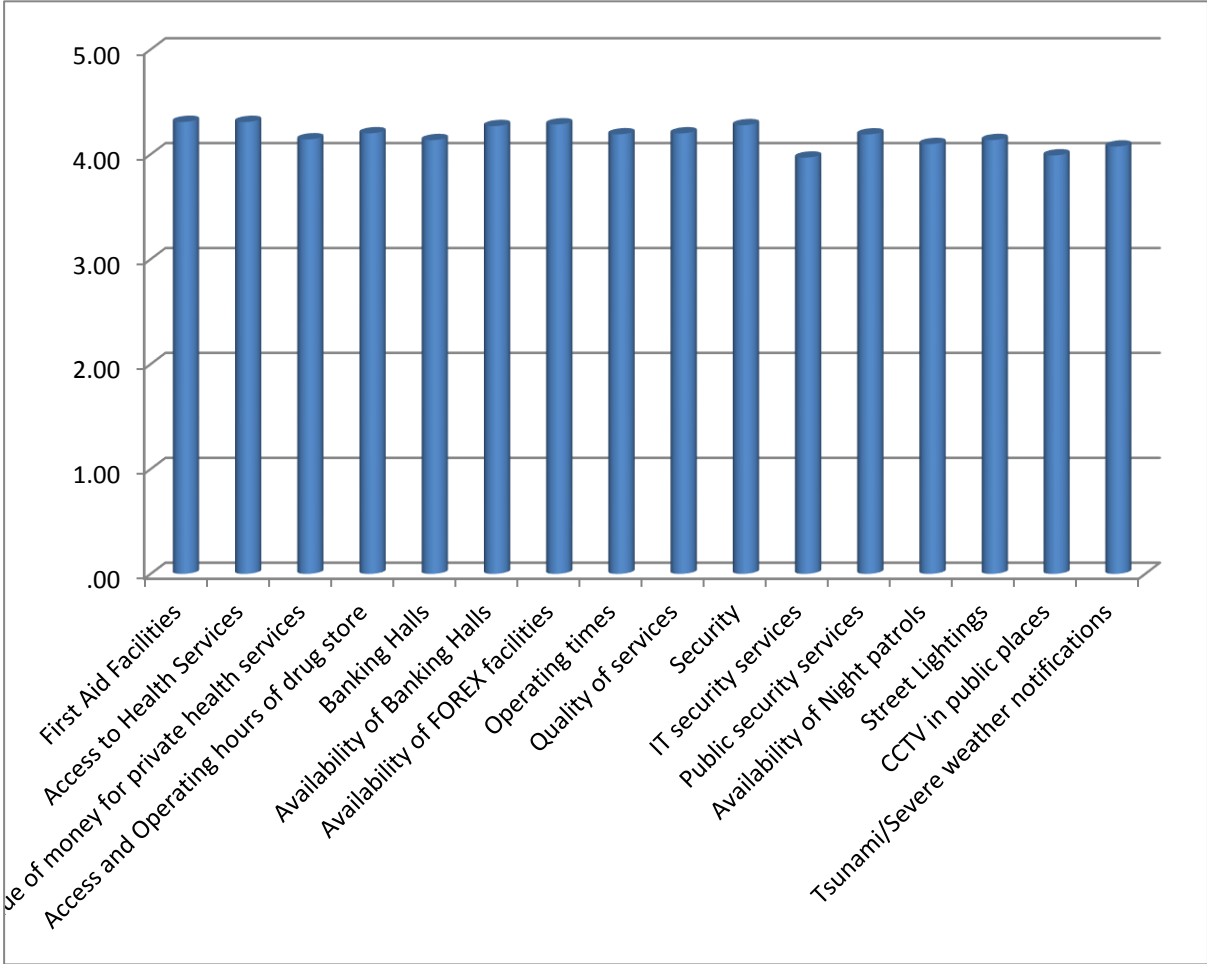


The first category of infrastructure proposed is the “*Transport Infrastructure*” which includes both airport and road infrastructure as the principal transport infrastructure. Among the components proposed under the airport

infrastructure, 'Security' and 'Rest room/Toilet' are found to be the highly important with an average score of 4.29 and 4.20. It is important to highlight the usefulness of 'Signage/Information Centre' at the same time

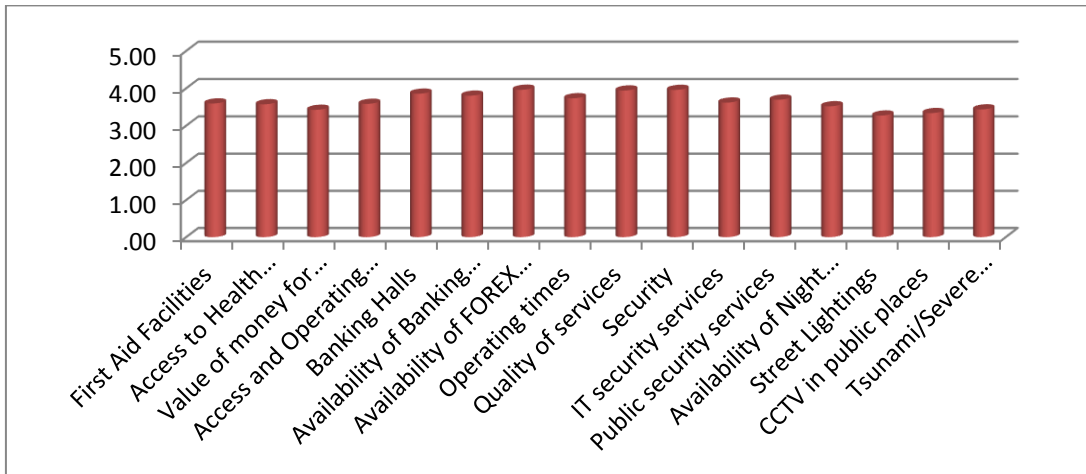
Soft Infrastructure

Figure7: Importance Mean Scores – Soft infrastructure



Conversely, Figure 7 produces the different mean values under the 'Soft Infrastructure' category. Most of the 'Banking facilities/services' have recorded a good score as compared to factors like: 'Street Lightings', 'CCTV in public places' and 'Value of money for private health'.

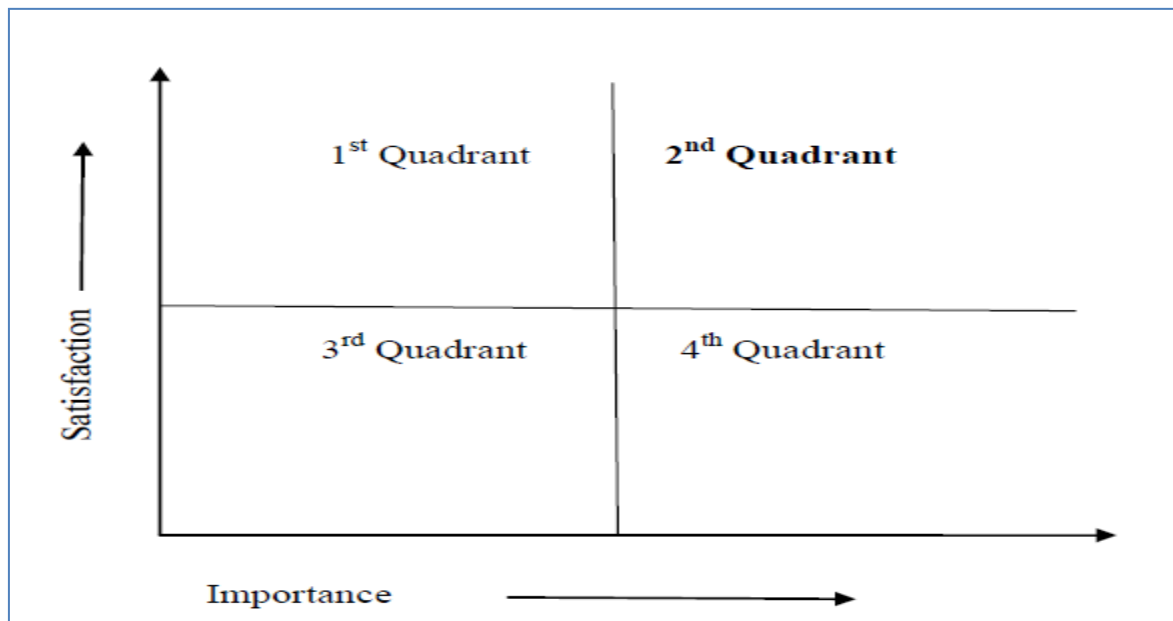
Figure 8: Satisfaction Mean Scores – Soft Infrastructure



Importance – Satisfaction gap

The Importance – Satisfaction gap is derived from the difference between Importance and Satisfaction average ranks (**Importance mean scores – Satisfaction mean scores**). Figure 9 below depicts the different scenarios that may crop up, but the results of the mean scores derived for all components eventually lie in the 2nd quadrant (*high importance – high satisfaction*) with a mean scores of above 2.5 for both sets of data.

Figure9: Importance – Satisfaction chart



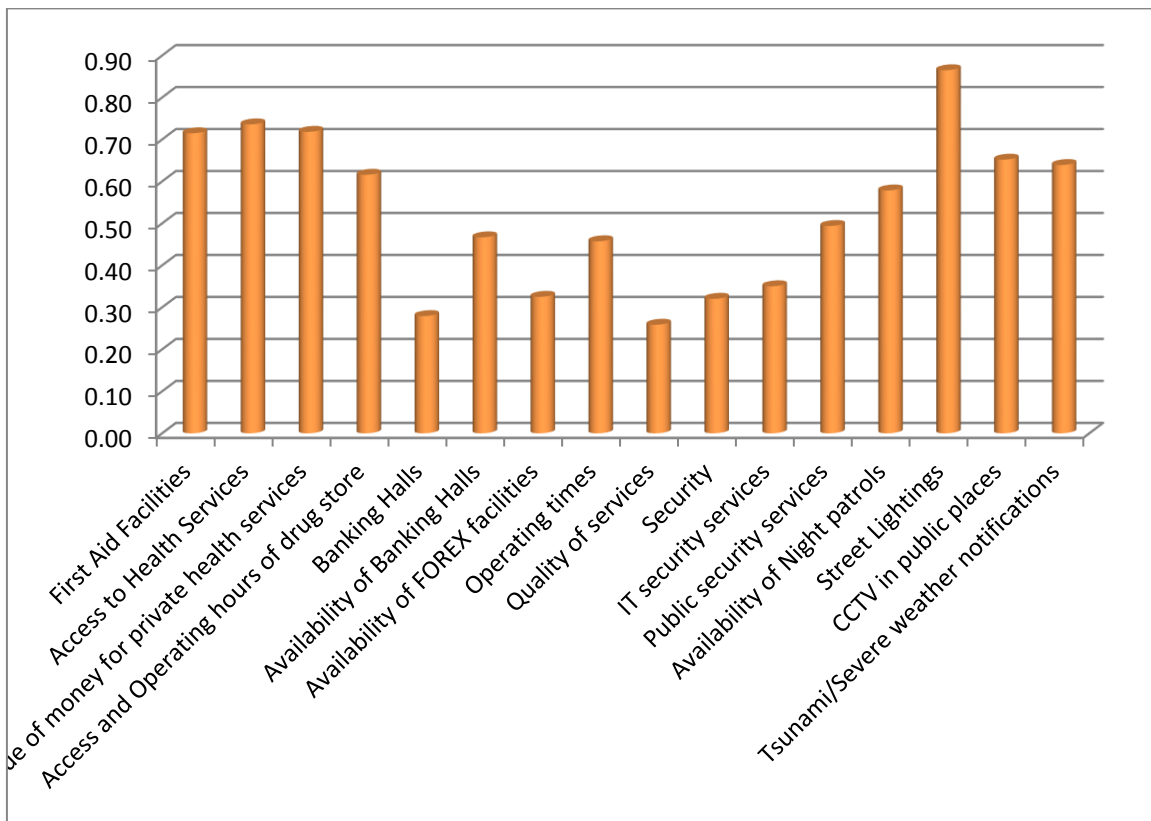
- Note: 1st Quadrant = Low Importance & High Satisfaction
- 2nd Quadrant = **High Importance & High Satisfaction**
- 3rd Quadrant = Low Importance & Low Satisfaction
- 4th Quadrant = High Importance & Low Satisfaction

The difference between the mean score is less than 1 for all the components - in fact one will not expect a large gap difference when the variables are located in the 2nd quadrant. As such, a difference gap of less than 1 also suggests that the mean level of importance nearly portrays the level of satisfaction assigned by the tourists. A negative difference value simply underscores that the satisfaction value is greater than the importance one whilst a positive sign shows that the tourists have ranked a higher value for the importance than the satisfaction variables. The higher the positive sign, the more emphasis is to be laid on the particular infrastructural/services elements.

Although the *importance-satisfaction gap* is rather small (that is less than 0.5) for the general factors, some important conclusion can be drawn. Firstly from Figure 9, it can be seen that six factors (*'Location of Mauritius', 'Cultural Diversity', 'Hospitality of People', 'Political Stability', 'Marketing & Media Promotions' and 'Multilingual Aspect of Country'*) have negative loadings: which suggests that satisfaction scores are greater than importance attributed by tourists. In fact, it is true that the country enjoys political stability as compared to many of its African's counterparts and that in terms of cultural diversity and multilingual aspect of country, Mauritius enjoys a well founded reputation. Conversely, the remaining variables have an above horizontal axis value (where difference is not more than 0.4). *Cost of living* was perceived as the highest gap in this category: as a result the authorities should pay particular emphasis on this component as there are competing countries where cost of living is more pleasant and attractive.

As far as the last category of infrastructure is concerned, all the variables (*first aid facilities, access to health services, value for money and access for and operating hours of drug store*) falling under '*Health*' are poorly rated, resulting in a gap value of greater than 0.5. Security services is deemed to be very important in the visitors' eyes and this tend to multiply when going in a foreign country – '*street lightings*', '*CCTV in public roads*', '*availability of night patrols*' and '*alert systems*' have all experienced a significant gap value as shown in the survey results. These bottlenecks need to be tackled so as to make the tourists feel more secure during their stay in Mauritius.

Figure10: Importance-Satisfaction Gap Mean Scores – Soft Infrastructure



The main focus of our study is to assess the importance attached to the soft infrastructure. Along this line, the questionnaire contains a number of statements (measured on a 5 point Likert scale with anchored 5 for ‘very important’ and 1 for ‘not important at all’) to obtain the respondents’ views on the overall status of the country’s soft infrastructure. They encompass availability of health services, banking services and security services including Tsunami Alert system. The mean score (Table 2) for the 16 statements ranges from 3.97 to 4.31, which indicates that the tourists equally ascribe high importance to the soft infrastructure. The availability and quality of health service is very important in their decision to choose Mauritius as a destination and they also attach equal importance to their security.

Table 2: Mean Score

| Importance | Satisfaction | Importance - Satisfaction gap | |
|--|--------------|-------------------------------|------|
| <u>Soft Infrastructure</u> | | | |
| <i>Health</i> | | | |
| First Aid Facilities | 4.31 | 3.59 | 0.71 |
| Access to Health Services | 4.31 | 3.57 | 0.74 |
| Value of money for private health services | 4.14 | 3.42 | 0.72 |
| Access and Operating hours of drug store | 4.20 | 3.58 | 0.62 |
| <i>Banking</i> | | | |
| Banking Halls | 4.14 | 3.86 | 0.28 |
| Availability of Banking Halls | 4.27 | 3.80 | 0.47 |
| Availability of FOREX facilities | 4.29 | 3.96 | 0.33 |
| Operating times | 4.19 | 3.73 | 0.46 |
| Quality of services | 4.20 | 3.94 | 0.26 |
| Security | 4.28 | 3.96 | 0.32 |
| <i>Security Services</i> | | | |
| IT security services | 3.97 | 3.62 | 0.35 |
| Public security services | 4.19 | 3.70 | 0.49 |
| Availability of Night patrols | 4.10 | 3.52 | 0.58 |
| Street Lightings | 4.14 | 3.27 | 0.86 |
| CCTV in public places | 3.99 | 3.34 | 0.65 |
| Tsunami/Severe weather notifications | 4.07 | 3.43 | 0.64 |

Factor analysis was used in an exploratory manner to analyse and summarise the interrelationships among variables (commonly cited in the literature) which influence a tourist's decision in choosing a destination. An initial factor analysis was run with all the 14 variables, giving three factors. Some of the variables loading onto a particular factor were low and also did not make theoretical sense. These were eliminated in the final factor analysis. Therefore, the 14 variables with loading greater than .50 on the original three factors were analysed separately in a second factor analysis. The reason was to remove some of the 'noise' added by variation due to extraneous variables. A final factor analysis was completed using the resulting 9 variables. All the assumptions of the PCA model were satisfied (Hair *et al.*, 1998). The results were rotated, using the varimax rotation to isolate more meaningful dimensions. After Varimax rotation three factors (those with eigenvalues greater than 1.0 were retained and used to identify groupings of items which influence a tourist's decision in choosing Mauritius as a destination. Variables with high loadings (greater than .50) were considered to be representative of the characteristic reflected by that factor, indicating that convergent validity is adequate.

Table 3: Rotated component matrix of respondents'- Soft Infrastructure

| Infrastructural Elements/Services | Component | | |
|--|-------------------------|--------------------------|------------------------|
| | <i>Banking Services</i> | <i>Security Services</i> | <i>Health Services</i> |
| Banking Halls | .735 | | |
| Availability of Banking Halls | .685 | | |
| Availability of FOREX facilities | .810 | | |
| Operating times | .816 | | |
| Quality of services | .814 | | |
| Security | | | |
| IT security services | | .673 | |
| Public security services | | .762 | |
| Availability of Night patrols | | .791 | |
| Street Lightings | | .761 | |
| CCTV in public places | | .797 | |
| Tsunami/Severe weather notifications | | .754 | |
| First Aid Facilities | | | .792 |
| Access to Health Services | | | .869 |
| Value of money for private health services | | | .768 |
| Access and Operating hours of drug store | | | .774 |
| <i>Eigenvalue</i> | 4.120 | 4.026 | 3.058 |
| <i>% of Variance explained</i> | 25.75 | 25.16 | 19.11 |
| <i>Cronbach's Alpha</i> | .935 | .931 | .907 |

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
 Total Variance explained: 70.02%
 Barlett's Test of Sphericity: 5595.579 (.000)
 KMO = Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.926
 For each variable, missing values are replaced with the variable mean

Along the same line as for the previous dimensions of infrastructure (ROAD, HOTEL and UTILITY), these variables were grouped into distinct components using the PCA. After varimax rotation three components were identified as showed in **Table 3**. They were labelled as Banking Services, Health Services and Security Services. The consistency of the items falling under each component was verified using the Cronbach's Alpha reliability test and the values obtained are satisfactory. Initial statistics (showed below the table) suggested that the variables would factor well.

Differences due to Respondents' Profile - Soft Infrastructure

A Mann Whitney test was performed to test for any significant difference between the respondent's gender and the provision of different soft infrastructure. The result shows that the mean value for women are higher compared to that of their male counterparts. In particular 'First Aid facilities' and 'Access and Operating Hours of Drug Store' were statistically significant. This implies that women are more concerned about the provision of first aid facilities as they are more of a caring nature than their counterparts.

Further analysis was done to assess whether there is significant relation with the length of stay on the island, the number of people accompanying the visitors, the age group and the nationality profile on the proposed infrastructures. According to the K-W tests, there are no statistically significant difference for most of the proposed infrastructure based on the length of stay, the number of people accompanying the visitors and the age group. However most of the variables under the named infrastructure element/services (except first aid facilities, availability of ATMs and Tsunami Alert system) reported a statistical significant difference with the visitors' nationality.

Econometric Framework

To complement the survey analysis, we further assess the importance of soft infrastructure in tourism using an econometrical framework, using selected data from our tourism survey, more particularly on tourist satisfaction (rating score of the actual satisfaction on a number of dimensions and including elements that proxy for soft infrastructure). Our dependent variable is repeat/recommended tourism which was also recorded from the 1721 tourists surveyed. We posit that satisfaction with respect to a number of 'ingredients' (our independent variables in this case) is related to the probability of repeat tourism.

Central to our econometric modelling is the construct of a measure for soft infrastructure. Such a proxy was built by aggregating the satisfaction scores of the various elements and dimensions pertaining to soft infrastructure (banking, health and security) summarised below (table 4)

Table 4: Dimensions of soft infrastructure

| |
|--|
| <i>Health</i> |
| First Aid Facilities Access to Health Services Value of money for private health services Access and Operating hours of drug store |
| <i>Banking</i> |
| Banking Halls Availability of Banking Halls Availability of FOREX facilities Operating times Quality of services Security |
| <i>Security Services</i> |
| IT security services Public security services Availability of Night patrols Street Lightings CCTV in public places Tsunami/Severe weather notifications |

To control for other factors that may affect the decision of tourists to recommend Mauritius as a destination or to engage in repeat tourism, we extracted scores on other major potential determinants of tourism decision (well documented in the literature, see Witt and Witt, 1995, Naudee and Saayman, 2004 among others), including cost of living (COST), level of development of the destination (DEV), Promotion of the destinations (PROMO) and other infrastructural components related to Hotel Infrastructure (HOTEL), Transport infrastructure (TRANS)), Tourism attractions (TOURISM) and Utility Infrastructure (UTILITY). It is noteworthy that infrastructural development's role on tourism, mostly related to transport and communication has received some empirical treatment recently (see Seetanah 2007) and in some ways our work one can construed as being disaggregating aggregate infrastructure into its different types, but focus on an analysis of soft infrastructure, an element largely ignored in the literature. We have included the other different components of infrastructure (refer to table below for their definition in this study) for more comparative insights.

Table 5: Infrastructure Components

| |
|--|
| Airport Infrastructure (waiting areas, airport administration, airlines cargo, duty free shops, rental car services) |
| Road Infrastructure (road quality, road security, public transport) |
| Hotel infrastructure (service quality, shopping malls, restaurants, casinos) |
| Tourism Infrastructure (heritage sites, museums, wild life) |
| Utility Infrastructure (telephone, internet, water and electricity system) |

Thus our proposed empirical model is specified as:

$$RT_i = (COST_i, DEV_i, PROMO_i, HOTEL_i, TRANS_i, TOURIST_i, UTILITY_i, SOFT_i)$$

Subscript i denotes each tourist, RT refers to the response of coming back to or recommend Mauritius. In fact, from the survey, it takes the value of 1 if the tourist answered yes to question (that if he is coming back or would recommend the destination) and 0 if answered no. COST, DEV, PROMO, HOTEL, TRANS, TOURIST, UTILITY and SOFT, defined here above, are the determinants of repeat tourism.

Since we are dealing with around more than 1721 respondents at a particularly point of time and given that the dependent variable is a binary one (0 if tourist signifies his intention not to come back or will not recommend the destination and 1 if the tourism signifies his intention to come back and to recommend the destination), the preferred methodological approach is that of 'limited dependent variable regression' (Greene, 1997) as the dependent variable was dichotomous in nature, taking the value 1 or 0. We thus define a binary variable $P_i = 1$ and $p_i = 0$ otherwise where z is the case if the tourist responded his willingness to repeat or recommend. So the binary variable basically measures whether a tourist will repeat or recommend the destination. The probability that a tourist repeat or recommend the destination r is $P = \text{Prob}[y/z < 1 | x] = \text{Prob}[\varepsilon < 1 - \beta | x] = F(1 - \beta)$, where F is the cumulative density function specified for the error term in the levels regression, x the matrix of explanatory variables (household characteristics), [beta] is a vector of coefficients, e, is an error term, and F is the cumulative density function applied to that error term. When a normal

distribution is chosen for F, a Probit model results; when a logistic distribution is used, a Logit model is estimated.

In fact, though Ordinary Least Squares (OLS) could have been used to compute the estimates for the binary choice models, certain assumptions of the classical regression model are violated. These include non-normality of the disturbances, heteroscedastic variances of the disturbances and questionable value of R as the measure of goodness of fit. Moreover, OLS imposes constant parameters over the entire distribution and these may lead to bias estimates (Grootaert, 1997). Linear probability models (LPM) have also been alternatives, but Probit and Logit models are recommended to overcome the problems associated with Linear Probability Models (LPM). The former models use Maximum Likelihood Estimation (MLE) procedures. A multinomial Probit is used since probit models are more flexible than Logit models and that it plays an important role in applied econometrics (Heckman, 1981). More specifically multinomial logit choice models assume that all the decisions are considered simultaneously and are independent. However Probit model allows for the existence of possible correlated disturbances between two decisions. Finally, Probit models also permits the testing of the existence and significance of the interdependence of these joint decisions.

RESULTS AND DISCUSSION

Results from the multinomial Probit, based on data extracted from the satisfaction survey, is presented in Table 6 below:

Table 6: Probit Model Estimates

(Dependent variable RT= probability of repeat/recommended tourism)

| <i>Variable</i> | <i>Probit model estimates</i> |
|-------------------------------|-------------------------------|
| <i>Constant</i> | 0.06 (4.23)*** |
| <i>COST</i> | 0.012 (1.11) |
| <i>DEV</i> | 0.07 (2.32)** |
| <i>PROMO</i> | 0.049 (2.14)** |
| <i>HOTEL</i> | 0.078 (2.17)** |
| <i>TRANS</i> | 0.043 (2.36)*** |
| <i>TOURIST</i> | 0.058 (1.91)* |
| <i>UTILITY</i> | 0.036 (2.21)** |
| <i>SOFT</i> | 0.053 (2.05)* |
| <i>R²</i> | 0.64 |
| <i>Number of observations</i> | 1721 |
| <i>Prob > chi2</i> | 0.002 |
| <i>LR chi2(9)</i> | 1434.64 |

*significant at 10%, ** significant at 5%, ***significant at 1%

The small letters denotes variables in natural logarithmic and t values are in parentheses.

The likelihood ratio chi-square of all the models has a p-value of 0.003 which serve to confirm that our model as a whole fits significantly better than an empty model.

The reported coefficients represent the level of correlation between the independent variable and the dependent variable. Of interest to us is SOFT which is reported to be a statistically significant predictor of the probability of repeat and recommended tourism. In fact, the coefficient of SOFT is 0.053 suggesting that each point of increase in satisfaction related to SOFT (soft infrastructure) results in a 0.053 standard deviation increase in the predicted Probit index, that is in the probability of repeat or recommended tourism. Thus soft infrastructure related to tourism is seen to be an important precursor to a tourist's choice for a destination and an important element in a destination's competitiveness and attractiveness framework. This piece of results validates the general theoretical and empirical argument that infrastructure is an important dimension on tourism development, especially for the case of island economies. The present result interestingly focuses on soft infrastructure, an element which received scant attention.

Interestingly, there is evidence that the other types of infrastructure also matter in the decision of tourist, although to different extent. As a matter of fact tourist appears relatively more sensitive to transport and hotel infrastructure amongst all infrastructure, as witnessed by the relative size of the coefficient.

In addition, the other explanatory variables were also found to be significantly correlated, with the expected signs, with the independent variable. Interestingly cost of living (COST) appears to be not significant in predicting repeat/recommended tourism. This could be explained by the fact the country of origin of most of our tourists are developed nations with the cost of living in their country being much higher than in Mauritius. Such results are to a large extent consistent with recent previous econometric works investigating the determinants of tourism development on the island

CONCLUSIONS

Analysis from the survey reveals that 80% of the visitors are satisfied with Mauritius as a tourist destination. The majority of the tourists are either couples or partners while the retirees and family are underrepresented. Slightly above 40% of the tourist have visited the island before, which indicates that the island is able to attract repeat tourist. In line with the national statistics, France, Great Britain and Reunion make up the majority of the tourist. The African continent represents only 10%, with South African having the lion share. The survey results also reveal that the majority would like to return for a second holiday and would also recommend the destination to relatives and friends.

Among the proposed "*General Factors*" that influence tourists' decision, the hospitality of people and the hotels standard are found to be very important in choosing their travel destination. Equally '*Security of transport including Taxi safety*' are rated as very important with an average score of 4.29. On the other hand,

tourist travelling with family members attached high importance to first aid facilities and access to health services.

Although the *importance-satisfaction gap* is rather small (that is less than 0.5) for the general factors and tourist site infrastructure, the quality and security of our roads more precisely the width of the roads, the road signs, the markings of the roads, security patrol and footpaths need particular attention since the level of satisfaction generated by foreign visitors does not match the importance assigned by them. Also, the adverse state of the public transport and the congestion dilemma has been highlighted. The gap difference is more pronounced in the utility and soft infrastructure/services category: internet facilities and availability and quality of water supply; health and security services.

The mean score for the case of soft infrastructure were relatively high side which indicating that the tourists equally ascribe high importance to the soft infrastructure. The availability and quality of health service was very important in their decision to choose Mauritius as a destination and they also attach equal importance to their security. The phenomenon of repeat tourism is undeniably a subset of appropriate factors: good infrastructure; tourism facilities and services among others. Good quality infrastructure is likely to attract tourists more often although John *et al.* (2000) revealed that repeat tourists were influenced mostly by regular visit to friends or family and ease of travel.

In terms of soft infrastructure, tourists rated communication, both internet and telephone services, and security to be most important. Significant gap has been found in the categories of '*Health*' and '*Security*'. All the components assessed under the category of Soft infrastructure are critical to the tourism industry with mean score ranging in a bandwidth of 3.97 and 4.31. It has been found in the survey findings that tourists attribute a high level of importance to health. In fact, first Aid facilities and access to health services are a real concern to these visitors among all the proposed utilities under the Soft Infrastructure. Government should emphasise on the continuous improvement and provision of these basic health care services which are of utmost importance to the tourists.

External factors having a major impact on Africa's tourism potential are the continent's perceived poor track record in areas such as safety, security and health. Interviews conducted with tourism opinion leaders and major tour operators to Africa have confirmed the acute importance of these factors on tourism performance and sustainability. In fact there are several proposed solutions to remedy the tourism situation in Africa. One such recommendation is to encourage and assist African countries' effort to address security, hospitality management, infrastructure and environmental constraints to tourism development through tourism training programmes.

The econometric approach focusing on a Probit framework to model repeat/recommended tourism confirmed that SOFT infrastructure is a statistically significant predictor of the probability of repeat and recommended tourism and such result confirm the theoretical links between such infrastructure and tourism. Furthermore, the other explanatory variables were also found to be significantly correlated, with the expected signs, with the independent variable with the exception of cost of living (COST) which was found not to be significant predictors of repeat/recommended tourism.

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Appendix

Table A1: Some key figures about the Mauritian Tourism Sector

| | 1980 | 1990 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|------------------------------------|------|-------|--------|-------|--------|--------|-------|--------|--------|--------|-------|--------|--------|--------|
| Population ('000) | 1060 | 1080 | 1125.1 | 1140 | 1151.1 | 1163.9 | 1174 | 1186.4 | 1215.6 | 1223.1 | 1231 | 1237.3 | 1243.1 | 1250.4 |
| No. Hotels | 43 | 75 | 90 | 92 | 95 | 95 | 95 | 97 | 110 | 97 | 102 | 102 | 112 | 109 |
| Hotel Rooms | 2101 | 4603 | 6809 | 7267 | 8255 | 8657 | 9024 | 9647 | 10233 | 10857 | 11488 | 11456 | 12075 | 11925 |
| Tourist arrival ('000) | 115 | 291.5 | 558.1 | 578 | 656.5 | 660.3 | 681.6 | 702 | 810 | 907 | 930.5 | 871.4 | 934.8 | 964.6 |
| Tourism Receipt (million) | 7500 | 9207 | 11890 | 14668 | 14234 | 18166 | 18238 | 19397 | 21865 | 40687 | 41213 | 35693 | 39456 | 42845 |
| Tourism Receipts (% of GDP) | 6% | 10% | 13% | 13% | 14% | 15% | 16% | 17% | 20% | 17% | 15% | 13% | 13% | 13% |

Source (Statistics Mauritius, 2011)

Figure A2: % distribution of tourist arrivals by country of residence, 2001 – 2011

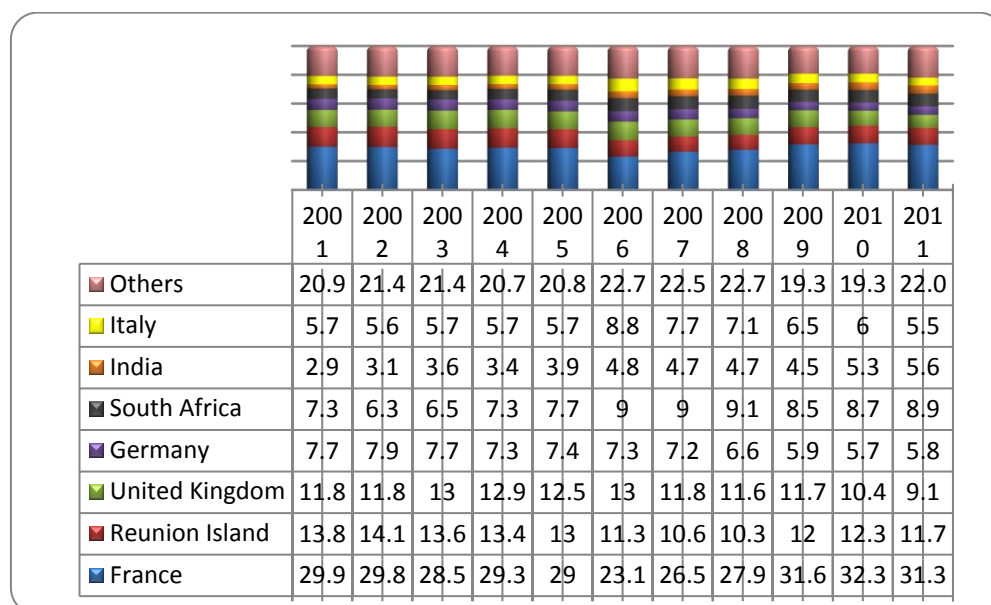
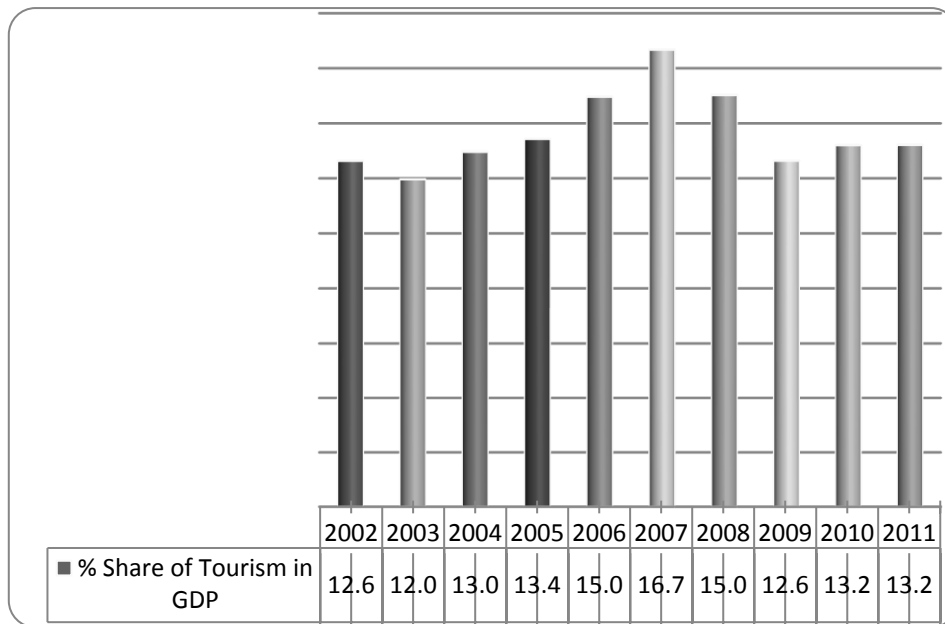


Figure A3: % Share of tourism in GDP, 2002 - 2011



$\% \text{ Share of Tourism in GDP} = (\text{Tourist Earnings} / \text{GDP at Market prices}) * 100$

Source: Bank of Mauritius Statistics

CURRICULUM ALIGNMENT BETWEEN THE HIGH SCHOOL MATHEMATICS CURRICULUM AND TRANSITION TO HIGHER EDUCATION EXAMINATION IN TURKEY

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ABSTRACT

Central exams are very critical for passing the higher education levels in Turkey. One of these central exams is the Transition to Higher Education Examination (THEE) for high school students in Turkey. With regard to THEE results, high school students make a choice among the university programs. There are a total of 120 questions on the exam. This exam consists of 4 tests which including Turkish, Social Science, life science and mathematics. In mathematics test have 40 questions. There are algebra and geometry questions in this sections. In this study we aimed to investigate the alignment between high school mathematics curriculum (K9-K11) objectives and THEE mathematics test. High school mathematics curriculum has 88 objectives related to THEE. All of K12 mathematics curriculum objectives and some K10 and K11 objectives which are not related to THEE content coverage, are excluded. On the other hand, geometry questions in THEE mathematics test were excluded the analysis because of the students take a different exam for geometry. Also when the geometry questions were included in the analysis, it would be wrong results. Because of this reason 33 of the 40 questions were included in the analysis.

To achieve this aim high school mathematics curriculum and THEE questions were analysed by three coders. Two of these coders are high school math teachers and have master of curriculum and instruction degree. The other coder who is the one of the researcher, has undergraduate degree in high school math teaching and Ph.D. students in curriculum and instruction.

Coders used Survey of Enacted Curriculum (SEC) Model procedure, to analyse high school curriculum and THEE questions. In the end of the analyse alignment index will calculate between the high school curriculum and THEE. Also THEE and high school curriculum topics will compare coarse and fine grain level. And if there was misalignment between THEE and high school curriculum, its possible causes will discuss. Also results will discuss with previous studies in the literature. And what will make recommendations about what to do to get better alignment.

THE IMPORTANCE OF DEVELOPING THE PSYCHO-PEDAGOGICAL SKILLS OF THE TUTORS IN TRAINING THE FUTURE NURSES

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ABSTRACT

One of the most important members of the tutoring team is the nursing tutor, whose role in the training of future nurses has always been a subject of interest, research and development for all educational systems. Tutoring represents a system and a program to support and counsel students, in order to facilitate integration in the educational system, to provide guidance in choosing the most suitable cultural and social options, appropriate for the student life, while also improving their school results. The tutorial system encourages the student communication and trust towards the school and the teachers. Student tutoring is conditioned by proven professional competence. In order for the tutors to really meet the needs of the students, they are required to be acquainted with the learning knowledge theories and their models, as well as the application of learning methods specific to the pedagogy of medical education, coupled with a continuing personal and professional development. Thus, the definition of psycho-pedagogical training for clinical practice tutors, followed by the development of specific skills, regulation and status consolidation for them represent the strategic objectives in a general context of training for future nurses.

Keywords—nursing, tutor

THE STUDENT'S ATTITUDES TOWARD TEACHING THROUGH MIND MAPPING METHOD TO LEARNING KANJI IN JAPANESE CLASS AT SUANSUNANDHA RAJABHAT UNIVERSITY

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ABSTRACT

The purpose of this study aim to investigate students' attitudes towards teaching through Mind Mapping method to learning KANJI in Japanese class at Suansunandha Rajabhat University (SSRU), a survey of seventy male and female the first year undergraduate students from faculty of humanities and social sciences japanese major, were selected to participate in the study.

This study was in the context of exploring effective teaching and learning in Japanese class using Mind Mapping method from a student's perspective. The instrument for the study was Mind Mapping method with 15 activities and questionnaire concerning attitude toward learning through Mind Mapping method on knowledge, feeling and trend of behavior expression. Data were analyzed and presented by mean, average and standard deviation.

The results of the study shows a positive attitude toward use of Mind Mapping method to learning KANJI and students gained attitude toward learning through Mind Mapping method on knowledge, feeling, and trend of behavior expression, their attitude as a whole was at a good level after learning KANJI in Japanese class.

Keywords- kanji, Japanese class, students' attitudes, Suan Sunandha Rajabhat University Students

INTRODUCTION

Suansunandha Rajabhat University has a variety of teaching and learning. Especially teaching and learning Japanese language. Japanese language was popularity for students. From a pedagogical point of view, the number of students learning Japanese as a foreign language (hereafter JFL learners) has increased considerably during the past few years (Japan Foundation 2000). In this years have 70 people who studies in Japanese major at Suansunandha Rajabhat University and studies about basic Japanese language, grammar, vocabulary of Japanese language and Japanese Kanji class. Japanese alphabets was 4 types, have Romanji, Hirakana, Katakana, and Kanji. Romanji was Roman alphabets, Hirakana and Katakana was traditional Japanese alphabets and Kanji was Chinese characters, Chinese alphabet was applied by japan and used in name Kanji. Students studied hard if they can't memory 4 types Japanese alphabet. Especially students must learn Japanese Kanji because. Japanese Kanji can help students to memory Japanese vocabulary easy and reading and writing Japanese language of students will be effective well. so this is important point for learning Japanese language especially learning Japanese Kanji in Japanese Kanji class.

The learning of kanji or Chinese characters is considered to be one of the most challenging problems faced by learners of Japanese as a second/foreign language (hereafter JFL/JSL learners). The typological differences between kanji and alphabets are assumed to be responsible for this difficulty (Bourke, 1996; Flaherty, 1993; Toyoda, 1998; Watanabe & Toyoda, 1994). Thai students can't memories Japanese Kanji, because it's difficulty for memory and writing Japanese Kanji or Chinese characters. These are the challenge for teachers to find kanji learning method or learning strategies. Haththotuwa Gamage (2003) has opinion about learning Japanese

Kanji. Psycholinguistic studies on word recognition on both alphabets and Chinese characters have given rise to conflicting theories on how Chinese characters are processed in the mental lexicon, language learning strategies are specific behavior or techniques that students use to improve their language learning (Oxford 1990, 1993; O'Malley and Chamot 1990; Rubin 1981). Learning styles on the hand, are defined as more general behavior in language learning (Oxford 1994). All language learners, whether they are skilled learners or not, tend to use some kind of language learning strategy in order to enhance language skills. At the early stages in learner-strategy research, strategies used by 'good learners' were identified in order to enhance the learner capabilities of 'poor learners' (Chamot and Kupper 1989; Naiman et al. 1978; Rubin 1981; Stern 1975; Wenden and Rubin 1987; Haththotuwa Gamage 2003).

The traditional education delivery system has been a classroom setting with a teacher giving a vocabulary, Japanese Kanji, how to write Kanji alphabets and students listening and writing in notes. Interaction between the teacher and student has been viewed as an essential learning element within this arrangement. However, innovations in education have a variety of learning method or learning strategies. In this study was in the context of exploring effective teaching and learning in Japanese Kanji class used Mind Mapping method for teaching Japanese kanji. Mind mapping was firstly developed by Tony Buzan, a mathematician, psychologist and brain researcher, as a special technique for taking notes as briefly as possible whilst being interesting to the eye as possible. Since then, mind mapping turned out to be usable in many different ways other than just simple note taking. Mind maps have, among other things, been used in education, the advantages of Mind maps has unique appearance and a strong visual appeal. Thus information may be memorized and recalled faster, the learning process is speeded up and information becomes long living. (Brinkmann, 2003).

In this study, educator used Mind Mapping method taught Japanese Kanji with The first year students undergraduate students in Japanese Kanji class. The purpose of this study aim to investigate students' attitudes towards teaching through Mind Mapping method to learning KANJI in Japanese class at Suansunanta Rajabhat University (SSRU), a survey of seventy male and female the first year undergraduate students from faculty of humanities and social sciences japanese major. The focus of this study is on students' attitudes towards was taught Japanese Kanji by used Mind Mapping.

LITERATURE & THEORY

Many researches have been done on about effective teaching methods, effective learning, Students Attitude toward Teaching, educator has focused on and studied through many researches for investigated students' attitudes.

Toyoda (1998) indicates that it is during the intermediate stages that most learners from alphabetic backgrounds lose their interest and motivation for studying kanji, although they were interested during the initial stages. This may be due to several reasons. Firstly, the gradual increase of new kanji to be learnt and retaining the already learnt kanji seem to be an endless memory-load on the part of the learner at this stage. Secondly, it is at the intermediate stages that the learners are exposed to authentic material other than kanji textbooks, and frustration builds up when learners realize they are still unable to read an authentic text such as a newspaper. Haththotuwa Gamage (2003). The strategies used most often are the most helpful. Repeated writing was reported as the most used strategy type although alphabetic background learners reported using repeated writing strategies significantly more often than character background learners. The importance of strategy training and explicit instruction of fundamental differences between character and alphabetic background learners of Japanese is discussed in relation to teaching strategies. Once of teaching methods was Mind Map can improved student's ability, knowledge, Memory in Japanese Kanji class. The method of mind mapping takes into account that the two halves of the human brain are performing different tasks. While the left side is mainly responsible for logic, words, arithmetic, linearity, sequences, analysis, lists, the right side of the brain mainly performs tasks like multidimensionality, imagination, emotion, colour, rhythm, shapes, geometry,

synthesis. Mind mapping uses both sides of the brain (Buzan, 1976), letting them work together and thus increases productivity and memory retention. This is accomplished by representing logical structures using an artistic spatial image that the individual creates. Thus mind mapping connects imagination with structure and pictures with logic (Svantesson, 1992; Beyer, 1996; Brinkmann, 2003). Akinoglu and Orhan (2007) studied the effects of note taking during their science courses through the technique of mind mapping by primary education students, on their attitudes, academic achievement and concept learning. It was determined that there was a significant positive difference in students' concept learning, overcoming misconceptions, academic achievement and attitudes towards science courses by taking notes through the mind-mapping method. It can be summarized that Mind Mapping improves their Japanese Kanji learning and memory.

RELATED WORKS

Alobiedat (2010) investigated students' attitudes towards use of platform as learning resources at University of Granada (UGr), a survey of two hundred fifty-eight male and female undergraduate students from faculty of education, were randomly selected to participate in the study. The results of the study show a positive attitude toward use of platform as learning resources and there was a significant difference, due to the gender, owning a personal computer (PC), and having access to the internet, and it was in favor of male students, and student who own a pc, and student whom do have access to the internet respectively.

Haththotuwa Gamage (2003) studied and investigates three important issues in kanji learning strategies; namely, strategy use, effectiveness of strategy and orthographic background. A questionnaire on kanji learning strategy use and perceived effectiveness was administered to 116 beginner level, undergraduate students of Japanese from alphabetic and character backgrounds in Australia. Both descriptive and statistical analyses of the questionnaire responses revealed that the strategies used most often are the most helpful. Repeated writing was reported as the most used strategy type although alphabetic background learners reported using repeated writing strategies significantly more often than character background learners. The importance of strategy training and explicit instruction of fundamental differences between character and alphabetic background learners of Japanese is discussed in relation to teaching strategies.

Brinkmann (2003) used mind maps and concept maps, are presented. Both are means to show ideas and concepts connected with a topic. Their suitability as a pedagogical tool for mathematics education is considered and the possible applications of mind mapping and concept mapping in mathematics education together with their advantages and limits are discussed. It turns out that both, mind mapping and concept mapping, may be efficient tools to improve mathematics achievement.

METHODS

1. Sample of Study

The study was conducted at faculty of humanities and social sciences Japanese major at Suansunandha Rajabhat University. A random sample of undergraduate male and female students (N=70), the participants were asked to complete a questionnaire which included items to measure students' attitude toward teaching through Mind Mapping method to learning KANJI in Japanese class.

2. Development of Instrument

A 5-point Likert type scale with strongly agree; agree; undecided; disagree; and strongly disagree for the items of the questionnaire, was developed to measure students' attitude toward teaching through Mind Mapping method to learning KANJI in Japanese class. The questionnaire consisted of two parts the first part consist of the demographic information, the second part consist fifty items. To verify the reliability of the questionnaire the researchers distributed questionnaire on sample of forty students out of the original sample.

The reliability of the scale was 0.83, and to verify the validity of the questionnaire in terms of objectivity, language, and the number of items.

3. DATA ANALYSIS

Each response was assigned a score according to the 5-point Likert scale, where 5 indicates "I use this approach very often" or "This is very helpful" and 1 indicates "I never use this approach" or "This is not a helpful approach". A response of 3 was regarded as a neutral response. The results were recorded for each statement by taking the mean response. Response patterns were noted down for possible relationships. A statistical analysis was employed for significant differences within character and alphabetic background learners. (Haththotuwa Gamage ,2003)

RESULTS

To answer the question, what is the attitude of Suansunandha Rajabhat University students' towards use Mind Mapping method to learning KANJI in Japanese class? To answer the question, the means, and standard deviations, for the respondents of the study samples was computed, the mean was 4.04 and std. deviation was 0.44, which this means a positive attitude from the students toward use of Mind Mapping method to learning KANJI in Japanese class. From above, the result indicate that use of Mind Mapping method to learning KANJI, will alleviate students learning in all of its form aspects, like help student to clarify the understanding, memorized Japanese Kanji, also help student enhanced their interaction between student each other and teacher, the use Mind Mapping also might help student organize their study time about the subject content, encouraged students to know more about the subject. Balim has found out that all groups' understanding of concepts was equivalent. Significantly, students in the experimental group 2 reported positive opinions, stating that learning through concept maps was useful and engaging. (Balim,2013) and Alobiedat studied "The Student's Attitude toward Use Platform as Learning Resources at University of Granada" has shown a positive attitude toward use of platform as learning resources and there was a significance difference, due to the gender, owning a personal computer (PC), and having access to the internet, and it was in favor of male students, and student who own a pc, and student whom do have access to the internet respectively. In study for Haththotuwa Gamage (2003) studied investigates three important issues in kanji learning strategies; namely, strategy use, effectiveness of strategy and orthographic background, found the most used strategy type although alphabetic background learners reported using repeated writing strategies significantly more often than character background learners. The importance of strategy training and explicit instruction of fundamental differences between character and alphabetic background learners of Japanese is discussed in relation to teaching strategies. so in the study can shows the attitude of Suansunandha Rajabhat University students' towards use Mind Mapping method to learning KANJI in Japanese class have a positive attitude and students gained attitude toward learning through Mind Mapping method on knowledge, feeling, and trend of behavior expression, their attitude as a whole was at a good level after learning KANJI in Japanese class.

CONCLUSION AND FUTURE WORK

In conclusion, from the result analysis of the data gained from samples, the attitude of Suansunandha Rajabhat University students' towards use Mind Mapping method to learning KANJI in Japanese class have a positive attitude and student's memory of Japanese vocabulary, Japanese KANJI, knowledge has increased. Because, in classroom, use of Mind Mapping method to learning Japanese KANJI, students can be imagine or draw Mind Mapping, memorized Japanese KANJI by drawing Mind Map and imagination. Students have a positive attitude, feeling happy and fun towards use method to learning. From observation, all of students have fun in learning Japanese KANJI, want to learning more than example, want to learning Japanese grammar by use of another method. From interview some students. They sad "this method is wonderful, same drawing games, very funny and happy for learning Japanese KANJI" and from the result analysis of the data from

students can concluded use of Mind Mapping method in Japanese KANJI class can increase Japanese KANJI learning, Japanese KANJI memory and knowledge about Japanese.

The results can be explained that this Mind Mapping not only gave students a good attitude towards learning. This Mind Mapping may also be able to help develop the students memorize kanji. Seen from the end of the lesson, students did exercises. Next time in the future work. This technique will be developed and conducted research in the classroom.

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THE RELATION OF FACTORS AND CAUSES OF THE ACCIDENTAL ON TRUCK TRAILER IN THAILAND

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ABSTRACT

In Thailand, average number of road accidents occurs 75,000 times per year. Moreover, there are 13,000 casualties and more than 900,000 are injured annually, which costs approximately 100,000 million baht a year. Thus, it is defined that road accident is the most serious problem at the present time, which should be solved urgently. The accident statistics of Thailand go to top five of the world record. In the last decade, the amounts of loss are more than two hundred billion baht, representing 2.8% of GDP

According to this research on truck trailer accident and the accidental involvement founded that the most of researches and this research still based on the general concept of the road accident and same direction with others vehicle types accident research. The factors are the road accidents causes include Driver, Vehicle, Road and Environment which is considered as a fundamental model of road accidents. However, the truck trailer accident and the accidental involvement research showed that certain factors are more significant influence of the basic model. General, It also found that in the Driver which includes a variable that can be measured several variables are related, such as a variable in a demographic factors (gender, age, level of education) is associated with variations in the driver behavior factors (driving speed limit, alcohol/substance abuse, fatigue from work)

We summarized that, In this research, we focus on Driver factors, Vehicle factors, Environment factors, Fleet management factors, and Risky driving behaviors factors and finding a measurement variables of each factors which to be used for measuring and testing the consistency of the model with truck trailer accidents and the accidental involvement empirical data.

Keywords - Accident, Truck Trailer, Vehicle

INTRODUCTION

In Thailand, average number of road accidents occurs 75,000 times per year. Moreover, there are 13,000 casualties and more than 900,000 are injured annually, which costs approximately 100,000 million baht a year. Thus, it is defined that road accident is the most serious problem at the present time, which should be solved urgently. The accident statistics of Thailand go to top five of the world record. In the last decade, the amounts of loss are more than two hundred billion (THB), representing 2.8% of GDP (Health Systems Research Institute, 2006).

Accident's statistics in Police traffic department in years 2552-2553 found that three main causes of accidents include over speed limit, more than a third of all accidents causing or 34.77 percent (National Police Agency, 2554), consistent with United States study results. Accidents related to speed and have resulted in deaths, accounting for about one-third of all accidents. (National Institute of Health, 2549)

However, considering the type of vehicle involved in the accident. The motorcycle is a more frequency causes of accidents accounted for 37.15 percent. Passenger cars and truck trailer accounted for 28.37 and

21.87 percent. We found some issue is interesting, considering about the amount of property damages and casualties, it is found to be related to the number accidents causing by truck trailer (Royal Thai Police, 2011). This may identify that the accidents caused by rolling stocks affect the severity of accidents. Furthermore, the study of the severity of road accidents on highways in South Korea (Lee, Chung, & Son, 2008) found that trucks and trailers are related to each other in the same direction to the severity of accidents (number of fatalities, injuries, vehicles involved in the accident, and damaged vehicles).

On the other hand, Lemp, Kockelman, & Unnikrishnan (2011) indicate that the loss of life and serious injury in road accidents caused by truck trailer depend on the increasing number of trailers and trucks and are related to the size and weight of those truck trailer. What is more, the study of severity of injury of the driver in one-vehicle accident and a multi-vehicle accident on highway in a rural area reveal that rolling stocks are often involved in one-vehicle accident and multi-vehicle accident (Chen & Chen, 2011). It is not only found that the number of trucks trailer is counted as four per cent of the number of all registered vehicles, but 8 per cent of them are also involved in accidents with severe injury (Zhu & Srinivasan, 2011).

There are several aspects in previous researches which show various differences between private car accidents and truck trailer accidents (Eicher et al., 1982; Evans, 1991; Walton., 1999; Council et al, 2003; McCall & Horwitz, 2005 and Rosenbloom et al, 2009), including the differences of causes and factors involved in the accident. Accordingly, there should have a study and proposal of model of truck trailer accident and it should be separated from the model of private car accident (Chang & Mannering, 1999).

Road traffic injuries constitute a major public health and development crisis are predicted to increase if road safety is not addressed adequately by Member States. The World Health Organization (WHO) has been concerned with this issue for over four decades. As early as 1962, a WHO report discussed the nature and dynamics of the problem (Peden et al, 2004). The researches on road traffic injuries or road accident and road safety have been trying to reduce the number of accidents and the size of the damage (OECD, 2008) which have been studied extensively and continuously. The basis of the study focuses on three main factors (driver, vehicle, and environments) which cause road accidents. The concept of study is divided into a single accident cause (Brenac 1996; Baruya 1998) and a combination of several factors causing road accidents (Rumar, 1982; Rumar and Stenborg 1995; Bryer 1999; Cascetta et al. 1999; McKnight, 2004; Aworemi et al, 2010).

Traditional considerations of traffic safety focus on the physical environment, the vehicle and the road user. Improvements in road environment and vehicles have achieved major safety gains. However, less progress has been made in understanding the behavior of the road user (Rothengatter, 1997). Psychology has become more involved in the study of risk behaviour and traffic safety, focusing on the relationship between driving behaviour and accident involvement.

According to the results of research on road accidents, it indicates that 50 per cent of accidents mainly come from driver when combined with associate cause of accident (driver and vehicle or driver and environment) and when combines the driving factor with the other aspects of accident, the number is more than 90 per cent. (Rumar, 1982; Rumar and Stenborg, 1995; Bryer, 1999; Cascetta et al, 1999;; McKnight, 2004; and Aworemi. et al, 2010).

Subsequently, there are many developed concepts of road accidents. The popular concept is the study of the causes of road accidents which is used to present a model of road accidents (road accident causation model) and three main factors are included (Iversen & Rundmo, 2002; Sümer, 2003; Björklund, 2008; Verschuur & Hurts, 2008; Lee. et al, 2008; Wong et al, 2010; Hassan & Abdel-Aty, 2011; and Shi et al, 2011). The proposed model aims to create a model that can explain the causes of the accident as much as possible. However, the mechanism of accident is complicated. Furthermore, there are many causes and variations which is the nature and mechanistic of the accident (Aworemi, Abdul-Azeez, & Olabode, 2010). Thereby, the factors of risky

driving behavior are combined with the physiological factors of the driver (such as gender, age). These factors are combined as one variable in the same model to be consistent with the real accident which is complicated.

The model development may help us to have a better understanding about the road accidents. However, there are some arguments due to the results of many studies which indicate that physical factors variable of the driver (such as gender, age) and the risk of driving behavior are correlated significantly (Hagen, 1975; Wasielewski, 1984; Jonah, 1986; Mayhew et al., 1986; Reason et al, 1990; Levy, 1990; Laberge-Nadeau et al., 1992; Forsyth, 1992. ; Brorsson et al., 1993; Durkin, 1995; Harre et al, 1996; Vavrik, 1997; Preusser et al, 1998; Harre et al., 2000; Rhodes et al, 2005; Oltedal & Rundmo, 2006; Teese & Bradley. , 2008 and Scott-Parker, 2009).

As a result, the combination of physical factors variables of the driver (such as gender, age) and risky driving behavior is regarded as neglect the relationship between variables. This may affect the proposed model which is not consistent with the accidents in the real world.

From previous research, interesting issue was founded that the accident from a truck trailer and drive for working had a significant relation between accidents and wages (Monaco & Williams, 2000; Rodríguez et al, 2003). Therefore, the payment of wages depending on workloads or number of running trip increases the risk of road accident which consistent with the findings of Fort et al., (2010) It was founded that the risk of accidents were related in the same direction with number of working hours. In comparative research on severity injuries level from road accident between truck trailer accidents and private car accidents have a significant difference. The accident caused by a truck trailer had more severity injuries than accident caused by private car. The significant difference of the study results supports the contention that truck trailer and non-truck involved accidents should be modeled separately. (Chang & Mannering, 1999)

CONCEPTUAL FRAMEWORK

The researcher was interested to proposed model of road accidents based on the truck trailer accident data due to the road accident by truck trailer cause the high damage, injured and dead. To comply with recommendations from the literature review, it suggested separating the Trucks trailer accidents model from the Private car accident model. Truck trailer accident model consists of the driver physical factors (e.g gender, age), vehicle factors (e.g. motion of vehicle, age of vehicle), environment factors (e.g. number of lane, weather, road surface), fleet management factors (e.g. Wage, Employee type, Organization), risky driving behaviors (e.g. speed, drink driving, fatigue diving) and accident factors (e.g. number of injuries, number of vehicle involvements).

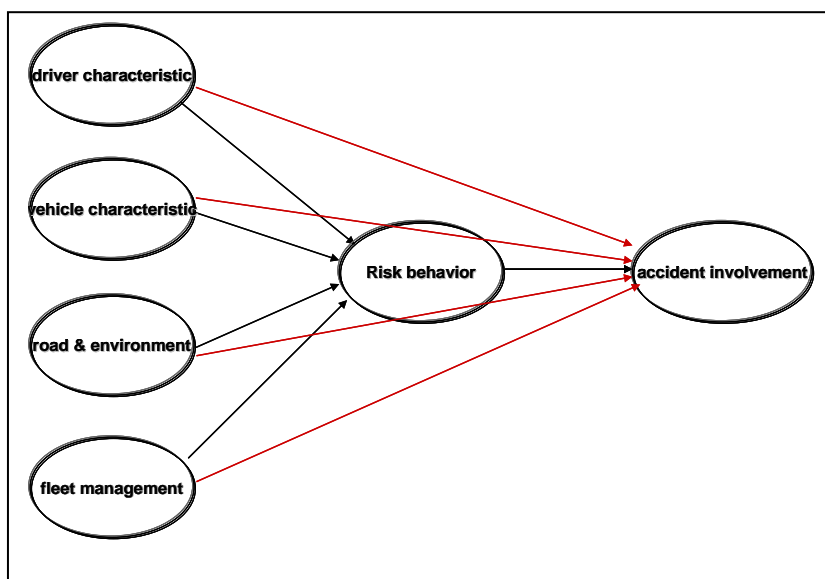


Figure 1. Conceptual model of Truck trailer accident model

From fig.1, the model was presented including the three main groups (Driver, Vehicle and Environment according to road safety approach) and fleet management factors (Wage, Employee type, Organization) which the mediator factors in the model is risky driving behaviors passed to accident factors. This model is complex because it consists of six latent variables (driver physical factors, vehicle factors, environment factors, fleet management factors, risky driving behaviors and accident factors) and fifteen measurement variables (gender, age, motion of vehicle, age of vehicle, number of lane, weather, road surface, Wage, Employee type, Organization, speed, drink driving, fatigue diving, number of injuries, number of vehicle involvements). In addition, it includes nine relations to examine. Structural Equation Modeling: SEM was adopted to verify the goodness-of-fit effects among the overall model, structural model and measurement model for this study because SEM can handle complex relationships among endogenous and exogenous variables simultaneously and furthermore it can also include latent variables in the model.

RESEARCH DESIGN

A mixed method research, this study is intended to use qualitative and quantitative data collection techniques and analysis procedures sequentially. The using of qualitative and quantitative approaches in combination can provide a better understanding of research problems than either approach alone (Saunders et al., 2007). This research combines both of qualitative and quantitative data. The qualitative data are collect by means of written documents, interviews with expert truck drivers. The quantitative data were collected from truck drivers who have an accident experience.

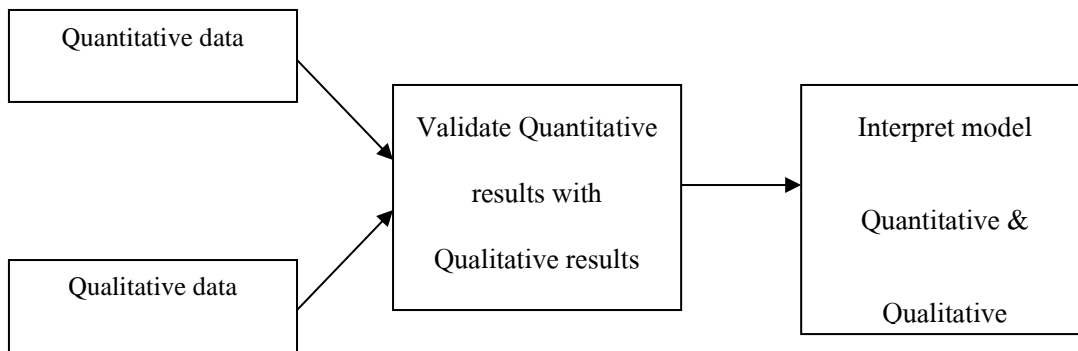


Figure 2. Triangulation Design: Validating Quantitative Data Model

STATISTICAL METHODOLOGY

SEM methodology spread fast as a consequence of the development of specific packages, like LISREL (Joreskog and Sorbom 1988, 1989, 1995) and AMOS (Arbuckle & Wothke, 1995) the availability of these packages has encouraged several applications in different contexts. This approach allows the modeling of a phenomenon by considering both the unobserved “latent” constructs and the observed indicators that describe the phenomenon. Corresponding with Shah & Goldstein study which found that Structural equation modeling (SEM) is the measure for the relationships among various variables in the research process of human perceptions, behaviors or phenomena (Shah & Goldstein, 2006)

SEM is a technique that consists of a set of equations that are specified by direct links between variables and hence it can be called “the simultaneous equations”. However, in SEM, latent variables (unobserved or unmeasured variables) can be introduced (Lee et al., 2008). The advantages of using SEM include: (1) it can handle complex relationships among variables, where some variables can be hypothetical or unobserved (latent variables); (2) It estimates all coefficients in the model simultaneously and thus, one is able to assess the significance and strength of a particular relationship in the context of the complete model, (3) multicollinearity can be accounted for, (4) when using latent variables in SEM, measurement error is eliminated and thus more valid coefficients are obtained (Dion, 2008; Martinez et al., 2010). Therefore, SEM is an adequate tool to model the complex relationships such as those that are being modeled in this study.

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DEVELOPING A COMBINATION OF SIX SIGMA AND LEAN IMPACTING ON FIRM'S SUPPLY CHAIN MANAGEMENT

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ABSTRACT

Hence, the purpose of this study is to provide a conceptual framework of supply chain management, in order to address the combination impacting and developing a six sigma process within lean manufacturing for small and medium sized of automotive manufacturing in Thailand. Within a literature review, a case study, face-to-face interview in typical six sigma process, lean manufacturing and supply chain management have been carried out. While six sigma process, lean manufacturing and supply chain management have many similarities, especially concerning origin, tool and effects, methodologies, the paper suggests and proposes that the supply chain management of automotive manufacturing in Thailand base on combination impacting by the cooperation within process that they differ in some areas, in particular concerning the main theory, approach and the main criticism. The paper provides the models that how six sigma process, lean manufacturing can be integrations impacting and developed to provide a properties of quality concepts for improvement automotive manufacturing in Thailand. The paper reports the first study on the status of lean six sigma implementation of automotive manufacturing in Thailand. The paper will also represents an origin research initiative that considering the supply chain to develop and improved methodological aspects in terms of how to combination lean six sigma in the literature.


Keywords: Six Sigma, Lean, Supply Chain Management


INRODUCTION

The automotive sector is a major driver of the Thai economy with strong infrastructures and a vast network of small and large, local and foreign companies all along the car-production supply chain. A large hub in ASEAN and Asia, the Thai automotive industry is gearing towards a green automotive production base. In 2015, the production of cars in Thailand was 1.9 million cars with 800,000 cars sold domestically and 1.2 cars exported. Most of the vehicles built in Thailand are developed and licensed by foreign producers, mainly Japanese and American but with several other brands as well for car production, notably BMW and Mercedes. The Thai car industry takes advantage of the ASEAN Free Trade Area (AFTA) to find a market for many of its products. Thailand is one of the world's biggest markets for pickup vehicle car with over 50 percent market share. Presenting the Thai automotive industry from a governmental perspective to attract potential investors, the Thailand Board of Investment (BOI) produced a report to highlight structures, outputs and new developments planned for the upcoming years. The Thai government is eager to assist the private sectors and drive the entire automotive supply chain towards more value creation. Their goal is to make Thailand a global production base for green automotive, enhancing value creation and environment preservation both for the export and domestic markets. In this first report from 2015, the BOI presents the automotive industry and developments of recent years before diving in details: automotive numbers and sub-industries of auto-parts and automotive electronics. The report highlights particularly interesting opportunities in Thailand and the advantages of the country for investors of the sector.

Figure 1

Shown the currently number of production car in Thailand (Thai Automotive Industry Association, 2015)



| Units | | Production | Domestic Sales | Export |
|-----------------------|---|------------|----------------|-----------|
| Cars |  | 1,913,002 | 799,632 | 1,204,895 |
| - Passenger Cars | | 761,346 | 356,063 | 462,264 |
| - Commercial Vehicles | | 1,151,656 | 443,569 | 742,631 |

LITERATURE & THEORY

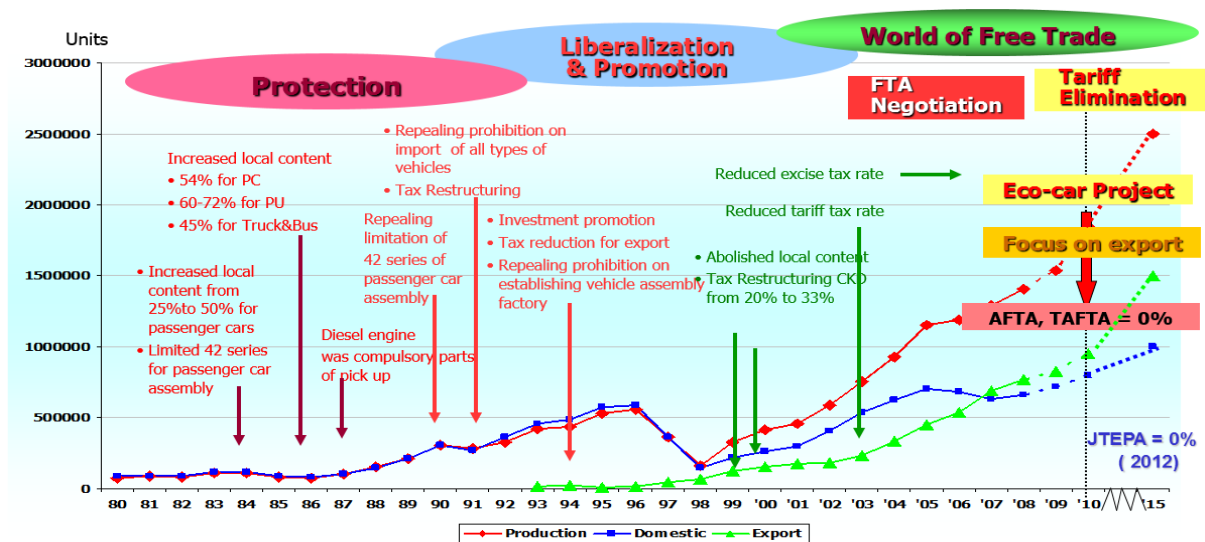
During the last decade in the automotive assembly is a concept of management of quality control in the production of different treatments. Including the management of quality within organizations using Six Sigma (Six Sigma) and industrial systems Lean (Lean manufacturing) has been taken up in the enterprise different to the industry. Automotive although the work is very important in the management of the relevant documents, the similarity between management and Six Sigma management, lean manufacturing industries. But many questions remained regarding enforcement. Concept and context of these organizations (Roy Aderson et al. 2006). Competition in the automotive sector higher. The need to reduce costs in the organization. Car assembly plant in the United States. The Ford Motor Company assembly plant, it has taken a variety of program management and Lean Manufacturing. The production Just in time to help to increase competitiveness (The Machine That Change the World, Jame P.Womack, 1990). And to eliminate misunderstandings about Six Sigma and lean management manufacturing systems, industrial production has affected the organization's competitive advantage. By describing each system and the concepts and techniques that support the use of Six Sigma and lean manufacturing industries that affect the competitive advantage of the organization (Edward D.Amheiter and John Maleyeff, 2005). The system Six Sigma originated from the company Motorola have thought the quality of the production process that allows waste in just 3.4 pc to produce one million pieces. And also as a tool to help businesses. Can solve the problems of the manufacturing process of the operating system, too. Six Sigma is a methodology that seeks to identify and eliminate defects, errors or failures in business processes or systems by focusing on those processes (Dr. Mikel Harry, Galvin Manufacturing Corporation, 1980). The Thailand government has to play a role in transmission. Industry automobiles countries by the promotion of investment. On the industrial assembly of cars and auto parts industry in the country in year 2504 the amount of industrial vehicles were registered with the department of industrial plants in the country with a total of 2,242 representing 100% of the factory. The automotive industry, large (LSEs) All 82 plants representing 4% and manufacturing automotive components size enterprises (SMEs) through 2,160 plants representing 96% by the expansion of the industry, automotive parts as well (Thailand Auto Parts Manufacturing Associations, 2014). Competitive supply chain management conditions in the businesses of the auto industry and the automotive industry. Group makes automotive industry must adapt to meet the business. Build quality and value of the production line (Jens J.Dahlgaard, 2006). Although the foregoing, making research ideas to research, development, integration of lean manufacturing and Six Sigma to affect the supply chain management of an arms race in the Lord. Arm of the automobile industry and automotive parts

manufacturing industry within Thailand country via developing a combination of lean manufacturing and six sigma impacting on firm's supply chain management (FSCM).

Figure 2

Shown that the marketing trending of automotive industry in Thailand

(The Auto -Parts Manufacturing Associations, 2014)



The framework for this research. The research aims to study the scene. And the effect of improving the integration of lean manufacturing and Six Sigma to affect the firm supply chain management of enterprises manufacturing automobile parts and vehicles assembly industries. Thailand that researchers conducted a literature review of international research and in order to develop a conceptual framework. By creating a framework for research. The researchers used the very concept of research.

RELATED WORKS

Origin and theory, even though lean and six sigma have the same or similarities origin, the concept of lean manufacturing and six sigma to eliminate non-value added based on customer requirement and customer satisfaction. Six sigma is often associated within the field of quality management, for example, Deming (1994) they have to general Deming cycle (PDCA) in term of quality. In particular, Deming (1994) had stated that. Regarding the concepts, theory, process review, methodologies, approach, effects and criticism are shown in Table 1.

Table 1

Shown the similarities and different between lean manufacturing and six sigma methodologies.

| Concepts | Lean Manufacturing | Six Sigma |
|---------------|---|-----------------------------------|
| Origin | The quality evolution in Ford manufacturing | The quality evolution in Motorola |
| Theory | Zero defect | Eliminate wastes |
| Process | Reduce reduction and improvement process | Improvement processes |
| Approach | Project's management | Project's management |
| Methodologies | Define Measurement Analyze | Value Map Eliminate |

| | | |
|------------------|-----------------------------------|---------------------------------------|
| | Improve Control | Flow Literate |
| Tools | Statistical and analytical tool | Analytical tools |
| Effects | Performance | Performance and customer satisfaction |
| Criticism | Improvement customer satisfaction | Improvement customer satisfaction |
| Other | N/A | N/A |

Pyzdek (2003) and Magnusson et al. (2003), The first methodology used to improve an existing process can be divided into five phases. (1) Define. Define which process or product that needs improvement. Define the most suitable team members to work with the improvement. Define the customers of the process, their needs and requirements, and create a map of the process that should be improved. (2) Measure. Identify the key factors that have the most influence on the process, and decide upon how to measure them. (3) Analyse. Analyse the factors that need improvements. (4) Improve. Design and implement the most effective solution. Cost-benefit analyses should be used to identify the best solution. (5) Control. Verify if the implementation was successful and ensure that the improvement sustains over time. Jiju Antony (2005), Six sigma in small and medium size UK manufacturing enterprises. The results was six sigma in SMEs, Quality program and Critical success factors. Melissa J (2007), Exploring future competitive advantage through sustainable supply chains. The results was potential competitive advantage firms can create through the creation of a sustainable supply chain. S.C. Lenny Koh (2007), Could enterprise resource planning create a competitive advantage for small businesses. The results was small to medium sized enterprises, Resource management and Competitive advantage. Andreas R (2008), A framework for purchasing transport services in small and medium size enterprises, Improve relationships with logistics service providers (LSPs). Assadej Vanichchinchai (2009), The relationship between quality management and supply chain management (An Analysis of The Automotive Industry in Thailand). Supply Chain Management Practice (SCMP), Quality Management Practice (QMP) and Firms Supplier Performance (FSP). Guangshu Chang (2009), Total Quality Management in Supply Chain by construct Implementation of total quality management in supply chain system but not only in enterprise has become an exquisite premise of the survival of enterprise.

METHODS

The framework for this research. The research aims to study the scene. And the effect of improving the integration of lean manufacturing and Six Sigma to affect the competitive advantage of enterprises manufacturing automobile parts and assembly industries. Thailand that researchers conducted a literature review of international research and in order to develop a conceptual framework. By creating a framework for research. The researchers used the very concept of research.

Statements and significance of the problem was impact of lean on six sigma and firms competitive advantage. Thailand automotive industry development under government policy and increase Thai economy. Hypotheses of this research as below.

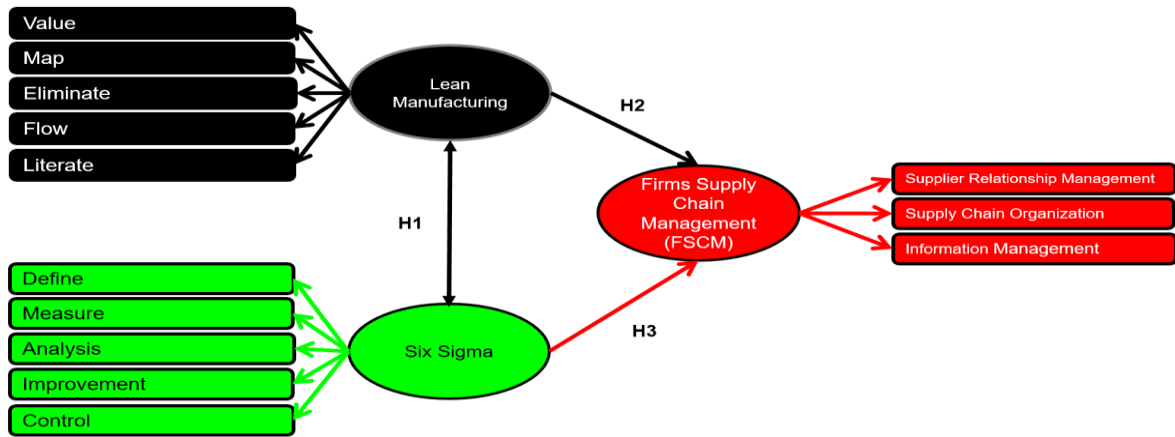
H1 = Lean manufacturing was positive relationship to Six sigma and Six sigma was positive relationship to lean manufacturing.

H2 = Lean manufacturing was positive relationship to firms supply chain management (FSCM).

H3 = Six sigma was positive relationship to firms supply chain management (FSCM).

Figure 3

Shown Conceptual framework of the research



(1) Lean Manufacturing principle

Roy Andersson, Henrik Eriksson and Håkan Torstensson, 2006; Andrew Thomas, 2009; Brun. A, 2011; Alessandro Laureani and Jiju Antony, 2012; Alessandro Laureani and Jiju Antony, 2012; Nurul Fadly Habidin, 2013;

(2) Six Sigma principle

Caulcutt. R, 2001; Edward D. Arnheiter and John Maleyeff, 2005; Jiju Antony and Maneesh Kumar, 2005; Jens J. Dahlgaard, 2006; Paul M. Gibbons, 2010; Sunil Sharma, 2010; Souraj Salah, 2010; Lawrence M. Corbett, 2011; Ian D. Blackman, 2013; Shri Ashok Sarkar and Arup Ranjan Mukhopadhyay, 2013;

(3) Firm Supply Chain Management

Supply chain management is concerned with the management of the entire system from inbound, in process and outbound included the flow of information through the first chain to factories and warehouse up until the end of customers. (Source: Operations and supply chain management, 12th Edition. Nicholas J. Aquilano, Chase, Richard B., Jacobs Robert F)

RESULTS

The test of the first hypothesis produced a model which was significant at less than the 0.01 level, indicating that the infrastructure variables alone were sufficient to predict process flow performance. The additional of the set of unique process flow variables produced a statistically significant increase in value added of supply chain management performance. We also investigated the effects of just in time in lean manufacturing and quality practices as moderating effects via the use of interaction terms in the firm supply chain management models. However, they may have difficulty finding problems which have the potential to further improve the process, if there are eliminate waste of supplier relationship the effect. The combination with the best quality performance are given an added ability in firm supply chain management approached.

CONCLUSION AND FUTURE WORK

The purpose of this paper is to describe automotive manufacturing in Thailand have been through a lean manufacturing via used just in time system from the replacement of the traditional of mass production practices by lean six sigma. In this paper, a study presents the results of the developing a combination of lean and six sigma impacting on firm's supply chain management of automotive manufacturing in Thailand. Today's automotive manufacturing are required to competitions with lean manufacturing and six sigma base on supply

chain management. In order to reach the manufacturing goals are required to compete with manufacturing paradigms such as lean manufacturing, six sigma impact to supply chain management. This's paper contribution of firm supply chain to an automotive manufacturing in Thailand to understudied as is the importance of how to develop and combination between lean six sigma assets. Further work is needed to expand this research to consider broader supply chain management typologies that link complexity with both practice difference management approaches to accommodate complexity. Performance can be expanded to include quality control, innovation and cost saving. Such research will become increasingly critical as competition from firm lean manufacturing vs firm six sigma methodology vs firm supply chain management.

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VIEWS OF TEACHER'S ON USAGE OF ORGANIZATIONAL LEARNING MECHANISMS IN PRIMARY SCHOOLS¹

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ABSTRACT

Organizational learning mechanism is a critical component of increasing schools' organizational learning competence. The aim of this study is to determine level of usage organizational learning competencies in primary schools regarding to teacher's views. Research was carried out by survey method, in accordance with the subject and aims. The population of study consists of public and private primary school teachers working in central district of Konya province in 2011 – 2012 educational years. The study sample includes 640 public and private primary school teachers chosen with stratified sampling method. Data have been collected with demographic traits form and organizational learning mechanism scale developed by Schechter and adapted into Turkish by Unal. Collecting data was analyzed by using SPSS 16 packaged software. According to the research findings, perceptions of primary school teachers about organizational learning mechanism are "medium – level" in public school and "high – level" in private school. Public schools' success, also have increased when level of use of organizational learning mechanisms have been increased at the school. Teachers opinions' on use of organizational learning mechanisms at their school are analyzed with regarding to demographic traits. As a result, significant statistical differences are observed between teachers' opinions and number of teachers in school, working period together with principal.

Key Words: Organizational Learning Mechanism (OLM), School Success, School that learns

INTRODUCTION

Idea of school learnability is one of the prominent subject in recent years. This is because; schools must be harmonized with their environment. They also behave proactively in order to get prepared new circumstances without changing environment. Learning school is an organization including learning process, strategy and structure that increasing the capacity of coping up with and reacting powerfully to alteration in a dynamic and uncertain environment (Schechter, 2008; Schechter & Atarchi 2013; Silins, Mulford & Zarrins, 2002; Silins, Zarins, & Mulford, 2002). Learning organization has actualized with organizational learning. Therefore; organizational learning is a critical component of effectuating school efficiency (Schechter & Atarchi 2014).

According to Schechter (2008), organizational learning expresses different meaning as dependent or independent variable. Organizational learning means strategy, process and activities that applied by organization on the purpose of encouraging learning as dependent variable and outcomes of learning processes as a independent variables. On the other hand, outcomes of learning processes state: a) changing of members' of organizations objectives, desired behaviors, tacit assumptions, and strategies related to mental models, b) changing of behavioral output operating organizational standards such as performance, habits and procedures.

Organizational learning can be examined two different dimensions, structural and cultural. Learning mechanisms constitute the side of structure and learning culture constitutes the side of cultural (Popper and Lipshitz, 1998, 2000; Schechter, 2008). This research is focused on the structural side of organizational learning, learning mechanisms.

¹ This paper is generated from the part of the Master thesis titled as "İlköğretim okullarında örgütsel öğrenme mekanizmalarının kullanılmasına ilişkin öğretmen görüşleri" which was supervised by Ali Unal at the Necmettin Erbakan University, 2015.

As Popper and Lipshitz(1998, 2000), Organizational Learning Mechanisms(OLM) refer to structural and procedural arrangements allowing organizations to learn directly or indirectly. At the same time; OLM creates an environment that transferring individual learning to organizational knowledge or causing information exchange and acquisition of new information (Unal, 2014). From this respect, OLM helps explaining perceptibly how to learn organizations (Popper & Lipshitz, 1998, 2000). According to Schechter (2008) and Schechter and Qadach (2012), demonstrate the process concretely by defining five OLMs that work dynamic and cyclical.

a. Information Acquisition: This includes experiential learning, vicarious learning, grafting, and searching and noticing environment.

b. Information Distribution: This expresses the process by which an organization shares information among its units and members.

c. Information Interpretation: A socio cognitive process that gives meaning to the distributed information. These sense-making activities share and develop interpretations. Organizational members decide whether incorporate the information into organizational routines or not.

d. Organizational memory: The processes and means by which organizational experiences are stored and coded into organizational memory for future use. These are both mental artifacts such as stories that represent organizational cultural pattern and values and structural –technological artifacts such as resource room, written policies, dress, furniture and operating procedures within an organization.

e. Retrieving information from memory for organizational use: Past encoded information is used to influence present decision making process.

In order to interacting other teachers in school, there is a need for learning mechanisms that provide dialog and collaborative structure to school (Kruse, 2003; Silins & Mulford, 2002). As a consequence, schools must be established OLMs for teachers to determine structures that help them sharing information and common thought constantly.

The aim of this study is to determine level of usage of organizational competencies in primary schools regarding to teacher's views and whether or not level of the usage of organizational learning mechanisms influence academic success of students. Based on this aim, following questions have been answered:

1. At which level do Primary schools (public – private) use organizational learning mechanisms according to its dimensions?
2. Do learning mechanisms that used in primary schools differentiate according to types of school (public or private)?
3. Does students' academic achievement differentiate according to level of organizational learning mechanisms used in school?
4. Does usage of organizational learning mechanisms in primary school differentiate according to numbers of teachers in school?
5. Does the level of organizational learning mechanisms differentiate according to working years of teachers with school headmaster?

METHODOLOGY

This research was carried out by survey methods in accordance with the subject and aims. The populations of study consist of 10.713 primary school teachers who work at 206 public schools and 3471 primary school teachers who work at 18 private schools in central district of Konya province. The study sample is defined by using stratified sampling method. In order to stratify schools, achievement exam that is applied in 2011 by Konya provincial directorate of national education, results are used. According to this exam result, schools are put in order from the most successful to the most unsuccessful. Then, schools are divided into three group, successful, middle successful and low unsuccessful. In each layer, the most successful 25 public schools are chosen and study is carried out with them. The other hands, all of private schools in Konya province are involved in research. As a result, sample of this research consists of 640 public and private school teachers. Qualities of these teachers are shown Table - 1.

Demographic traits form which prepared for defining personal and occupational information about teachers whom participating survey and organizational learning mechanism scale developed by Schechter (2008) and adapted into Turkish by Unal (2014) are used as a measurement instrument. Organizational learning mechanisms scale includes four dimensions; analyzing information, storing-retrieving-putting use of information, receiving and disseminating information and seeking information, and 27 items that purposed to measure these dimensions.

Table 1
Demographic traits of research sample

| Demographic traits | Type of School | f | % |
|--------------------------------------|-----------------------|----------|----------|
| School Type | Public | 480 | 75 |
| | Private | 160 | 25 |
| Gender | Female | 349 | 54,5 |
| | Male | 291 | 45,5 |
| Working years | 0-10 years | 168 | 26,2 |
| | 11-18years | 292 | 45,6 |
| | 19 + years | 180 | 28,2 |
| Education | Associate degree | 46 | 7,2 |
| | Undergraduate | 533 | 83,3 |
| | Master degree | 61 | 9,3 |
| Numbers of teachers at school | 0-35 | 104 | 16,2 |
| | 36-75 | 420 | 65,6 |
| | 75 + | 116 | 18,2 |
| Working years with headmaster | 1 year | 283 | 44,2 |
| | 2-3 years | 298 | 46,6 |
| | 4 years and over | 59 | 9,2 |
| Total | | 640 | 100 |

RESULTS

First sub-problem is that “At which level do Primary schools (public – private) use organizational learning mechanisms according to its dimensions?”. For explaining this sub-problem’s values, Mean and standard deviation are figured out and results are shown in Table – 2.

Table 2
Usage level of organizational learning mechanisms

| Organizational learning mechanisms | Type of school | N | M | SS |
|--|-----------------------|----------|----------|-----------|
| Seeking Information | Public | 480 | 2,94 | ,67 |
| | Private | 160 | 3,54 | ,46 |
| Analyzing Information | Public | 480 | 3,49 | ,97 |
| | Private | 160 | 4,29 | ,62 |
| Receiving - Disseminating Information | Public | 480 | 3,38 | 1,01 |
| | Private | 160 | 4,74 | ,78 |
| Storing Information | Public | 480 | 3,51 | ,86 |
| | Private | 160 | 4,40 | ,54 |

According to teachers worked in public schools; organizational learning mechanisms are used under the “medium – level” in receiving and disseminating information dimension and the other dimensions are used in “medium – level”.

According to teachers worked in private schools, organizational learning mechanisms are used in “medium – level” in receiving and disseminating information dimension and the other dimensions are used in “high – level”.

Second sub-problem seeks an answer that "Do learning mechanisms that used in primary schools differentiate according to types of school (public or private) ? The results of t test are shown Table -3 that weather the usage of organizational learning mechanisms differentiates or not, according to types of schools.

Table3
Usage of Organizational Learning Mechanisms according to type of school

| Organizational learning mechanisms | Type of school | N | M | SS | T | sd | P |
|---------------------------------------|----------------|-----|-------|-------|-------|-----|-----|
| Seeking Information | Public | 480 | 14,71 | 3,35 | 10,59 | 638 | ,00 |
| | Private | 160 | 17,72 | 2,29 | | | |
| Analyzing Information | Public | 480 | 10,46 | 2,90 | 9,82 | 638 | ,00 |
| | Private | 160 | 12,86 | 1,85 | | | |
| Receiving - Disseminating Information | Public | 480 | 23,69 | 7,06 | 15,52 | 638 | ,00 |
| | Private | 160 | 33,18 | 5,48 | | | |
| Storing Information | Public | 480 | 42,18 | 10,35 | 12,14 | 638 | ,00 |
| | Private | 160 | 52,74 | 6,48 | | | |

Organizational learning mechanisms both used in public and private schools show statistically significant difference in all dimensions. Mean demonstrates that private schools are mostly used organizational learning mechanisms in all dimensions.

Third sub- problem seeks an answer "Does students' academic achievement differentiate according to level of organizational learning mechanisms used in school?" The results of Anova and LSD test are shown on Table – 4 .

Table 4.
Usage of Organizational Learning Mechanisms according to Students' Achievement Variable

| Dimensions | Achievement* | N | Mean | Std. Dev. | F | P | (LCD Test) Mean Difference* |
|---------------------------------------|--------------|-----|-------|-----------|-------|-----|-----------------------------|
| Seeking Information | 1 | 160 | 15,72 | 3,00 | | | 1-3 |
| | 2 | 160 | 14,88 | 3,21 | 19,30 | ,00 | 2-3 |
| | 3 | 160 | 13,50 | 3,45 | | | |
| Analyzing Information | 1 | 160 | 11,60 | 2,46 | | | 1-2 |
| | 2 | 160 | 10,42 | 2,59 | 26,72 | ,00 | 1-3 |
| | 3 | 160 | 9,35 | 3,16 | | | 2-3 |
| Receiving – Disseminating Information | 1 | 160 | 27,32 | 6,53 | | | 1-2 |
| | 2 | 160 | 23,29 | 6,38 | 45,41 | ,00 | 1-3 |
| | 3 | 160 | 20,45 | 6,54 | | | 2-3 |
| Storing Information | 1 | 160 | 47,46 | 9,14 | | | 1-2 |
| | 2 | 160 | 42,10 | 8,71 | 49,39 | ,00 | 1-3 |
| | 3 | 160 | 36,97 | 10,40 | | | 2-3 |

*1.Successful, 2. middle successful, 3.low unsuccessful

According to the results of analysis, students' academic achievements differentiate related to the usage level of organizational learning mechanisms at school. Mean shows that schools the more use organizational learning mechanisms, the more their students being successful.

Fourth sub- problem is that "Does usage of organizational learning mechanisms in primary school differentiate according to numbers of teachers in school?" Anova test results to seek an answer this question are given Table – 5.

Table 5.
Usage of Organizational Learning Mechanisms according to Numbers of Teachers Working at School

| Dimensions | Teacher numbers* | N | Mean | Std. Deviation | F | P | (LCD Test) Mean Difference* |
|------------|------------------|-----|-------|----------------|-------|-----|-----------------------------|
| | 1 | 104 | 15,20 | 3,25 | 23,14 | ,00 | 1-3 |

| | | | | | | | |
|--|---|-----|-------|-------|-------|-----|-----|
| Seeking Information | 2 | 420 | 16,00 | 3,11 | | | 2-3 |
| | 3 | 116 | 13,69 | 3,79 | | | |
| Analyzing Information | 1 | 104 | 10,95 | 2,82 | | | 1-3 |
| | 2 | 420 | 11,40 | 2,69 | 12,47 | ,00 | 2-3 |
| | 3 | 116 | 9,93 | 3,26 | | | |
| Receiving – Disseminating Information | 1 | 104 | 24,64 | 7,12 | | | 1-3 |
| | 2 | 420 | 27,43 | 7,70 | 21,99 | ,00 | 2-3 |
| | 3 | 116 | 22,39 | 7,72 | | | |
| Storing Information | 1 | 104 | 44,28 | 9,66 | | | 1-2 |
| | 2 | 420 | 46,53 | 9,81 | 24,31 | ,00 | 1-3 |
| | 3 | 116 | 39,09 | 11,96 | | | 2-3 |

*1.1-35 teachers, 2.36-75 teachers, 3.76 and over teachers

As an analysis result, usage of organizational learning mechanisms differentiate in all dimensions with regard to numbers of teachers working at school. All analysis results demonstrate that when numbers of teacher are over 76 at school, usage of organizational learning mechanisms is “the least” and when numbers of teachers are between 36 and 75; usage of organizational learning mechanisms is “the most”.

Fifth sub- problem is that "Does the level of organizational learning mechanisms differentiate according to working years of teachers with school headmaster?" Anova test results are shown Table – 6.

Table 6.

Usage Of Organizational Learning Mechanisms according to working years of teachers with school headmaster.

| Dimensions | Working years* | N | Mean | Std. Deviation | F | P | (LCD Test) |
|--|----------------|-----|-------|----------------|-------|------|------------------|
| | | | | | | | Mean Difference* |
| Seeking Information | 1 | 283 | 15,57 | 3,52 | ,84 | ,430 | |
| | 2 | 298 | 15,29 | 3,37 | | | -- |
| | 3 | 59 | 15,81 | 2,64 | | | |
| Analyzing Information | 1 | 283 | 11,28 | 2,88 | 4,32 | ,014 | 2-3 |
| | 2 | 298 | 10,73 | 2,96 | | | |
| | 3 | 59 | 11,71 | 2,08 | | | |
| Receiving - Disseminating Information | 1 | 283 | 26,71 | 8,13 | 10,66 | ,000 | 1-2 |
| | 2 | 298 | 24,78 | 7,72 | | | 1-3 |
| | 3 | 59 | 29,42 | 5,62 | | | 2-3 |
| Storing Information | 1 | 283 | 45,20 | 11,11 | 6,28 | ,002 | 1-3 |
| | 2 | 298 | 43,66 | 10,37 | | | 2-3 |
| | 3 | 59 | 48,81 | 7,52 | | | |

*1.1 Year, 2.2-3 Years, 3. 4 and over Years

As a result of analysis, usage of organizational learning mechanisms at school has differentiated related to working years with headmaster for three dimensions except the dimension of storing information.

Means demonstrate that all dimensions of organizational learning mechanisms are mostly used when working years with headmaster are four years and over.

CONCLUSION AND FUTURE WORK

In this work which aims to reveal determination of utilization levels and effects on student's academic success of organizational learning mechanisms in primary schools, it has been showed that organizational learning mechanisms are being used "medium- level" in public schools and "high- level" in private schools. This result has similarity with research of Omur (2014) and Unal (2014). It is remarkable that both public and private school teachers have "the least" perception level on seeking information dimension.

According to Schechter (2008) seeking information dimension is an actively researching process of information. Schools are structured as more bureaucratic institutions and teachers are expected to adapt to existing rules instead of learning.

Seeking information is the basis of other dimensions; therefore, less activities in seeking information dimension also means decreasing the efficiencies of other dimensions.

Greater usage of organizational learning mechanisms for all dimensions in private schools shows that public schools structured as bureaucratic institutions and are expected to comply with the rules instead of making innovation or teachers perceive to comply with the rules as their duties.

Yumusak and Yildiz's findings (2011) are on the same direction. Omur's (2014) research result as high schools putting organizational learning mechanism to forefront more than vocational schools supports comment that private schools pay attention to academic achievement more than public schools.

Students have more academic achievement in public schools that using learning mechanisms than others point out the accuracy of the hypothesis about organizational learning and organizational learning mechanisms. This result is the expected situation.

In relation to use of organizational learning mechanisms, it has been ascertained that these mechanisms are used "the least" in schools having 76 or more teachers, "the most" in schools having 36-75 teachers. Omur's findings (2014) show the same results for high schools.

According to researches' results, it is possible to say that organizational learning mechanisms can be used in medium-sized schools effectively, however using in larger schools create problems. The reason for this situation might be increasing numbers of teachers in school making difficult to know each other and avoiding cooperation.

When working time of teachers with headmaster is 4 years and over, organizational learning mechanisms are used mostly in schools. Increasing working hours of headmaster and teachers within school is expected to lead to trust each other and get to know each other better. Performance of headmaster has been evaluated in every-4-year-in-Turkey. After evaluation, successful headmaster can continue working the same school or be appointed to another school. According to the results obtained in this research, if headmaster who being evaluated as successful can continue in the same schools, the use of organizational learning mechanisms can be increased.

Based on findings, encouraging new knowledge seeking and implementing teachers, identification and reduction of bureaucratic practices in public schools, forming the schools with 36-75 teachers and ensuring headmaster work for longer than 4 years in the same schools proposals can be made

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DEVELOPMENT OF COMMUNICATIVE GRAMMAR TEACHING MODEL IN TEACHING PRE-SERVICE ENGLISH-MAJOR TEACHERS

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ABSTRACT

This research reports on the application of communicative grammar teaching model in English to the pre-service English-major teachers. This study aims to explore the effectiveness of communicative grammar teaching model in English on improving students' motivation and attitudes towards learning English grammar. It was conducted in a classroom of thirty fourth-year English-major students of Faculty of Education of sixteen three-hour weekly sessions. The action research method was adopted, involving two cycles of teaching-learning process. The material design for communicative grammar teaching was based on the information that the students gave since the initial reflection stage, the first grammar teaching cycle and the second grammar teaching cycle. The data were collected from the interviews of the students and the students' self-assessment questionnaires. The findings revealed that communicative grammar teaching model improved students' motivation and attitudes towards learning English grammar. The students' motivation and attitudes towards learning English grammar had significantly developed.

Keywords: communicative grammar teaching, teaching model, pre-service teachers, English-major teachers

INTRODUCTION

The context of English teaching in Thailand is EFL (English as a Foreign Language), which means students have most of their exposure to English only inside the classroom – the students are assumed to have restricted opportunities to use English in their daily life. Teaching English in Thailand for the past thirty years has been significant due to the wide use of English in the world society. Though the significance of English is marked, the standard Thai is the medium of instruction at all levels of education in Thailand (Makaramani, 2013). In spite of studying English for six years in primary school and another six years in secondary schools, many students were not able to communicate in English. The major causes of this problem may lie in the emphases of English teaching in Thailand, which are not on encouraging speaking ability. Rather, they are on reading skill and the knowledge of grammar and vocabulary (Wongsothorn et al., 2003). Since most of students rarely have chances to use English in their everyday life, but they have to study it for years, a lot of them are doubtful of the value of learning the language. This is one of the reasons for their lack of motivation. It is also due to the limited use of English in Thai society that teaching methods have focused on reading and grammatical correctness. The teaching of grammar must be very influential in English teaching in Thailand.

It has been controversial for a long time whether English grammar is necessarily taught in the classroom or whether it is better that learners acquire grammar naturally from meaningful input and opportunities to interact through communicative activities. For many teachers, grammar has ever taken anything other than a central role in their classroom methodology (Hedge, 2000: 143). However, Krashen (1982)

proposes the idea that grammatical competence can develop in a fluency-oriented environment without conscious focus on language forms. So, if teachers believe that a focus on grammar is necessary in classroom language learning, how should we integrate grammar teaching into communicative methodology which pays attention to communicative competence? Communicative grammar teaching model has been designed for this reason.

LITERATURE AND THEORY

Communicative Language Teaching (CLT) captures the communicative functions that language performs. Language is the system by which meanings are communicated and expressed through various language patterns and purposes. CLT aims to enable students to communicate in the target language both inside and outside the classroom (Larsen-Freeman, 2000). To be able to communicate in the target language effectively, the students need to develop communicative language ability as well as linguistic knowledge. Therefore, they need to be taught how to use the language appropriately in different contexts. So, the communicative approach is relevant in teaching the students in the study because with communicative activities the students are able to practice applying learned grammatical structures to language use in real situations.

Communicative competence (Alptekin, 2002; Hymes, 1971; Netten & Planchat-Ferguson, 1995; Paulston & Britanik, 1995; Widdowson, 1978) is the key concept of CLT. Canale and Swain (1980) propose a definition of communicative competence which covers the knowledge in four areas: grammatical competence, discourse competence, sociolinguistic competence and strategic competence. Grammatical competence is focusing on knowledge of grammar, vocabulary and phonology. Developing the learners' ability to take part in the process of communicating through language is the ultimate concern of foreign language teaching. Richards (2002: 6) summarizes the principles of CLT as follows:

- The goal of language learning is communicative competence.
- Learners learn a language through using it to communicate.
- Authentic and meaningful communication should be the goal of classroom activities.
- Fluency and accuracy are both important dimensions of communication.
- Communication involves the integration of different language skills.
- Learning is a gradual process that involves trial and errors.

In order to reach the goal of students' communicative competence, communicative activities need to be applied. Communicative activities such as games, role plays, simulation and problem-solving tasks, give students opportunities to practice communicating in different social contexts and in different roles (Larsen-Freeman, 2000: 128; Rao, 1996: 466). Communicative activities should develop a pattern of language interaction where a negotiation of meaning occurs between speakers in pairs or small groups. During the activities the teachers act like an organizer, an advisor, a monitor or a facilitator providing necessary language items and guiding the students' performance (Hedge, 200: 62-63; Larsen-Freeman, 2000: 128; Rao, 1996: 465)

As grammatical competence is viewed as the first aspect to be achieved in communicative competence, this research is an attempt to design the communicative grammar teaching model by following

the 5 basic stages of language teaching: warm up, presentation, practice, production, and wrap up. In the warm up stage, the teacher should bring grammar instruction to life by stimulating in the topic and raising awareness and giving the reason for learning. In the presentation stage, the teacher presents the new grammar point in meaningful context. The teacher may use pictures, diagrams, real objects, or action in order to present the grammar point. In the practice stage, the students practice communicating through games, simulation and role plays. The production stage provides students an opportunity to put grammar to use in real life situations relating students' own contexts. Finally, the students conclude the learned grammar point(s) according to their own comprehension. They may create their own diagrams, pictures or any other forms of visual presentations. The 5 basic stages are shown in Figure 1.

Figure 1: The 5 basic stages of Communicative Grammar Teaching Model



METHODOLOGY

This study adopted an action research approach to investigate the value of applying the communicative grammar teaching model to thirty fourth-year English-major students of Faculty of Education at a Thai university of sixteen three-hour weekly sessions. The research was conducted through two cycles of action research spiral of planning, acting, observing and reflecting (Kemmis & McTaggart, 1988) for sixteen weeks.

The study began with an initial reflection on the teaching-learning situation. Two grammar points were taught by direct explicit grammar teaching method for four three-hour weekly sessions. The reason for doing this is to figure out the problems that may arise from learning English grammar through the traditional method. The problems discovered at this stage were used as a basis to plan an action for improvement. Questionnaires asking about students' belief and students' initial attitudes towards grammar teaching were applied in order to get the information about their learning styles and learning activities. After that the new model of teaching, communicative grammar teaching model, was designed for implementation in the first cycle. Instructional materials were developed for teaching in the first teaching cycle according to the students' reflections.

The teaching implementation of two grammar points was conducted in class for six weekly sessions. Data were collected from the interviews of the students and students' self-assessment questionnaires. Reflections on the lesson taught provided for implications for improvement in the next action step. The instructional materials for the second teaching cycle were designed according to those reflections from the students.

Another two grammar points were taught in class for six weekly lessons. The activities and materials used in the second teaching cycle were based on the reflections from the first teaching cycle. Data were collected from the interviews of the students and students' self-assessment questionnaires at the end of the teaching.

RESULTS

The findings of the study from the initial reflection stage, the first teaching cycle, and the second teaching cycle are presented in Table 1.

Table 1: Summary of the findings

| |
|---|
| Initial Reflection Stage |
| Questionnaires about students' belief |
| <ul style="list-style-type: none"> • Grammar is the most important part in English teaching and learning. • Students have to study grammar in order to be good at communication. • The teacher has to correct all students' grammatical mistakes. • Grammar points can be effectively taught through teacher-centered instruction. • Grammar should be learned through songs, games, role plays, dramas, and competitions. |
| Students' initial attitudes towards grammar teaching |
| <ul style="list-style-type: none"> • Students have negative attitude towards learning English grammar. (boring, hard to understand, a lot of rules to memorize) |
| First Teaching Cycle |
| <ul style="list-style-type: none"> • Students have more confidence in speaking English. • Students feel that their grammar knowledge has been improved. • Students enjoyed learning grammar. • Students are able to apply grammar knowledge in their communication. • Students like learning grammar through pair work and group work. • Students want to learn English grammar through songs, games, role plays and drama. |
| Second Teaching Cycle |
| <ul style="list-style-type: none"> • Students have more confidence in speaking English. • Students feel that their grammar knowledge has been improved. • Students enjoyed learning grammar. • Students are able to apply grammar knowledge in their communication. • Students like learning grammar through pair work and group work. • Students like learning grammar through songs, games, role plays and drama. |

From the initial reflection stage, the researcher designed the communicative grammar teaching model according to the 5 basic steps: warm up, presentation, practice, production, and wrap up by adding songs, games, role plays and drama. After teaching the first teaching cycles, the self-assessment questionnaire and the interview were used to collect data. The interview session reflected the strengths and weaknesses of the teaching and learning activities. Thus, the second teaching cycle was designed according the reflections after the first teaching cycle.

CONCLUSION AND DISCUSSION

There were changes in students' motivation and attitudes towards learning English grammar throughout the study. From the initial information gained from the questionnaires, students had negative attitude towards learning grammar. However, later on during the study, the students viewed themselves become better in English grammar as well as English communication. From their self-assessment, they gained more

confidence in applying English grammar in communication. Moreover, the communicative grammar teaching helped create the group working skills among students.

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THE DEVELOPMENT OF VIDEO LESSONS FOR DEVELOP THE SKILLS TO SOLVE PROBLEMS OF MATHEMATICS, MATHAYOMSUKSA 1 (GRADE 7), THE DEMONSTRATION SCHOOL OF SUAN SUNANDHA RAJABHAT UNIVERSITY, THAILAND

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ABSTRACT

Video lessons were very useful in education system. It was presented in multimedia and also delivered content that was apparently created substantial interest. When it was employed in class, it attracted the attention of students. Students were able to remember and gained more knowledge. In mathematics where most abstraction content was emphasized. A video lesson helped boosting mathematical problem-solving skills among students. The purposes of this study were 1) to create a video lessons aimed to improve the grade 7th student's skills in solving mathematic problems in order to meet the efficiency standard of 80/80 2) to compare the study achievements before and after video lessons learning.

The population for this study was those 7th grade students in 4 classrooms at the Demonstration School of Suan Sunandha Rajabhat University. The sample group was selected 1 classroom contained 30 students in the 1st semester of 2015, selected by random sampling. The statistics used to collect data, included average scores, standard deviation, and the t-test.

The finding from this study showed that the video lessons augmented the mathematics problem-solving skills with the efficiency at 83.75/82.17 which was higher than the established requirement. The achievement of post-study was higher than that of the pre-study at the statistical significant 0.05.

Keywords--- Video lessons, mathematic problem-solving skills

INTRODUCTION

At present, education played a significant role in developing and managing education to enhance potentiality and quality of the people in the country. It was essential to earnestly execute this in order to reinforce a person's ability to the maximum including the ability to analyze, to solve problems, to initiate new ideas, to do self-learning, to adapt oneself to keep up with abrupt changes (Akkarin Simahasarn, 2003). In fundamental education management, mathematics was a subject that led to scientific and technological breakthroughs. Present world had been advanced due to scientific discovery which depended on mathematical knowledge. In addition, mathematics intensified each individual's logics as it promoted sanity, thinking management system, work execution planning (Siriporn Thipkong, 2002). The nature of mathematics was mainly an abstract. Some content was difficult to explain to learners. It required logical thinking in order to perceive and understand the mathematical structure. Due to this, most students or learners did not prefer mathematics and their academic results was not successful (Noppawan Molkongnoppaklao, 2002). It was apparently evident that Thai students were rather weak at mathematics. As indicated from the O-Net examination for the 6th grade elementary schools hosted by the National Institute of Educational Testing Service (NIETS) for the academic year of 2015, the average score of the 5 main subjects were less than 50% and mathematics was one of them. This pointed out that the mathematics teaching management was not well fulfilling. The root causes could have come from the teaching methods from the teachers or even from the students themselves. Hence, the core role that teacher needed to settle was various teaching methods so as to

trigger interest towards the subject among students' minds. Nowadays, mathematics academic teaching and learning management was focused on urging students to use logics, sanity, and skills to solve mathematical problems on a daily basis.

Using media in teaching could successfully activate interest and satisfaction among students' minds which led to better academic result. As mentioned by Samrerng Boonreungrat (1981), when students were into the subject, they concentrated on it, they were willing to search for more knowledge, pay significant attention to it, perceive and respond to based on their positive perception, and accept the value of the subject. At the end, their academic results became better off.

At present, video technology was employed with various works particularly on academic management, curriculum planning, teaching media, etc. Owing to advanced computer technology together with state-of-the-art information system developed for globalization era, academic development unceasingly grew and presented useful information for every level of learnings (Somkiat Korbuakaew, 2003). The importance of the video was referred as follows; the video was fully qualified in terms of audiovisual education as it sent out information to audiences to visually and audibly perceive. It created good tangible experience (Howell, 1970). Besides it was a medium that resulted in high perception as a person's perception came from vision for 75%, hearing for 13%, touching for 6%, smelling for 3% and tasting for 3% (Dale, 1956).

By virtue of the above-mentioned matters and reasons, it was important to deal with the problems in the existing mathematics teaching and learning management particularly on mathematic problem solving issues as well as the benefits from using the video as mentioned earlier. The researcher was inspired with the idea of elaborating video lessons by focusing on mathematics problem solving matter in order to deploy them as teaching media tools to cope with the teaching and learning problems. They also helped to efficiently boost students' skills when it came to solving mathematic problems.

LITERATURE&THEORY

Learning was all about behavioral change, idea development, ability development through experience and interaction between students and environment. It allowed a person to live happily in a learning society which was full of complex procedures. Organizing academic learning and teaching that inspire students' enthusiasm to learn was not an easy task. Many philosophers and psychologists had tried to locate theories and processes relating to learning over years such as learning by doing conducted by John Dewey, discovery learning discovered by Jerome S. Bruner, meaningful learning researched by David P. Ausubel, to name a few. Robert M. Gagne proposed 8 conditions of learning including signal learning, stimulus response learning, chaining, verbal association, discrimination learning, concept learning, rule learning, and problem solving process.

In order to improve the academic teaching and learning in mathematics efficiently, relevant principles along with theories concerning mathematics learning management had to be put into account as a development framework. Such theories were pointed out as follows (Komol Paisarn, 2011);

1. Bruner's Theory of Instruction: It was a theory directly related to mathematics teaching and learning. It referred to a productive learning comprising 4 fundamental factors -- a content structure, learning readiness, insights from systematic speculation of past experience, and motivation to learn. Additionally, this theory indicated that a person owned an ability to learn or think mathematically in 3 different levels as explained below;

1.1 Level of direct and tangible experience

1.2 Level of visual image

1.3 Level of relations and symbols—a level where a learner could symbolize what he perceived at the 1st level and the 2nd level.

2. Piaget's Cognitive Theory and Vygotsky's were the foundation of the Constructivism theory. As stated by Piaget, a person's cognition was adapted through the assimilation process and the accommodation process. The development emerged when a person obtained and assimilated new information or new experience and they were blended with his existing cognitive structure. Piaget believed that everyone

had a step-by-step cognitive development resulting from his interaction and experience with external environment together with his logic and mathematic thinking, knowledge socialization, maturity, and a balance development process of the person. On the other hand, Vygotsky was heavily focused on culture and society. He proposed the idea on 'zone of proximal development'. This concept played a significant role to changes on mathematics teaching and learning management. He pointed out that every student had his own cognitive development and had his own potential to develop the cognition to the target level. The gap between where a student was currently at and where the target level he had a potential to reach was called 'zone of proximal development' (Tissana Khaemane, 2011).

Concept of student-centered teaching and learning management

This was complied with the Cognitivism which believed in brain-based learning. This involved information management process, information storage and usage, memory-based learning that affected memory, forgetfulness, and knowledge transfer. Motivation arising during the learning process was crucial as it could indicate interest, influence to information management process and direct impact on learning pattern of learners (Chanathip Pornkul, 2008).

RELATED WORKS OR DISCUSSION

The analysis to locate the efficiency of the invented educational video lessons found that the efficiency was at 83.75/82.17 which was higher than the initial criterion set at 80/80. When comparing the differences of the academic results before and after the video lessons were employed, it was discovered that students achieved in better academic results after the use of the video lessons with the level of significance at .05. This was in accordance with the research conducted by Chalit Limprakun (2013) which was on the development of educational video lessons for basic repairing of clothes subject for 36 students in the 5th grade elementary level, the demonstration school of Silpakorn University (early childhood and elementary). He used a random sample selection method. It was shown that the efficiency of the invented educational video lessons was at 77.76/77.97 which was higher than the pre-set criterion at 70/70. Moreover, the analysis result was in conformity with Intira Robroo's study (2015) which was on the development of multimedia lesson used for demonstrating the applied program of audio media production. According to this study, the efficiency of the lesson created by the researcher was at 80.09/87.20 which fulfilled the pre-determined assumption. The comparison of learning efficiency was in the same manner with Santana Seelao's research (2010) which was aimed to study the comparison of the academic efficiency concerning the subject of number counting for the 1st year kindergarten level. During the class, a video lessons and a standard teaching were deployed, one at a time. It was found that students learning through an animation video lessons had higher academic achievement than those learning from a standard teaching. The level of significant was at .05.

From the observation, the sample group learning the subject of development to enhance mathematics problem-solving skill from video lessons were having a good time towards the lesson in class. The video lessons were in multimedia and came with simulation, and drama. Actor's names were contemporary to those in the present day; moreover, the drama content was funny while giving advice on how to calculate or solve the mathematics problems. All these urged the interest among the sample group's minds which promoted their learning ability, class exercise achievement, along with good score in post-exercise after class. Thus, the guideline to upgrade video lessons to be more efficient was to present it in a drama form or in a hypothetical situation/simulation that was suitable with the contemporary period. Then learners would pay even more attention to the video lesson. This finding was in line with the research of Hewson (2002) which studied on comparison between using animation and using graphic communication in chemistry subject. The finding showed that better academic achievement was on those who learnt through animation rather than those learning through graphic communication. Video lessons were intriguing and handy as it appealed learners to increase their learning ability and to enjoy the lesson, to get excited with the swift change of pictures, sound, light and colors. Various presentation styles like those in a movie formed better communication, and allowed many students to attend class and study all together at the same time as well as helped in demonstration.

METHODS

This research was aimed to study and promote educational video lessons in order to develop mathematics problem-solving skills for the 7th grade high schools. The following steps were used to conduct this study.

1. Study relating documents, theories, and researches.
2. Analyze content by studying the 2008 fundamental academic curriculum for mathematic subject for the 7th grade level.
3. Determine the learning objectives and segregate contents into 2 parts including 1) plus and minus of a decimal and problem-solving 2) logarithm and problem-solving.
4. Create a storyboard and educational lesson for video lessons. Produce educational video lessons in a form of CD Rom.
5. Make a test form to measure academic result, a class exercise, and a measurement form for experts to do assessment towards the video lessons
6. Take the research tool including the invented lesson in video lessons, a test form, a class exercise, and a measurement form to the experts to evaluate their quality.
7. Amend, improve various tools based on the experts' advice
8. Collect data to locate the efficiency of the educational video lessons, the details were as follows;
 - 1) Take the efficiency measurement test to test with the sample group. This was a pre-test. Execute teaching program by using the created educational video lessons. Once finished, allow the sample group to do the exercise.
 - 2) Let the sample group study the 2nd lesson from the video lessons and do the exercise. Upon the finish of the 2 lessons, allow the sample group to do a post-test.
9. Take the collected data for statistical analysis as follows;
 - 1) Analysis to determine the efficiency of the educational video lessons by comparing the average score results from the class exercise and from the post-test (E_1/E_2).
 - 2) Analysis to compare academic efficiency achievement among the sample groups before and after the video lessons by using the t-test, dependence group type.
10. Summarize the result for discussion

RESULTS

According to the finding,

1. The educational video lessons created to elevate mathematic problem-solving skills for the 7th grade students was at an efficiency level of 83.75/82.17, which was higher than the pre-set criterion at 80/80.
2. The academic achievement among the sample group after attending a video lessons was higher compared to that before the video lessons. The level of significance was at .05 as detailed in Figure 1;

Figure 1 Academic achievement result

| | N | \bar{X} | S.D. | t-test |
|----------|----|-----------|------|-------------|
| Pretest | 30 | 11.23 | 2.40 | t = 23.327* |
| Posttest | 30 | 29.30 | 3.06 | |

*Level of significance at 0.05

As seen from the Figure 1, the academic achievement among the sample group after they attended the video lessons was higher than that before the video lessons with the .05 level of significance. The t-test value from the calculation was higher than the t value from opening the table at the location of $\alpha = 0.05$ and $df = 30-1$, t value was at 1.6991 meaning learning through the video lessons led learners to increase their learning ability and knowledge.

CONCLUSION AND FUTURE WORK

As pointed out on this research result, the invented video lessons were more efficient than initial expectation per the pre-set criterion. It also augmented learners's academic achievement results compared to those happened before the videos lessons. The video lessons were presented in a creative multimedia form with simulation blended with demonstration focusing on techniques used to solve mathematics problems. This motivated learners to pay high attention to the video lessons, which finally resulted in better learning. Hereby the researcher had some of the advice for the next research as follows;

1. There should be a development of the mathematics video lessons in other different topics.
2. There should be collaboration among the experts in contents, teaching, and video lessons manufacturing in order to successfully develop an efficient video lessons.
3. There should be comparison between the educational video lessons with other teaching media in order to bring in new knowledge.

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