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GREEN IT/S ADOPTION WITHIN GSCM IN CONSTRUCTION INDUSTRY: AN ELUCIDATION AND PRACTICALITY REVIEW

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Abstract: *In the current globalized and competitive economy, the adoption of information technology and information system (IT/S) is turning out to be pivotal in supply chain management (SCM). IT/S as a potent tool holds an important role for effective control of today's complex supply chain in the organization and leads to the better supply chain performance. Hence, the IT/S usage level has been increased significantly in response to its necessity in today's global business environment. As consequence of this condition, IT/S substantially contributes to environmental problem and ecological sustainability. Even though IT/S is beneficially to the organization but basically IT/S has negative impacts to environment from its production, use, to disposal. The use of IT/S consumed not less energy, generated footprint emission, and disposed large amount of e-waste. In contrary to its perilous effect, IT/S is offering promising potential to reverse its negative impact to environment by going green and by using IT application its self to greening the supply chain activities. These are termed as Green IT and IT for green or Green IS. However, the existing studies are still limited that assess the role of IT/S adoption in helping the organization to meet the sustainability goals in the whole supply chain process. Moreover, the elucidation and practicality of green IT/S its self are still unclear even green IT/S is starting implemented in several different contexts. In an effort to address this situation, this study clarifies green IT/S by interpreting it through comprehensive review of literatures. This study also provides description of potential practicality adoption of green IT/S within green supply chain management (GSCM) where the outcome will contribute to strengthening the supply chain sustainability performance, especially in the context of construction industry.*

Keywords: Green IT/S, GSCM, Construction Industry

Introduction

Nowadays, the organization is necessitated to be more flexible to adapt and respond to the market changes since the rapid changing and dynamic global business environment.

However, current business condition is not only urged the organization in the market competition but also environmental protection and earth's sustainability (Chou & Chou, 2012). The disintegration of the earth or environmental degradation which are identified by the emergence of global warming, climate change, and natural disasters has raised the level of environmental awareness and the importance of environmental protection. Organizations are getting aware of the necessity of sustainability in performing and managing work (Siedel, Recker, Pimmer, & von Brocke, 2010).Organizationshaveincreasingly concerned about their negative impacts to the environment from their business operation activities. Based on Lamming and Hampson (1996), the environmental impacts occur in the entire supply chain and across all stages of product's life cycle. Thus, in an exertion to this, various companies have adopted GSCM practices in aiding in greening the supply chain operation activities.

Meanwhile, in managing the effective supply chain, IT/S plays the important role.Fasangari, Roudsari, and Chaharsooghi, (2008) stated that IT/S usage is considered as a prerequisite in controlling today's complex supply chain. Nowadays, IT/S is regarded as a prerequisite of competitiveness, not an option to source of competitive advantage (Li, Yang, Sun, & Sohal, 2009).Hence, the IT/S usage level has been increased significantly in response to its necessity in today's global business environment and has undoubtedly contributed to environmental problem and ecological sustainability by consumed not less energy, generated footprint emission, and disposed large amount of e-waste (Elliot & Binney, 2008; Hedwig, et al., 2009). As a result, integrating environmental concern into IT/S has also become pivotal for organizations' competitiveness while gaining ecological sustainability. Adding the "green" component into IT/S which term as green IT/S holds the promise as a tool in eradicating its negative environmental impacts andgreening other business operation activities (Erek et al., 2009).SCM, IT/S and environmental sustainability have interconnected relationship and complement each other that must not be disregarded (Elliot & Binney, 2008; Zhu, Sarkis, &Lai, 2008). Therefore, green IT/s is necessity in GSCM to achieve sustainability outcome.

However, the existing studies are still limited that assess the role of IT/S adoption in helping the organization to meet the sustainability goals in the whole supply chain process. Moreover, the elucidation and practicality of green IT/S its self are still unclear even green IT/S is starting implemented in several different contexts. As an effort to address this situation, this study clarifies green IT/S by interpreting it through comprehensive review of literatures. This study also provides description of potential practicality adoption of green IT/S within green supply chain management (GSCM) where the outcome will contribute to strengthening the supply chain sustainability performance, especially in the context of construction industry.

Issues of the Study

Construction industry is a major contributor to environmental problems. Based on United Nations Environment Program (2007), construction industry is main contributor of emissions to environment which account for around 30-40%. Moreover, as written in Warta Pusat of Urban Sector Development Reform Project (USDRP) (May 5, 2010) Indonesia's construction activities have sucked up 40% of the raw materials, consumed 36% of the total energy, spent 62.5% of the power supply, absorbs 12% of the water supply, and produced 136 million tons of construction and demolition waste (CDW) annually.Besides, construction industry is characterized by fragmentation, poor coordination among players and less

integrated between processes within the supply chain network in project. These have been acknowledged as the major causes of the poor performance(Abduh & Raharjo, 2013) since the performance of the construction depends on the performance of its supply chain (Glavinich, 2008). However, the nature of today's global business condition forces all the business operation to be competitive not only in the market but also should meet the environmental requirement.

Based on the aforesaid, basically, green supply chain management adoption is the main solution of the environmental and sustainability issues that face by organizationwhile controlling the effective supply chain (van Hoek & Erasmus, 2000; Rao & Holt, 2005; Zhu,Sarkis, & Lai, 2008; Shi & Koh, 2012). GSCM able to tackle the negative environmental impacts of business operation in the entire supply chain (Srivastava, 2007; Zhu, Sarkis, & Lai, 2008). However, in business operation, the entire supply chain activities cannot be separated from the role of IT/S. As a tool and solver, IT/S holds crucial role in improving upstream, within, and downstream of SCM in an organization (Li, Yang, Sun, & Sohal, 2009). IT/S supports SCM by providing integration and coordination of physical and information flow in the entire supply chain, in which leads to the better supply chain performance (Li, Yang, Sun, & Sohal, 2009; Omar, Ramayah, May-Chuin, Sang, & Siron, 2010). At the same time, the increasing use of IT/S has indubitably contributed to environmental problem by consuming a plenty energy, generating footprint emission, and disposing a large amount of e-waste.However, the existing studies are lacking in examining the impacts of IT/S on the environment.In contrary to its perilous effect, IT/S is offering promising potential to reverse its negative impact to environment by going green and by using IT/S its self to greening the supply chain activities.These are termed as Green IT/S. Yet, the existing studies are still limited that assess the role of IT/S adoption in helping the organization's actions to meet the ecological sustainability goals in the whole supply chain process. Moreover, the elucidation and practicality of green IT/S its self are still unclear. There are relatively handful research materials available on green IT/S, especially within GSCM in Indonesia construction industry. These leads to the number of queries on green IT/S. When green IT/S starts to emerge? What are the difference between green IT and IT for green (green IS)? How the practicality of green IT/S within GSCM in construction industry? Does green IT/S support the implementation GSCM in achieve supply chain sustainability performance?

Elucidation

Basically, Green IT/S is a new phase of technological innovation and a set of organizational practices that greening the IT/S infrastructure and use the IT itself to greening other domains such supply chain (Mulvaney, 2011).Green IT/S is beneficial not only to the economy aspect by reduce energy consumption while saving costs, but also to the natural environment of our earth by minimizing the negative environmental impact such waste, footprint, and emission.

Green IT/S has appeared principally since 2007 and impressively growth since then as a new business and technological and social phenomenon. Green IT/S was arisen when the negative environmental impacts of significant IT growth and the increased urgency of dealing with environmental degradation were recognized. The emergence of Green IT has begun to combat the negative environmental of IT/S (Erek et al., 2009; Mulvaney, 2011). The impacts of IT/S have on the environment are defined into first-order or direct effect and second-order or indirect effect. The first-order effect is known as "Green IT" and second-order effect is

known as "Green IS or IT for Green". Organizations adopt Green IT/S based on three interconnected strategies of natural-resource-based view of the firm (NRBV) by Hart (1995), which are pollution prevention, product stewardship, and sustainable development. Even though the relationship between green IT and green IS are interconnected, they have different focus and purpose (Molla& Abareshi, 2011).

Green IT

The first-order or direct effect refers to the negative environmental impact of IT design, production, operation/use, and disposal. Hence making IT design, production, operation, and disposal greener refer to Green IT (Murugesan, 2008).

Green IT is conceptualized in certain ways rely on its context. Murugesan (2008) defined Green IT as a study and practices of designing, producing, operating/using, and disposing of IT infrastructures including computers, servers and its associated subsystems with minimal or no impact on the environment (environmental sustainability), energy efficiency and total cost of ownership. Meanwhile, Elliot and Binney (2008) explained Green IT in term of design, production, operation, and disposal of IT and no-IT-enabled product/services, which is not deleterious and beneficial to the environment during its entire life cycle. Thus, IT is considered as one of the key roles that transform supply chain management function in organization, mainly in construction industry. Furthermore, substitute the traditional technologies with IT will minimize the amount of resources used in the whole business operation of construction industry. It can be concluded that Green IT has potential in supporting the green supply chain management implementation and achieving the better sustainability performance of supply chain within contractors in Indonesia.

Green IS (IT for Green)

The second-order effect refers to the positive environmental impacts of using IT on business and economic process. Hence using IT to make organizations greener refer to IT for Green or also known as Green IS(Chen, Boudreau, & Watson, 2008).

Green IS concept can be simply defined as the usage of IS to enable sustainable development in economy (Boudreau, Chen, & Huber, 2007; Watson et al., 2008). Green IS means use IS application in the entire business operation process, from procurement, logistics, disposal, communication between upstream and downstream of supply chain members.. Moreover, Green IS has another function which is supporting the better sustainability performance of organizations (Baggia, 2016). Green IS adoption has become the crucial key that supports environmental action such GSCM of organizations. It can be concluded that Green IS has potential in influencing and strengthening GSCM implementation and resulting the more sustainable outcome of supply chain sustainability performance among contractors in Indonesia construction industry.

Practicality

The utilization of Green IT/S in organizations aims to achieve the sustainability of our earth by converse the natural environment. Organizations adopt Green IT/S based on three interconnected strategies of natural-resource-based view of the firm (NRBV) by Hart (1995), which are pollution prevention, product stewardship, and sustainable development. Firstly,

Green IT practice in pollution prevention strategy is organizational action in reducing energy consumed by IT infrastructures while Green IS practice is organizational adoption of IS to reduce overall emission, footprint, waste, and toxic materials. Secondly, the practice of Green IT in product stewardship is organizational action of dispose IT infrastructure in environmentally friendly way while the practice of Green IS is organizational adoption of IS to greener the upstream and downstream supply chain management. Lastly, Green IT practice in sustainable development strategy refers to organizational action on using renewable energy to operate IT infrastructures and Green IS refers to organizational adoption of IS to transform business operation. The detail practice of Green IT and Green IT are shown on the Table 1 in the next page.

Table 1: The Practice of Green IT and Green IS (IT for Green)

	Green IT	**Green IS (IT for Green)**
Pollution Prevention	• Have policies to purchase IT infrastructure by considering environmental criteria. • Have policies to use virtualization, thin client, cloud computing, etc. to reduce the number of IT infrastructures used and energy consumed by IT infrastructures. • Have policies to implement PC management. • Have policies to encourage the operation of IT infrastructure in environmentally friendly manner (save energy)	• Encourage the use of software to assess and monitor environmental indicator (emission, footprint, and waste). • Encourage the use of software to reduce overall emission, waste, toxic material consumption.
Product Stewardship	• Have policies to purchase IT infrastructure based on vendor's end-of-life program • Have policies to reuse and recycle IT infrastructures and its components to extent its cycle life. • Have policies to dispose IT infrastructures and its components in environmentally friendly manner. • Have policies to participate in product take-back program by suppliers.	• Encourage the use of software to plan and design green supply chain strategy. • Encourage the use of software to support procurement, supplies delivery, supplies storage and handling, reverse logistics, supplier development activities be more environmentally friendly.
Sustainable Development	• Have policies to use renewable energy to support the operation of IT infrastructures.	• Encourage the use of application for paperless business process. • Encourage the use of application for communication tools beyond email. • Encourage the use of application for collaboration or groupware. • Encourage the use of application for video-teleconference tools.

Conclusion

This study has been shown that Green IT/S has started becoming an important element in green supply chain management (GSCM) to meet the sustainability goals. Even green IT/S can be said still in early stage of development and adoption but it has potential and

play pivotal role in addressing environmental issues, especially by supporting the implementation of GSCM practices. The existing green IT/S literature are still limited on the evaluation of the potential role of green IT/S practices in strengthening the implementation of GSCM practices that might also improve the sustainability performance of supply chain in construction industry context. Thus, this study provides a valuable knowledge for researchers and practitioners to enhance their understanding on green IT/S in GSCM. It would be a fundamental for future research in further exploring on this topic. Suggestion for future research is the empirical study may be established to increase the understanding about the role of green IT/S in the relationship between GSCM practices and sustainability performance of supply chain.

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THE GENUINE OF RADIO

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Abstract: *Radio was a precious medium and today as a "runner up" medium in numerous countries. Astonishingly, after digitalization - radio turn out to bea whopping business. However, the digitalization trounces the long-standing technology, which is analog.Instead of having two types of technology, which is analog and digital, the digitalization once again puts the technology in perilous condition when there is an optional alternative for digital audio delivery. Now, it becomes a mayhem to the radio industries. To clear all the miss understanding on this issue, we would like to propose a specific category for radio eco-system.According to George Santayana, those who cannot learn from history are doomed to repeat it. In this regard, it has encouraged the researcher to examine the changes in the technology as well as the history of radio industries in Malaysia from the political economy aspect. The timelines are from 1996 to 2016.*

Keywords: Political economy, digitalization, radio history and Malaysia

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Introduction

Formerly, McLuhan declared that TV is a medium. McLeish convinced us that radio is a blind medium. However, researchers articulate both mediums as a vigorous dinosaur. Once upon a time, radio existed as a precious medium. After the arrival of television, radio become a "runner up" medium in numerous countries for several eras. Thanks to globalization and convergence that coined the digitalization.

Astonishingly, digitalization reformed the longstanding radio industries. Digitalization turn radio into whooping business. Therefore the pattern of societies listening to the radio is changing around the world (Action Plan, 2010; Lennett, Clark, Glaisyer, Meinrath, Napoli, Anderson, Li, Ninan, Jackson, Mehta, Smith &Stonbely, 2011; Rooke, 2013; SKMM, 2014) towards digital platform.

The Saga of Technology

Discussion on broadcasting technology, specifically on radio has been discussed by numerous of scholars such as Anderson, 2012; O'Neill, 2007; Senger, 1998; and Helbert, 2015. The problem is that those respected scholars were focusing on technology without emphasising the clear-cut definition on radio. Especially between analog, digital and Internet.

Most of books written by famous scholars (such as Graham, 2006; Baran, 2007 & Dominick, 2007) discrete between digital and Internet.

Instead of having two types of technology, which is analog and digital, the digitalization once again put the technology in perilous condition as if societies are surrounded with diversity of technologies. To this point, the majority of listeners believes that digital radio and Internet radio are different. The apparatus that listener's deemas digital radio or Internet radio is actually an alternative for digital audio delivery.

Without tip-off, digitalization trounce the long-standing technology, which is analog. Now, it become a mayhem to the radio industries. Then, our questions is what makes a Podcast radio is different from Internet and digital radio? Under what category we should categorize Podcast radio? The miss conception arise when media scholars ineffective to draw a line between analog, Internet and digital. As a result, this miss understanding led to the miss perception about the category of radio.

To clear all the miss understanding on this issue, researchers would like to propose a specific category for radio eco-system. This research involves the use of secondary data (reports and statistics) to obtain reliable analysis on the development of radio broadcasting. According to George Santayana, those who cannot learn from history are doomed to repeat it. In this regard, it has encouraged the researcher to examine the migration in technology and history generally and specifically from the perspective of Malaysia.

First of all, researchers offer a new frame for radio eco-system due to the miss understanding. Most of media scholars (Graham, 2006; Baran, 2007; Dominick, 2007) explained the eco-system of radio as completely different entities as shown in figure 1.1.

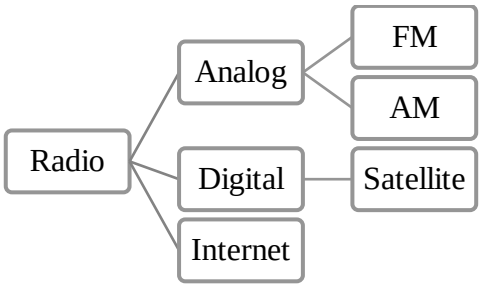

Figure1. 1:Eco-System of Radio According to Graham, Baran& Dominick

(Sources: Graham, 2006; Baran, 2007 & Dominick, 2007)

However, based on the past research (Spinelli, 2006; Rudin, 2006 & Berry, 2006), this issue subjects to agree to disagree conditions. Conversely, after the researchers analyse radio from the studio to the transmission – to some extent - expose that digital and Internet in radio context cannot classified as a different medium per se. Researchers discover that digital radio and Internet radio shared the same system, which is the use of digit binary to transmit the signal. The same digit binary applied to Podcast radio.

Figure 1.2 shows the new radio's eco-system in media context that proposed by the researchers.

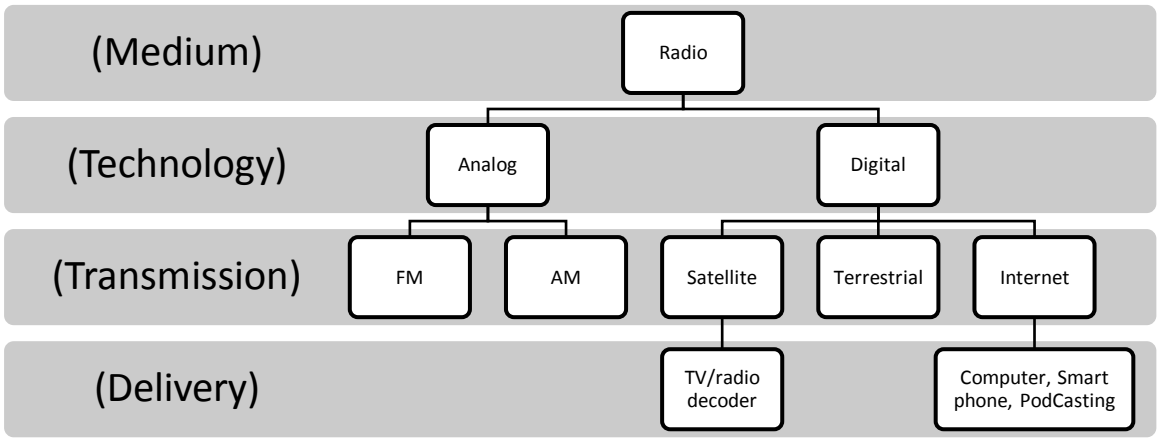

Figure1. 2: New Eco-System for Radio

According to the figure 1.2, researchers proclaim that radio is a visionless medium that use different technology to transmit the signal (FM/AM/satellite, terrestrial & Internet) and then decode by the receivers through, decoder radio or television, computer, smart phone, tablet, and apps. Furthermore, any Internet radio is an alternative audio delivery in order to cater audience's demands.

Radio's in Malaysia from 1996 to 2016

Researchers optimistic that the revolution of radio in Malaysia from the year 1996 to the year 2016, relatively gradual compared to the television industries based on document analysis. Due to the internal (political decision and economic scenario in Malaysia) and external factors (convergence, transnational, international bodies and global economic condition) which is influences the migration from analog to digital radio in the context of Malaysia.

Digital radio era in Malaysia began in the year of 1996. TunDr. Mahathir Mohammad chose Tan Sri Ananda Krishnan to establish the first digital radio and television (known as Astro) in Malaysia. However, TunDr. M idea arise seethe among the UMNO members. Yet, the expression from the party members disregarded by TunDr. M. Nevertheless, his political decision contributed to the growth of Malaysia's economic. Figure 1 shows rapid contribution from the sub sector services (transport, storage and communication) from the year1996 to the year1999 to the Gross Domestic Product (GDP).

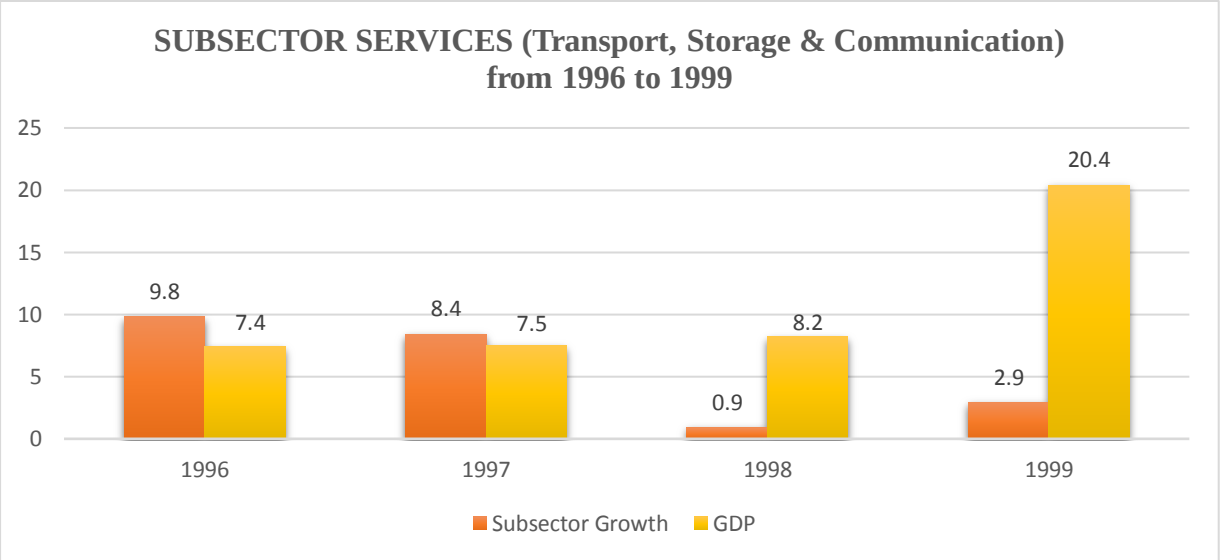

Figure 1: Subsector Services (Transport, Storage & Communication) From 1996 to 1999

However, Malaysia encountered economic crisis in the year 1997. Surprisingly, the crisis not affected Astro (first digital radio and television). The reason why sector services persisted during the crisis - due to the initiatives and incentives provided by the government.

Multimedia Super Corridor (MSC) is one of the government initiatives to enhance the telecommunication and communication sector in Malaysia and established in the year 1998. MSC Malaysia Bill of Guarantees (BoGs) provides incentives for organisation with MSC status to recoverduring the crisis. Astro hold MSC status which is, classified under Creative Multimedia Cluster (CMC).

From the year 2000 to 2009, numerous of digital radio station established under private organisation (IKIM FM, Astro Radio, Radio Rediffusion, Star Group) and national broadcasting station (Radio Television Malaysia/RTM). RTM began digital television project in the year 2000 and for digital radio in the year 2007. Researchers described radio industries in Malaysia during the year 2000 to the year 2009 as booming according to the document analysis (which is figure 2).

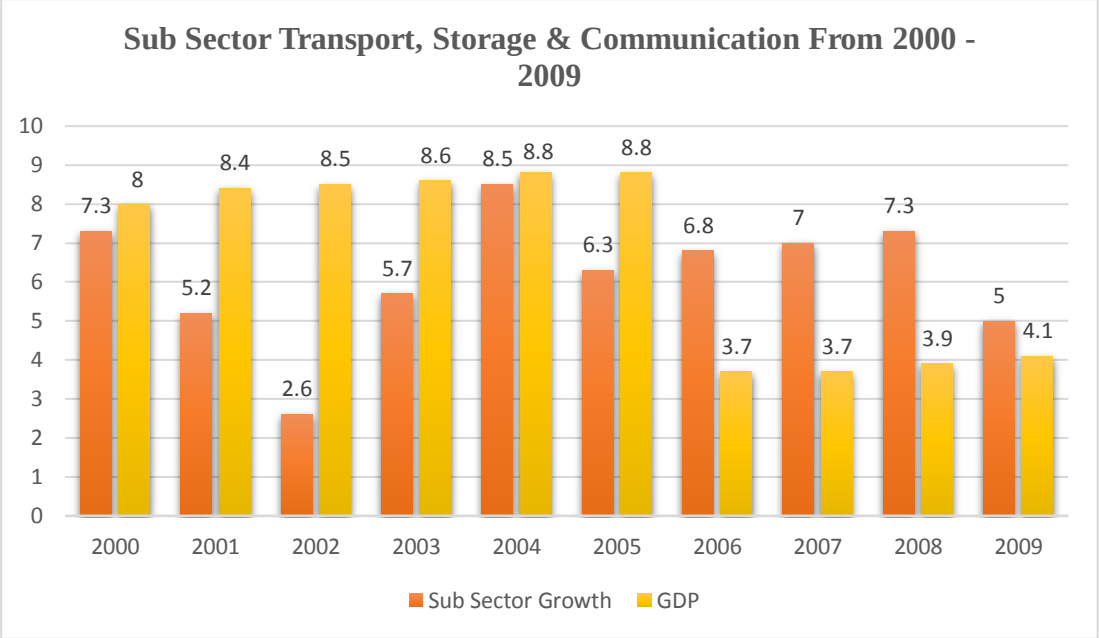

Figure 2: Sector Services: Sub Sector (Transport, Storage & Communication) From 2000 to 2009

However, researchers find out that the changes in the pattern of sub sector services to the Gross Domestic Product (GDP) from the year 2010 to the year 2016 occur. Previously, from the year 1996 to the year 2009, services sector combined transport, storage and communication under one sub sector. However, the alteration occur when communication itself stand alone as a sub sector for services without combined with other sub sectors (transport and storage). It shows that, communication started to influenced the GDP and become a big business through the convergence and transnational.

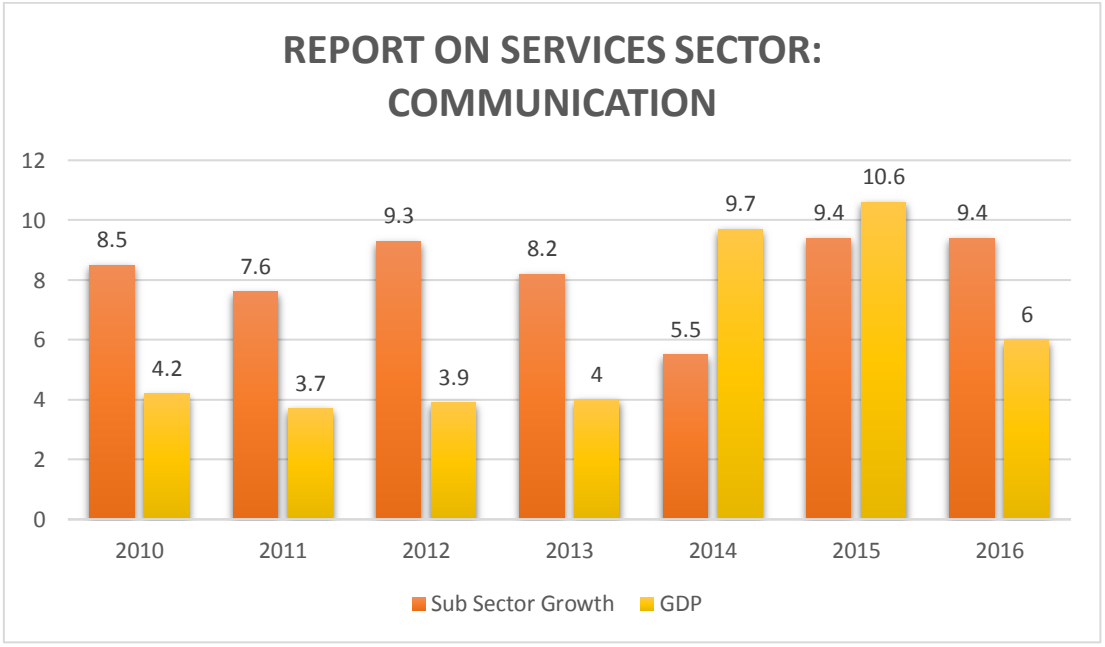

Figure 3: Report on Service Sector: Sub Sector Communication From 2010 to 2016

Conclusion

Due to the impending and unavoidable changes driven by regulatory bodies such as International Telecommunication Union (ITU) and Asia-Pacific Broadcasting Union (ABU), convergence and transnational in the developed world, Malaysia has no choice but to migrate to broadcasting using the digital system. Furthermore, political decision made by the government reflects the process of migration into digital world.

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SUSTAINABILITY OF TOURISM MANAGEMENT: MANAGING WASTE OF TOURISM INDUSTRY IN KELANTAN

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Abstract: *This paper will focus on the sustainability tourism management in the waste management aspect in Kelantan. Kelantan is used as the main subject place because of the lack of study in managing waste. Sustainable tourism and waste management are explored in this paper. The best practice in waste management for accommodation and camping site are also discussed in this paper.*

Keywords: Sustainability tourism, waste management

Introduction

According to the report on the official Tourism Malaysia website on September 2016, after the slowdown of tourist arrivals in 2015, the first half of 2016 is indicating sign of recovery with latest figures showing more tourist arrival with 3.7% compared to the same period in 2015. The total 13 million (13,032,775) tourists received by the country in the first half 2016 compared to 12.5 million (12,567,300) tourist in 2015. Even though the country recorded positive growth in the revenue, yet the massive influx of tourist in the country also can contribute to the environmental impact due to over consumption of natural resources and waste generation(PATA, 2002).The preservation should be taken seriously by the government or the tourism board in order to protect the environment and wildlife because of their value as a tourism resource (Ahmed, 2016). The community also should play their responsibility to make sure that our environment will always protected and prevent the waste issue from occurring.

The waste generation from the after effect of the tourism activity should be given more focus as the tourism industry is important to the country revenue and it should stay positive and give less negative effect to the country. Hence, the purpose of this paper is to discuss the managing waste generation from the after effect of the tourism activity in order to gain the sustainability tourism development in Kelantan. This paper also will focus on the managing the waste from the accommodation and campsite (outdoor) management practices. According to the report by Utusan in August 2016, the insensitive about the cleanliness issue is a synonym term for the Kelantan citizen. It is reported that, Kelantan is always entangle with the hygiene and cleanliness issue and it will affect the people perception about Malaysia and this is why this paper will focus on Kelantan State.

Literature review

Sustainable Tourism

Sustainability tourism can be define as maintaining the essential ecological process while make optimal use of environmental resources in fact, also helping to conserve the natural resources and the biodiversity (Denman, 2003).In order to gain the sustainability tourism, the aspect such as balancing the environmental, economical and socio-cultural should be achieved. The sustainable tourism need to consider the tourist and the visitor option while taking regard the current and future economical, social and environment impacts(PATA, 2002). The tourism industry is include in twelve priority sectors for integrating ASEAN countries by 2015 and it is due to the developed ASEAN Tourism Strategic Plan 2011-2015 which responsible in stimulating the sustainable tourism development.

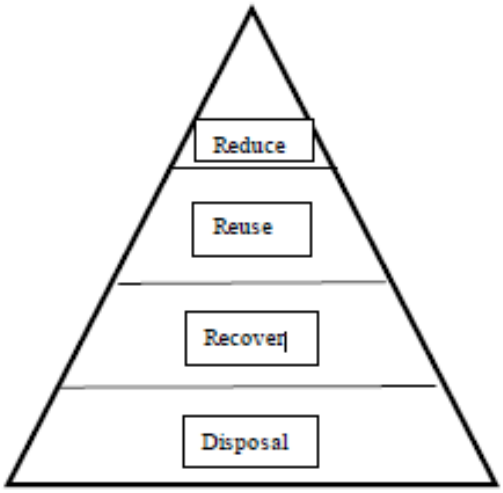
Malaysia is one of the twelve countries in the world that accepts the importance of preserving its social, environmental and cultural wealth heritage. There are many policies and acts which were formulated by the Malaysian Government (2015) that are favored to the environmental issues. For examples the Environmental Quality Order, 1987; National Parks Act, The Forestry Act, 1984, and the Protection of Wildlife Act 1972. These policies used as a guideline to develop a realistic sustainable tourism(PATA, 2002). The good implementation of sustainable tourism can guarantee the balancing in every aspects of natural environment, socioeconomy and community as well as managing the proper ways of the waste generation.

Waste Management

The waste management issue is not a new issue in Malaysia, especially Kelantan. Just like the other developing countries, Malaysia is facing the massive generation of waste and also additional problems with the disposal of waste (Lau, 2004). Kelantan is said to have the lower municipal solid waste is due demographic factors and facilities (Manaf, Samah, & Zukki, 2009).The number of waste generation is influenced by many factors including industrial, manufacture, economical and other internal development in the country. The Environment (EPA, 1990)defines waste as “any substance which constitutes scrap metal or an affluent or any unwanted substance arising from the application of a process or any substance which requires to be disposed of as being broken, worn out, contaminated or otherwise spoiled”.

The waste hierarchy for the strategy on waste was given by European Union (EU) to provide the best environmental options which have least impact on environment, and supports sustainable waste management (Webb, 2002). The figure showed the shape of the waste hierarchy regarding the reducing the waste until dispose the waste.

Figure 1.1: The Waste Hierarchy by European Union (EU)



Source: waste not wants not [12]

Best Practices in Waste Management

Accommodation

The characteristic of the waste from the accommodation to household waste is similar such as the diverse mix of materials including organic and hazardous material that can give rise to significant environmental impacts upon disposal (EEA, 2010). The packaging waste especially plastic and metals with high embodied energy often come from the accommodation and the restaurants (Eurostat, 2010). Usually, the tourism waste often varies seasonally and is generated at the sensitive littering area which put the pressure on waste management facilities during peak season and damaging high nature value resources. For example, the plastic waste in the sea and ocean threaten the whales, sea turtles and dolphin.
The waste management fall into four broad categories as below:(Styles, 2013)

1. **Reduce/ source reduction**: create as little waste possible by not producing it to begin with-implement green procurement, do not over-order, and select products with little packaging or returnable packaging.
2. **Reuse**: consider where certain items can be reused, sold or donated to others that can be use them
3. **Waste transformation**: sort out the waste and see if any of the waste can be transforming such as convert solid food waste to liquid waste.
4. **Recycle**: send sorted waste for recycling such as cupboard, glass, plastic and paper.

Camping Site

The camping is the outdoor activity which can lead to natural environment impact. According to the Oxford University Press 2013, camping can be defined as an outdoor activity which usually takes place in the nature. The camping people often used two or more spaces for rents and caravans in an area of land (Locke, 2008). The tourists usually provide their own accommodation facilities, such as tents and caravans including cooking amenities

and others. But some other camping site provides some additional services such as toilets facilities, sauna facilities and kitchen facilities (Cooper, 2008)

The impact of the camping is related to the transport to and from campsite, also the visitor disturbance of local biodiversity area (Cooper, 2008). The tourist may release the air pollution, GHG[1] emissions and energy from the transport (motor), cooking gas, and waste during their camping. Therefore, the best practices should be implementing at the campsite such as below:

1. **Environment education**: the tourist should be given the information and activities on local biodiversity control and protection, and also provision of local low carbon transport options like bicycle and electrical vehicles.
2. **Green area management**: the activity such as plant native species and install low impact lighting will help build the green area.
3. **Energy efficiency**: by installing efficient, automated low-energy lighting systems and use heat pumps and renewable energy is the best option to save the energy.
4. **Water efficiency**: using the reuse grey water[2] for toilet flushing and install efficient kitchen and laundry equipment will help to minimum the use of water.
5. **Waste minimization**: by separate all waste generated by campsite operation into recyclable fractions and provide facilities for collection and convenient separation of guest waste will make the waste is easy to manage and minimize it.

Discussion

Managing the right way of the waste can help development of the tourism industry for the country. The tourism industry in Malaysia is a develop industry which can gain more revenue to the country. Therefore, the sustainable tourism should be perfect and implement very well so that it will give the positive impact to the country. The natural environment should be preserve well and it is our responsible to take care and avoid any activities that can harm the environment. By implementing the basic rules and practices of the sustainable tourism and also the cooperation with other organization, our country sure can free waste issue. The waste issue only bring reputation to the country. The Ministry of Tourism should aggressively take any actions in order to continue the sustainable tourism in Malaysia.

Conclusion

As a conclusion, the sustainable tourism should be able to bring the profit and also be able to protect and maintain the resource of the tourism in order to keep the industry going for a long time. The issue such as waste must be overcome as soon as possible, so that it is not getting worse and affect the image of the country. The cooperation from the community, government, non-government organization and other parties are be able to resolve this kind of issue.

[1] The atmospheric **gases** that contribute to the **greenhouse** that effect by absorbing infrared radiation produced by solar warming of the Earth's surface. They include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO_2), and water vapour.
[2] Grey water is relatively clean waste water from baths, sinks, washing machines and other kitchen appliances.

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SIGNIFICANT FACTORS AND PREDICTION ON MALAYSIAN FILM VIEWERS USING MULTINOMIAL LOGISTIC REGRESSION

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Abstract: Lately, many researchers are interested in conducting data analysis with qualitative dependent variables involving more than two categories, known as Multinomial Logistic Regression (MLR). MLR model is a more appropriate model with regard to regression models since the categorical dependent variable is nominal with more than two levels.This paper presents a modelling approach using Multinomial Logistic Regression analysis on film viewers in Malaysia. It is a continuation of a Multiple Regression (MR) model and Multiple Binary Logistic (MBL) Regression where MLR models without interactions of independent variables were employed. The study was conducted to examine the significant factors based on the frequency of watching categories, such as 1) once or nil in a month, 2) twice a month, 3) three to four times in a month and 4) more than five times per month. From the frequency of watching categories (1, 2, 3 & 4), the frequency of watching more than five times per month (Cat 4) was referred to as the reference group, while the other categories had exhibited 255 models each.Statistical tests, modelling procedures and models' goodness-of-fit tests were carried out on a total of 765 models. In order to obtain a set of selected models (with significant variables), a progressive elimination (one by one, least significant first) of the insignificant variables is employed at phase 2 of model building procedures involving three types of tests namely NPC/NPM, multicollinearity and coefficient tests. It is also proposed to use pseudo R-square consisting of Cox & Snell, Nagelkerke and McFadden to finally single out the best model. The important findings highlighted in this study are the best model

validationusing the Mean Absolute Percentage Error (MAPE) and the method of how to estimate the missing values. Via the best models from each category, the model-building approach in Multinomial Logistic Regression analysis is established, and prediction using MAPE was done. Findings showed that the best models from all the respective categories (1, 2 & 3) had a common significant factor on the dependent variable. The results also showed that the best model from Cat 1 had the least MAPE (6.57%) thus indicated it was excellent to be used for prediction. Based on this, it is suggested that to attract more viewers, less films should be produced in a year, however, the allocated budget for film making should be focussed onproducing films which conformed to the identified significant factors that would attract more viewers. By using the best model, the number of film viewers can thus be predicted, and the expected revenue for the film industry can thus be estimated.

Keywords: Multinomial Logistic Regression (MLR), categories, significant factors, missing values, best model

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Introduction

Film has a unique cultural value because it is a universal medium, remarkably accessible and inclusive with its appeal traversing eras and intersection, national and phonetic boundaries. Besides being able to confront people with the real world, film also speaks to its imagination, can be informative and reveals essential truths about the human condition. Film also has immediacy and when viewed at the cinema provides an immersive experience, and is accessible. It has the ability to influence viewer's attitude and perception, especially to an avid viewer. They often use the word "obsession" to portray their association with film.For the avid viewers, cinema offers more than stories told in light and sound, seen once and soon forgotten. They are cinemagoers that frequently go to film celebrations and seasons, and are attracted to the silver screens with film as an integral part of their social life. The non-avid viewers, however seldom come to the cinema and usually based their interest on a certain type of movie or influenced by box-office movies. As for the avid viewers, it is common for them to cite a particular film as the formative influence on their development. This makes it interesting to do a systematic analysis of the perception of viewers and more so for the film industry in Malaysia. This study thus aspires to examine the significant factors that might have influenced the viewers' perceptions, thus contributing to the increase in the frequency of film viewing.

Literature review

According to Miller (1999), film had the ability to influence viewers' perception because it provided information and pseudo-experiences, particularly in the absence of an

individual's own experience. According to Kusumarasdyati (2004) and Luo (2004), film can catch the learners' interest, and it can positively affect students' motivation to learn. Dyna (2012)stated that many researches had been done, but none of the researchers were able to develop parsimonious consumer decision making model that explained cinema decision making process involving many factors. While Mustafa (2009) had studied that seven factors had helped the Egyptian audiences in determining their choice of films such as movie stars, directors, trailers, general advertising, word of mouth, movie genre and reviews, Mohammadian & Habibi (2012) had also discovered that four influential factors had attracted the Iranians to go to the cinemas; they werenamely, product, price, places and promotional factor.

Methodology

Modeling concepts of Multinomial Logistic Regression

In this study, mathematical modelling is employed to determine the factors that might influence viewers to go to cinemas. Logistic regression could be considered as a nonlinear regression(Kutner *et al.*, 2008). When there are only two categories of the dependent variable, multiple binary logistic (MBL) regression is regularly used rather than the discriminant analysis since there is a mixture of numerical and categorical independent variable(s). The logistic regression is easier to use because it includes procedures for generating the necessary dummy variables automatically, requires fewer assumptions and is more statistically robust. It is also necessary when the independent variables are categorical or a mix of continuous and categorical, and the dependent variable is categorical. It forms the best fitting equation or function using themaximum likelihood method which maximizes the probability of classifying the observed data into the appropriate category, given the regression coefficients.The multiple binary logistic (MBL) regression can be used wisely, especially when the dependent variable is qualitative, and is used to predict the binary response when the dependent variable is dichotomous. According to Halcousis (2005), the logit model is based on the cumulative logistic regression, and it will give the probability estimates that are bounded by 0 and 1. However, in this study, the Multinomial Logistic Regression (MLR) is used instead to analyze the significant factors on movie watching activities. The MLR model is a more appropriate model with regard to other regression models since the categorical dependent variable is nominal with more than two levels.

The general multinomial logistic regression model is given by: $Y_i = \Omega_0 + \Omega_1 W_1 + \Omega_2 W_2 + ... + \Omega_k W_k + u$ …(1) (Zainodin & Khuneswari, 2010) where 'Y_i' is the categorical dependent variable, 'W_j'denotes thej-th variable, 'Ω_0' is the constant term of the model, 'Ω_j' is j-th coefficient of independent variable Wj, for j=1,2, …, k, 'k' is thenumber of the single independent variables, (k+1) is the number of parameters, and 'u' is the error term, for j=1,2,…,k. This study was conducted to examine the significant factors based on the category frequency of viewing, Y_i, with i=1, 2, 3 & 4.

Data Preparation

This study had distributed 1337 questionnaires in several states within Malaysia namely Sabah, Sarawak, Johor, Selangor, Kedah and Pahang respectively with 647 male and 690 female respondents.The raw data collected were in the field of social science with regard to the frequency of film viewing by the cinema goers. Before any statistical analyses on the

raw data were carried out, data preparation were done that involved the process of cleaning and organizing the data, as shown in Figure 1. According to Noraini *et al.* (2015), data cleaningwas one of the prerequisites in statistical modelling to avoid biased and misinterpretation of the results. Next, factor analysis was used to examine the factors that influenced film audiences to become avid viewers. Factor analysis was an effective tool in reducing the dimensionality of a multivariate analysis (Bartholomew, 1980). Factors could be determined using factor analysis based on assumption that correlations were derived from scores that produced linear relationship (Child, 2006). Transformation into dummy variables of the independent variables was further performed before model-building procedures were carried out.

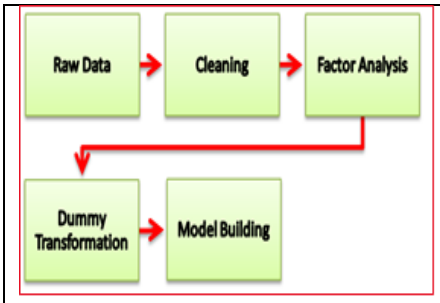
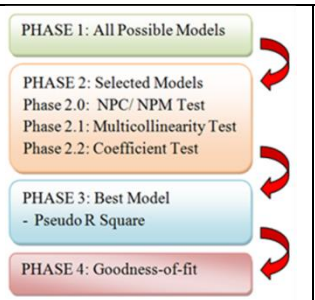


Figure 1: Data Preparation in Modeling Social Science Data



=>Number of all Possible models, $N = \sum_{j}^{q} {}^{q}C_{j}$

=>Model Labelling Ma.b.c
Ma = Full Parent Model
b = Variables removed in Multicollinearity Test
c = Variables eliminated in Coefficient Test

=>Best Model chosen based on the pseudo R-square
=>GOF tests:Pearson, Deviance &Likelihood Ratio Tests.

Figure 2: Summary of Four-Phase Model-Building Procedures in MLR models

Multinomial Logistic Regression Model-Building Procedures

Figure 2 depicted the summary of the Four-Phase Model-Building Procedures carried out in this study. Further explaination and illustration on the modelling procedures can be referredin:(Noraini *et al.*, 2016; Zainodin *et al.*, 2011; Diana *et al.* 2017). In this study, the multicollinearity test is based on the VIF approach (Zainodin *et al.*, 2015). The best model is chosen based on the pseudo R-square criteria, and finally the goodness-of-fit (GOF) tests were carried out on te best model to validify the model fitting for prediction and estimation.

Results and Discussions

The scree plot as shown in Figure 3, plotted the eigenvalues against the number of components. The components plotted above the red line, indicated that the eigenvalues had exceeded 1.0. The results from the scree plot suggested that the first two components with eigenvalues greater than one were chosen. Table 1 displayed the rotated component matrix. Eight categorical independent variables from both components that had the highest absolute value correlation greater than 0.50 were chosen for next step in the model building procedures.

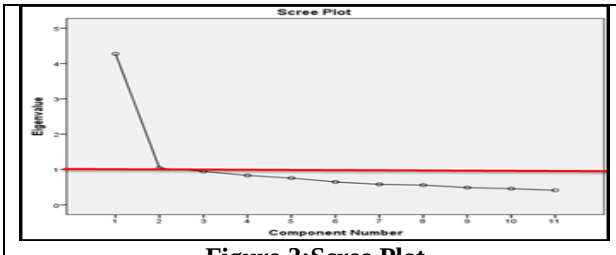


Figure 3:Scree Plot

Table 1: Rotated Component Matrix

	Component	
	1	2
Source of Information	.815	
Encouragement	.739	
Medium of Watching	.560	
Gratification	.442	.466
Film Production	.399	.301
Perception on Malay Film		.774
Public Perception		.635
Attraction	.374	.608
Theme	.395	.581
Genre	.490	.562
Showtime	.325	.478

Each category of the dependent variables was denoted as: Cat 1) once and never in a month, Cat 2) twice a month, Cat 3) three to four times in a month, and Cat 4) more than five times per month. The category of more than five times per month (Cat 4) was referred as the reference group. Factors on viewing activities were i) Encouragement, ii) Source of information, iii) Gratification, iv) Film Genre,v) Perception on Malaysian films, vi) Medium of Watching, vii) Film production, and viii) Attractions of Watching.Data transformation were then carried out resulting in 1277 samples, and further partitioned at 85% for modelling (n=1085), 10% for prediction (n=128), and 5% for estimating the missing values (n=64) using the best model. However, in this paper, only modelling procedures with prediction using Mean Average Prediction Error (MAPE) were illustrated.

After factor analysis and data transformation, 255 models were obtained from each category (1, 2 and 3) as shown bythe formula given as in (2), and in Table 2 below.

$$N = \sum_{j=1}^{g} ({}^{g}C_j) = ({}^{8}C_1) + ({}^{8}C_2) + ({}^{8}C_3) + ({}^{8}C_4) + ({}^{8}C_5) + ({}^{8}C_6) + ({}^{8}C_7) + ({}^{8}C_8) = 255\ Models \quad \text{.....(2)}$$

Table 2: Phase 1 on All Possible Models

Number of Independent Variables	1	2	3	4	5	6	7	8	Total	Models
Single Individual Variables	8	28	56	70	56	28	8	1	255	M1-M255

In this study, a total of 255 x 3=765 modelsfrom all the categories (1, 2 & 3). For illustration purposes,model M13 from category 1 was chosen. Phase 2.0 of the modelling procedures would show the removal ofthe near perfect colinearity (NPC) and near-perfect multicollinearity (NPM) from the model. Table 3 showed the Phase 2.0 of the NPC/NPM test with all the independent variables had R^2 less than 0.95, thus no highly correlated variable was removed at this phase. Next, Table 3 also showed Phase 2.1 of the multicollinearity test which had all the VIF values less than 5.0. Hence, no elimination of multicollinearity source variable/s was carried out. Further illustration can be referred in Diana *et al.(*2017).

Table 3: Phase 2.0-2.1 on Selected Models

PHASE 2.0

IV	R^2
D1	0.22122
D2	0.00921
D3	0.21014
D4	0.22402
D5	0.23529

PHASE 2.1

Model	Coefficients: Collinearity Statistics	
	Tolerance	VIF
D1	.779	1.284
D2	.991	1.009
D3	.790	1.266
D4	.776	1.289
D5	.765	1.308

Table 4 below showed Phase 2.2 of the Coefficient test of the selected model. The insignificant variable with the highest p-value was removed sequentially, until the variables that remained had p-values less than 0.05. According to Zainodin *et al.* (2011), with free from multicollinearity source variable and free from insignificant variable can be written as $M_{a.b.c}$, where 'm' denotes the model, 'a' denotes the number of parents model, 'b' denotes the number of variable removed due to multicollinearity and 'c' denotes the number of variables due to variable insignificance. The resulting model M13.0.10 was obtained after the multicollinearity test and the removal of 10 insignificant variables from the Coefficient test.

Table 4: Phase 2.2Coefficient Test on Selected Models

PHASE 2.2

Parameter Estimates

CAT 1ª	B	Std. Error	Wald	df	Sig.	Exp(B)
Intercept	.868	.145	36.005	1	.000	
D1	1.183	.210	31.729	1	.000	3.264
D2	.070	.153	.211	1	.646	1.073
D3	.004	.172	.001	1	.980	1.004
D4	-.003	.167	.000	1	.986	.997
D5	.137	.196	.490	1	.484	1.146

Parameter Estimates

CAT 1ª	B	Std. Error	Wald	df	Sig.	Exp(B)
Intercept	.867	.137	39.828	1	.000	
D1	1.183	.208	32.178	1	.000	3.263
D2	.071	.153	.211	1	.646	1.073
D3	.003	.166	.000	1	.984	1.003
D5	.136	.191	.507	1	.476	1.146

Parameter Estimates

CAT 1ª	B	Std. Error	Wald	df	Sig.	Exp(B)
Intercept	.868	.127	46.447	1	.000	
D1	1.183	.205	33.415	1	.000	3.266
D2	.070	.153	.212	1	.646	1.073
D5	.137	.187	.534	1	.465	1.146

Parameter Estimates

CAT 1ª	B	Std. Error	Wald	df	Sig.	Exp(B)
Intercept	.911	.088	106.249	1	.000	
D1	1.188	.205	33.669	1	.000	3.279
D5	.134	.187	.515	1	.473	1.144

Parameter Estimates

CAT 1ª	B	Std. Error	Wald	df	Sig.	Exp(B)
Intercept	.934	.083	127.689	1	.000	
D1	1.239	.192	41.574	1	.000	3.453

Subsequent removal processes of insignificant variables were performed until all the variables that remained in the model had their p-values less than 0.05. Category 1 had thus obtained 42 selected models before proceeding to Phase 3 of the model-building procedures.

Table 5: The corresponding selection criteria based on Pseudo R-square Category 1

NP	Model	Selected Model	(k+1)	*Cox and Snell* R^2	*Nagelkerke* R^2	*McFadden* R^2
6	M1	M1.0.4	2	0.0450	0.0689	0.0435
6	M2	M2.0.4	2	0.0078	0.0119	0.0074
↓	↓	↓	↓	↓	↓	↓
12	M15	M15.0.9	3	0.0562	0.0861	0.0546
↓	↓	↓	↓	↓	↓	↓
17	M75	M75.0.9	8	0.0777	0.1189	0.0763
↓	↓	↓	↓	↓	↓	0.0951
22	M100	M100.0.15	7	0.1066	0.1632	0.1064
↓	↓	↓	↓	↓	↓	↓
23	M134	M134.0.14	9	0.0616	0.0942	0.0600
↓	↓	↓	↓	↓	↓	↓
29	M175	M175.0.21	8	0.0893	0.1368	0.0884
↓	↓	↓	↓	↓	↓	↓
29	M200	M200.0.19	10	0.0743	0.1137	0.0729
↓	↓	↓	↓	↓	↓	↓
36	M240	M240.0.23	13	0.1105	0.1692	0.1106
41	M247	M247.0.28	13	0.1364	0.2088	0.1385
42	M253	M253.0.30	12	0.1172	0.1793	0.1176
			Maximum	0.1364	0.2088	0.1385

The best model was chosen based on the model that having the majority maximum value of pseudo Rsquare, namely,criteria based onCox & Snell, Nagelkerke and McFadden. Results in Table 5 showed that model M247.0.28 was chosen as the best model from category 1 where it had the maximum values of the pseudo R-square criteria. The factors of the best models from Category 2 and 3 respectively are shown in Table 6 below.

Table 6: Best Models From Category 1, 2 and 3

Category	Best Model From All Categories
1	M247.0.28 : Y_1= f(D_1, S_4, M_1, M_2, M_3, K_5, P_2, P_4, P_6, G_1, T_1, T_5)
2	M250.0.26 : Y_2= f(D_1, D_3, D_5, S_3, S_4, S_5, M_1, M_2, M_3, K_5, G_6, G_8, T_5, F_3)
3	M14.0.6 : Y_3= f(D_1, T_1, T_3, T_5)

The common significant factors ofthe MLR best models (Table 6- highlighted in green) were from Encouragement-Interest (D_1), and Attractions of Watching-Friends

Influence (T_5) categories.Goodness-of-fit (GOF) was be carried out to examine the goodness or appropriateness of the best model in fitting the data. The Pearson and Deviance Test were used to check the goodness-of-fit for the best model M247.0.28 from category 1. The Deviance statistics(670.1612) test carried out with significant p-value of 0.1837 ($p>0.05$) had shown that model M247.0.28 is an appropriate model. The likelihood ratio test carried out on all the factors in the best model also showed that they were significant with p-values less than 0.05. Finally, the MAPE of each best model from the 3 categories were calculated and compared. It can be seen below that model from category 1 is the best to be used for prediction of the film viewers.

MAPE (%): category 1= $\frac{1}{128}\left(\sum\left|\frac{A_t-F_t}{A_t}\right|\right) = \frac{8.4109}{128} = 0.0657 = 6.57\%$

MAPE (%) : category 2= $\frac{1}{128}\left(\sum\left|\frac{A_t-F_t}{A_t}\right|\right) = \frac{11.0285}{128} = 0.0862 = 8.62\%$

MAPE (%) : category 3= $\frac{1}{128}\left(\sum\left|\frac{A_t-F_t}{A_t}\right|\right) = \frac{30.4706}{128} = 0.2381 = 23.81\%$

Conclusion

Mathematical modelling concepts and procedures using multinomial logistic regressions (MLR)had determined the significant factors that influenced film viewers via their frequencies to the cinemas. The most significant factors were found to be from encouragement-interest category and attraction of watching-influence from friends category. Thus, these implied that more encouragement due to interest and friends would lead to higher frequency of avid viewers going to cinemas. In addition, this study also found that the source of informationfrom newspapers and magazines, through advertisements in cinemas, internet and television, besides genre of theme and action with the in-flux of Hindi and Korean films had contributed film viewers to frequentthe cinemas. Thus, it can be suggested to the Malaysian film producers to focus on these factors towards producing high quality films of the Malaysian context, hence, further projecting an increase in the number of viewers and expected revenues from the film industry.

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TRAFFIC CONGESTION PROBLEM IN KOTA KINABALU, SABAH USING FORD-FULKERSON ALGORITHM AND MAX FLOW-MIN CUT THEOREM

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Abstract: *Traffic congestion is a major urban transportation problem in operation management which occurs when the traffic volume exceed the capacity of existing road facilities. The occurrence of traffic congestion is due to the freedom of owning private vehicle, poor traffic facilities and unrestricted urban population growth. In this study, identification of maximum flow and bottleneck paths in Kota Kinabalu, Sabah, Malaysia was carried out. The scope of this study was a network within the Central Business District of Kota Kinabalu. All the possible routes from source to sink will be established. In terms of data collection, manual traffic count was used with the help of video recording. Ford & Fulkerson Algorithm was applied to find out the maximum flow. In addition, the max-flow and min-cut theorem was used to determine the bottleneck paths of the network. Thus, this findings would allow the traffic engineers together with city planners to decide which roadways facilities should be improved in order to minimize the traffic congestion problem.*

Keywords: Operation management, transportation, maximal flow, bottlenecks, minimize congestion

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Introduction

Traffic congestion is a major urban transportation problem which occurs when the number of traffic exceed the capacity of existing road facilities. Traffic Congestion can be an urban mobility problem which affects the economic productivity and the overall quality of life for many people. The occurring of traffic congestion is due to the freedom of owning private vehicle and unrestricted urban population growth. Traffic congestion can be categories into two types which are recurring congestion and non-recurring congestion. Recurring congestion is known as peak hour traffic congestion which is used to happen in the area of Central Business District (CBD). Besides, Non-recurring congestion is caused by any number of unexpected events which slow the traffic flow (McGoarty, 2010). The occurring of non-recurring congestion was due to the accidents, road maintenance, road closure for events and natural disasters. Non-recurring congestion is a problem which is quite hard to handle because it was unpredictable. The happening of the non-recurring congestion may cause the temporary closure of roadway and reduce of roadway capacity. The decrement of road capacity will result in the decrease of maximal traffic flow and slow the traffic vehicle's speed dramatically. The scope of this study is the network which Masjid Bandaraya Kota

Kinabalu set as source and the Kampung Air set as the sink. All the possible routes from source to sink will be established. The reason of selecting the routes between Masjid Bandaraya to Kampung Air is the central business district for Kota Kinabalu is in between them. The demand of traffic and the chances of occurring traffic congestion in the selected scope of study were higher than other locations. After the capacitated network formed, the maximal flow will be computed by using Ford-Fulkerson algorithm. Next, the max-flow and min-cut theorem will be used to determine the minimum cut value and the bottleneck path of anetwork. It allows traffic engineer to decide which roadways facilities should be improved. Lastly, the routes with low traffic congestionwas identifiedand classified as alternate routes for drivers. The improvement for the bottleneck path shouldput into practice which allows traffic goes smoothly. The main objective of this study is to find out the maximum flow and identify bottleneck path from Masjid Bandarayato Kampung Air in Kota Kinabalu.

Literature review

Suresh &Umadevi (2014) stated the fundamental details of traffic flow and several methods of estimation of capacity for Indian urban road. The major types of estimation can be classified under two broad categories as Direct Empirical Methods and Indirect Empirical (Simulation) Methods. Due to the complexity and high volume of traffic on Indian urban roads, it is appropriate to model the flow parameters and adapt direct empirical methods for estimation of capacity. The direct empirical methods using the observed fundamental traffic characteristics like Headway, volume and speed for capacity estimation by three methods which are Headway method, Observed volume method and Fundamental diagram method. Even the headway method was able to achieve the highest capacity estimation, but all three methods still need to be done and compared for achieving the best value.

Moore *et al.* (2013) studied the maximum flow in road networks with speed dependent capacities application to Bangkok traffic. A traffic flow problem takes edge weights represent road capacities (maximum vehicles per hour) that are functions of the traffic speed (kilometer per hour) and traffic density (vehicles per kilometer). To estimate road capacities for a given speed, empirical data on safe vehicle separations for a given speed are used. A modified version of the Ford-Fulkerson algorithm is developed to solve maximum flow problems with speed-dependent capacities, with multiple source and target nodes. It was found that the maximum safe traffic flow occurs at a speed of 30 km/hr.

Baruah (2013) presented applied minimum cut maximum flow using cut set of a weighted graph to the traffic flow. A weighted graph is a resulting graph with a real number which serves as a structural model in transportation. The traffic control strategy of minimal cut and maximum flow is to minimize number of edges in network and maximum capacity of vehicles which can move through these edges. With a minimal cut in the traffic network, it allows to minimize the waiting time of traffic participants for a smooth and uncongested traffic flow.

Methodology

A network graph $G = (V, E)$ was formulated with all the edges.Each edgeof the network graph has a non-negative capacity,$c(u, v) \geq 0$. $f(u, v)$ will be the flow. $s$nodewill be the source node and$t$ node will be the sink node. Before compute maximal flow using

ford-fulkerson algorithm, a capacitated network must fulfill the conditions below: First, the flow of the edges must not exceed its own capacity, $\forall(u,v) \in Ef(u,v) \leq c(u,v)$. Then the net flow from u to v and from v to u must be opposite to each other, $\forall u,v \in V, f(u,v) = -f(v,u)$. Next,the net flow to a node is zero except source node and sink node, $\forall u \in V: u \neq sandu \neq t \Longrightarrow \sum_{w \in V} f(u,w) = 0$. Lastly,the flow from the source node must be equal to the flow at the sink node $\sum_{(s,u)\in E} f(s,u) = \sum_{(v,t)\in E} f(v,t)$.

Ford-fulkerson algorithm can be considered as a greedy algorithm. The step of the algorithm starts with f(e)=0 for all the edges, e ∈ E. Then find a path P from the start node to the end node where each edge has f(e)<c(e). Next, the augmentation of the flow along the path P is performed. Repeat the step until the capacity of the sink node reaches maximum.

The max-flow min-cut theorem states that the maximum amount of flow that passes through from source node to sink node is equal to the total weight of the edges in minimum cut(Goldberg and Tarjan, 2014). This is given by the following algorithm:$Max\ \{val(f)\ ;\ fisaflow\} = min\{cap(S);\ sisan\ (s,t) - cut\}$.

Results and Analysis

Study Site and Data collection

In this study, the needed data was the volume of vehicle. Therefore, the traffic volume count should be performed at the selected intersection or roadway. There are two different methods to conduct the traffic volume counts which are manual counts and automatic counts. Due to the cost and budget, manual traffic count was being selected as the most suitable method compare to automatic count. The tools that were needed for manual traffic counts are tally sheet, stopwatch, paper and pen. The most common method of collecting traffic volume data is the manual method of traffic volume count, which involves a group of people recording number of vehicles passing, on a pre-determined location, using tally marks in inventories (Bharadwaj*et al.*, 2016). Besides, the traffic data collection involved different time intervals like hourly, daily, or annually. The data was collected in hourly so that it matches with the roadway capacity estimation method. Since the data was collected in hourly mode, a particular time intervals was chosen to collect traffic data in order to get a higher accuracy data. The chosen time interval is the peak hour in the morning of weekdays instead of weekends. The peak hour in the morning which is around 7am to 8 am was the most suitable time because of high volume of traffic. Suppose that the data was collected on spot with tally sheet and pen but it was changed to video shooting due to the problem of accuracy of the data. Hence, the data was collected through video clips by using a camera with a tripod stand. The camera was mounted on the tripod stand and located it at a high place just to have a wide and clear view. The video clips with replay function allow the collected data to be review again.

There are several methods to estimate the roadway capacity. The methods are categorized into direct empirical method and indirect empirical method (Suresh &Umadevi, 2014). The data that needed for the method that just mentioned are roadway width, traffic volume, headway, speed and density. The direct empirical method makes use of observed data to estimate the capacity directly. However, in the case of indirect empirical method will use the observed data and some computer software to run the simulation which involves complex simulation models. The estimated capacity by simulation model might not be accurate. Therefore, the direct empirical methods were being selected in this study due to less

cost, easy performing and come with better accurate results of estimated capacity. There are three approaches in direct empirical methods which are headways approach, volume approach and fundamental diagram approach. Among those approaches, volume approach was chosen as the main approach to estimate capacity of the selected roadway. The estimation of capacity by volume approach was making use of Passenger Car Unit (PCU) value in Table 1 and composition of traffic in Table 2 to calculate the total capacity in PCU (Hamsa, 2013).

Table 1: Passenger Car Unit (PCU) value for Urban Road

Class of vehicles	Urban Road PCU value
Car, Taxi, Light Goods Vehicle (LGV)	1.00
Motorcycle, Scooter	0.75
Medium Goods Vehicle (MGV) or Heavy Goods Vehicle (HGV)	2.00
Bus, Truck	3.00

In Table 1, the PCU values for different categories of vehicle were displayed by referring to the Urban Traffic System (Hamsa, 2013). The estimation of capacity by volume approach was making use of Passenger Car Unit (PCU) value in Table 1 and composition of traffic in Table 2 to calculate the total capacity of the selected locations in PCU.

Table 2: Composition of Traffic (Max Flow in 5 minutes interval)

No	Location name	From	To	Car	Motocycle	MVG & HGV	Bus & Truck
1	Jalan Tun Fuad Stephen 1	s	V_1	171	39	7	6
2	Jalan Pasir	s	V_2	114	18	9	10
3	Jalan Tun Fuad Stephen 2	V_1	V_5	173	32	10	1
4	JalanTuaran 1	V_2	V_3	162	28	11	5
5	Jalan Kompleks Sukan and Jalan Bunga Nasar	V_3	V_4	114	5	2	3
6	Jalan Kompleks Sukan and Jalan Bunga Nasar	V_4	V_3	56	11	3	0
7	Jalan Istiadat	V_4	V_1	58	15	2	3
8	Jalan Istiadat	V_1	V_4	50	8	3	3
9	Jalan Tuaran 2	V_3	V_6	130	19	3	2
10	Jalan K.K Bypass	V_5	V_7	90	18	2	3
11	Jalan Tuaran 3	V_6	V_9	169	13	19	5
12	JalanTunku Abdul Rahman 1	V_7	V_8	57	20	2	3
13	JalanTunku Abdul Rahman 2	V_8	V_9	62	12	3	6
14	Jalan Kemajuan	V_9	V_{10}	153	32	8	6
15	Jalan Laiman Diki	V_7	t	91	21	4	2
16	Jalan Coastal	V_{10}	t	81	9	4	0

In Table 2, different nodes were being assigned to the selected path from source node to the sink node. Each of the selected paths with the composition of different category of vehicles was displayed. Vehicle counts were classified as cars, motorcycles, Large Goods Vehicle (LGV) and Medium Goods Vehicle (MGV) and buses and trucks. The composition of traffic in Table 2 was the maximum flow in 5 minutes interval of the peak hour in the morning.

In volume approach, selected maxima model will be implied to estimate capacity. The flows in each 5 minute time intervals were extracted from the peak hour in the morning. A five minute interval with maximum flow was identified. This peak flow rate is multiplied by 12 in order to get the estimated capacity per hour. Similar steps was done for other locations

and displayed in Table 3. The maximum capacity obtained by this method was 2913 PCU and the minimum capacity obtained was 843 PCU.

Table 3: Capacity estimation using Selected Maxima Model of the selected locations (5 min time slice)

Location No	Max Flow in 5 Minutes in PCU	Total Capacity in PCU
1	226.25	2715
2	175.5	2106
3	220	2640
4	242.75	2913
5	130.75	1569
6	70.25	843
7	82.25	987
8	74	888
9	156.25	1875
10	118.5	1422
11	231.75	2781
12	87	1044
13	95	1140
14	211	2532
15	120.75	1449
16	95.75	1149

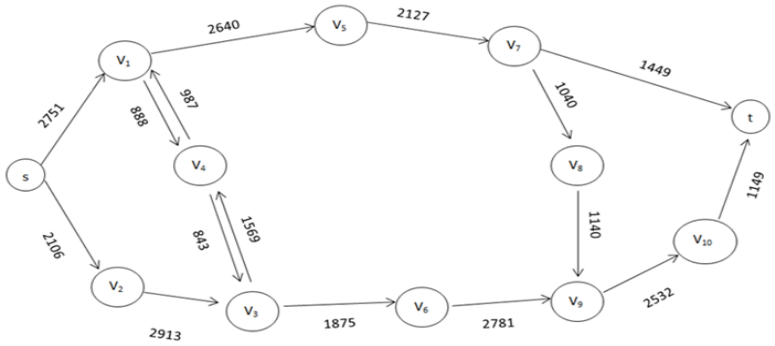

Figure 1: Network graph with estimated capacity

Figure 1 showed a network graph from source node (Masjid Bandaraya Kota Kinabalu) to sink node (Kampung Air Kota Kinabalu) with the estimated capacity from Table 3.

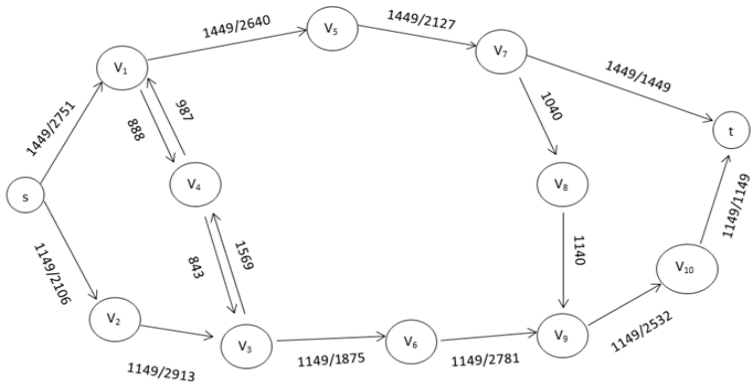

Figure 2: Network Flow after Ford-Fulkerson Method

The total maximum flow value is 2598 of vehicle per hour. The first route was from s→V1→V5→V7→t which carries a maximum flow of 1449 vehicles per hour. The second route is froms→V2→V3→V6→V9→V10→t.

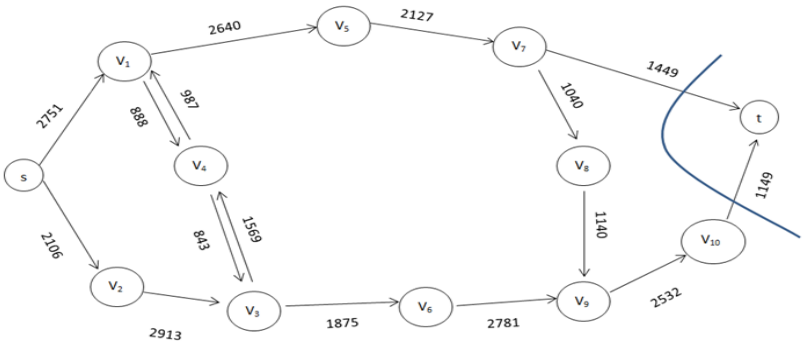

Figure 3: Minimum cut on the network flow

The cut capacity and the sum of the capacities of its arcs are the same. Bottleneck capacity which is the minimum residual capacity of any edge in P. The cut with the smallest capacity gives the maximum flow in the capacitated network. From Figure 3, the blue line stands for the minimum cut with the smallest capacity which is the same as the maximum flow that is computed by Ford-fulkerson method. The bottleneck routes of the network in Figure 1 are Jalan Laiman Diki and Jalan Coastal. Traffic planar should take the bottleneck paths as one of the consideration to minimize the traffic congestion.

Conclusion

A capacitated network the maximum flow for the selected scope of this study is 2598vehicles per hour. Moreover, the traffic planar should take concern on the bottleneck paths like Jalan Coastal and JalanLaimanDiki. However, the traffic volume might change from time to time. Therefore, the capacity in this study will not be constant all the time. Besides, a further research is required especially on capacity estimation of vehicles. There are some data like speed, width of the road and others that are still not yet included in estimating the capacity.

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INDICATORS FOR CRITICAL SUCCESS FACTORS FOR KNOWLEDGE TRANSFER VIA AUSTRALIAN GOVERNMENT WEBSITE FROM KNOWLEDGE MANAGEMENT, CUSTOMER SERVICE AND WEB-BASED SELF-SERVICE LITERATURE

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Abstract: *This paper presents and discusses the indicators for critical success factors (CSFs) for knowledge transfer (KT) via an Australian government website. The indicators are based from knowledge management (KM), customer service (CS) and web-based self-service (WSS) literature. The research explores CSFs from a case study at Department of Education in Australia that is known as AUSED from the perspective of provider. This study employed interpretive case study with qualitative methods. Primary data derived from interviews with nine government officers that are involved in the development and management of government website. Qualitative content analysis by inductive approach was used as analysis technique. From the analysis, 11 CSFs were identified. These CSFs were then being grouped into six themes, namely management role, user focus, employee focus, content focus, technology focus and organisational culture. Then these CSFs were being validated in a focus group to finalise the CSFs for knowledge transfer via Australian government website. This study used a single study of one government agency in Australia. Therefore, the result may not be applicable to other government departments due to differences of business areas. Nevertheless, this study produces a list of CSFs for strategic management in government agency to consider for development and management of government website. The list might lead towards a best guideline for knowledge transfer to happen via government website.*

Keywords: Critical Success Factors, Knowledge Transfer, Knowledge Management, Customer Service, Web-Based Self-Service

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Introduction

The aim of this paper is to present the indicators for critical success factors (CSFs) for knowledge transfer (KT) via an Australian government education website, from the

perspective of provider. The indicators are based from KM, customer service (CS) and web-based self-service (WSS) literature. The research explores CSFs from a case study at Department of Education in Australia that is known as AUSED.In this research CSFs are defined as "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation" (Rockart, 1979, p. 5).The structure of this paper is as follows: the next sections briefly discuss the definition of e-government, knowledge and KT used for this research context. The subsequent sections discuss the research methods used, for data capture and analysis. The penultimate sections reports and discusses the key findings; followed by a short conclusion that explores the significance of the results and possible further work.

For the purpose of this research, the definition of e-government as follows, the utilisation of the Internet particularly website to improve and enhance government operations (Benefit view), to disseminate government information and services (Service view), to acquire knowledge through website (Objective view) and to establish relationship between governments and their stakeholders particularly citizens, employees, business sectors and government agencies (Relational view).This research adapted Szulanski (2000) intra-organisational KT model to identify CSFs for KT via government website. This model has been chosen because it is well accepted and recognised among the researchers.Szulanski (2000) intra-organisational KT model consists of four stages, namely initiation, implementation, ramp-up and integration.

The following paragraph explains potential CSFs for KT via government website. These potential CSFs are the indicators from the three associated concepts that are related to e-government which is KM, CS and WSS. It is important to note that these potential CSFs are only the working indicators that may underpin KT success via government website. The identified CSFs for this research were inductively derived from the empirical work.

Knowledge management (KM) as discussed previously is important in e-government (Allahawiah&Alsaraireh, 2014). The following are the potential CSFs from the KM literature. **Awareness and notification:**Casalino (2014) describes that users should take the initiative to be aware of the organisation knowledge and be willing to institutionalise it. **User focus:** Phusavat and Anussornnitisarn (2008) report that there are several basic services that are critical and constantly needed by citizens such as identification or ID cards, copies of household certificates, updating of household members about births, deaths, and move-ins, marriage certificates and others basic services. **Presentation of knowledge:**Traunmuller and Orthofer (2007) recognise standardisation of the website is one ways to enhance the performance of the website including establishing a common understanding of processes, building on widespread administrative concepts, ensuring interoperable platforms, having administrative domain ontology, defining formats for data interchange and other types of standardisation. **Content:**Casalino (2014)noted that the organisation should exercise care to ensure that the knowledge are available to the knowledge consumers, whenever and wherever they want. **Accessibility:**Casalino (2014)noted that the knowledge assets should be stored in an electronic medium so as to enable efficient and faster access and retrieval. **Information Communication and Technology (ICT) infrastructure:**Casalino (2014)describes that the organisation should take seriously consideration about the technology in terms of the computing devices, network infrastructure and system software tools that will best fulfil the users' need in order to access the knowledge resources, establish an organisation-wide intranet that offers extensive communicating and collaboration capabilities and ensure that processes and events that relate directly or indirectly to the organisation's strategic direction are automated as computer-based information systems. **Leadership:**Kolsaker and Lee-Kelly

(2007) state that management role in the organisation is important to implement the objectives of the organisation. **Education, training and knowledge sharing:**Casalino (2014)contend that sharing knowledge among the employees is one of the important elements in the electronic KM framework for government organisation. **Employee focus:**Smith (2008) describes that human resource division should match work participant qualifications with requirements of process work tasks and determined by the work participant role model for smooth process execution in an administrative environment. **Interactive platform:**Casalino (2014)outlines that tacit knowledge is best shared through dialogue such as e-mail, discussion groups, expert locators, chat rooms, e-learning through online seminars and virtual classrooms, audio and videoconferencing links and other virtual collaborative workspace. **Attitude and change management:**Casalino (2014)promotes that provider needs to constantly scan the environment for potential opportunities and threats so that the organisation is fully prepared to exploit the entire situation to its advantage, administer and maintain the KM portal and its contents so that it is fully geared to meet the demands of users. **Security:**Smith (2008) assert that policy formulation, legal drafting and evaluation of policies are vital in the whole governance cycle.

Governments begin to view their citizens as customer by utilising the ICT to develop their national websites to have the necessary tools to meet their citizens' needs (United Nations, 2008). By doing this, government has improved the customer service and increased the satisfaction of customers (Al-Mashari, 2007). Although this study is not going to evaluate service quality on government website, the criteria discuss in this section may be useful since users are expecting to receive quality services from government through website (Allahawiah&Alsaraireh, 2014). The following are the potential CSFs from the customer service literature. **Awareness and notification:**Casalino (2014)describe that users prefer to receive notification services from the website for any information updates. **Usability:**Casalino (2014)believe that usability issues which include how a user perceives and interacts with a website, easy navigation, appropriate design and creates a positive experience for userare important in designing a website. **User focus:**Lockett et al. (2008) mentioned that customers are expected business processes to be aligned to the delivery of the customer-centric promises, such as guaranteed service levels, creativity and convenience.**Presentation of knowledge:** Hu et al. (2009) stated that website design is one of the determinants of service quality and continuance intention of online services. **Content:**Nadjib Usman et al. (2014)report that government agencies have the obligation to transfer government information to users. **Accessibility:**Lawson-Body et al. (2014) claim that lack of accessibility features on the website such as late e-mail response create frustration to users. **ICT infrastructure:**Lockett et al. (2008)contend that ICT infrastructure can improve CRM performance. **Leadership:**Trivellas and Dargenidou (2009) noted that a leader can play role as a director and coordinator in order to provide quality services. **User ICT literacy:**Lockett et al. (2008)believe that skills of the employees are one of the drivers for the CRM readiness for e-government.**Education, training and knowledge sharing:**Hu et al. (2009) reveal that manual can assist users with data entry and processing, eliminate human errors and reduce the turnaround time for processing, hence increase the service quality and the continuance intention of online services. **Employee focus:** The results of the study by Siddiquee (2008) conclude that in the emerging of the technology, Malaysia has introduced several programs in an attempt to address critical challenge of manpower needs.**Interactive platform:**Lockett et al. (2008)mention that customers are encouraged to participate in steering committees and supervisory or advisory boards in order to design the website for meeting customers and businesses' needs. **Attitude and change management:** According to

Lockett et al. (2008)working as teamwork is important. **Security:**Hu et al. (2009) stated that security can influence users' perception towards online service quality.

Different based of organisations have make use of the ICT and move their operations to the web to provide services to users. According to Yu et al. (2008) web services are expected to become the key technology to provide services through the web. Cooper et al. (2006) state that web-based self-service (WSS) is a key type of network-based customer service system (NCSS). Nadjib Usman et al. (2014)also assert that WSS can provide customers to access to organisation's support knowledge directly through the internet. In the context of e-government, one-stop government portal has served as WSS for users to access government information and services Reddick (2009). By providing WSS to users, government is improving the relationship with users (Schedler&Summermatter, 2007), enhancing customer service and the effectiveness of government operations while reducing costs Goh et al. (2008). The following are the potential CSFs from the WSS literature. **Awareness and notification:** Communications with key stakeholders, especially the media, and the management of public and media awareness is important in order to motivate users to use the website (Cullen, 2008). **Usability:** Study by Cooper et al. (2006)found that usability for WSS includes navigation and search. **User focus:**Lawson-Body et al. (2014)propose taxonomy of customers' needs amenable to online fulfilment such as knowledge of company about their services offered, new articles, company background, stock information and other information about the company, knowledge about the products and services offered, catalogues, membership services, new products, frequently asked questions (FAQs) and other information about the services. **Presentation of knowledge:**Cullen (2008) promotes online form design that can ease users and to encourage completion includes a single scrolling page, with minimal graphics, reduce download times and support dial-up access. **Content:**Cooper et al. (2006)mention that high quality content in the knowledge base is needed for WSS success.**Accessibility:**Lawson-Body et al. (2014)recognise site navigation is an important aspect for website accessibility because users need to conveniently find the sought information on the company website. **ICT infrastructure:**Research by United Nations (2008) found that government should provide an infrastructure both within the public sector and across society at large, one based upon reliable and affordable internet connectivity for citizens, businesses and all stakeholders in a given jurisdiction. **Leadership:**Cooper et al. (2006) report that top management support is always important in any strategic organisational initiative. **Education, training and knowledge sharing:**Cullen (2008) mentions that in order KM and knowledge sharing are going to be practiced by the staff, it must start from the top level of the management. **Employee focus:**Cooper et al. (2006) state that management should provide training to support agent in order to promote knowledge transfer and reuse and improve productivity.**Attitude and change management:**Research by United Nations (2008) found that codes of conduct are a formal documentation in the organisation which identifies values and beliefs held within an organisation that governing behaviour. **Security:**Cooper et al. (2006)claim that website provider needs to secure system and data privacy.

Research design

The concept of "success factor" was first discussed by Daniel (1961) in the management literature. It was Rockart (1979) however who first developed a methodology to elicit CSFs. Rockart (1979, p. 5) defines a CSF as "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the

organisation". This research adapted the CSF method which consists of an introductory workshop, one-to-one interviews and a focus group. The case site for this research is the Department of Education in Australia that is called AUSED. The researcher provided to AUSED with the background of the research and interviewed nine participants. The participants are the staff that are involved in the development and management of Australian government website including top, middle and operational management level across the department. The interview transcripts were analysed by using inductive qualitative content analysis(Elo&Kyngas, 2008).

Result

From the one-to-one interviews, participants identified 11 CSFs for KT via Australian government website. Four themes were emerged from the categories, namely management role, user focus, content focus, and technology focus. Then, the CSFs were validated in a focus group. Refer to Table 1 for the final list of the CSFs for KT via Australian government website.

Table 1: CSFs for KT via Australian government website

CSFs AUSED
Management role theme
• Governance
User focus theme
• Awareness and notification
• Usability: Functionality and navigation
• User focus: Understand needs of recipient
• Presentation of knowledge
• User positive experience
Content focus theme
• Content
• Knowledge storage and retrieval: Architecture
Technology focus theme
• Accessibility
• ICT infrastructure: Awareness of users' technology availability
• Search engine

Conclusion

This paper presents the CSFs for knowledge transfer via Australian government website. The CSFs identified contribute to building an understanding of the principles underpinning the delivery of successful government website. Furthermore, the CSFs provide useful guidance for strategic management at other government agencies to consider for ongoing development and management of government website. The CSFs may also become the factor towards the best guideline for KT to happen via government website.Nevertheless, this research used a single study of one government agency in Australia which the result may not be generalised. This result set as a foundation for the research in phase two that is currently on-going which is the integration of naqli and aqli in knowledge transfer researchers.The result of that research will be the subject for future publication.

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SATISFACTION FACTORS ON OPERATIONAL DECISION MAKING IN EMERGENCY MEDICAL SERVICE: A CASE STUDY IN KOTA KINABALU, SABAH

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Abstract: *Effectiveness of emergency medical services (EMS) depends on a wide range of decision making, planning and operational phases, such as ambulance locations and dispatching protocols.Patients' satisfaction is an important indicator of the quality of care and service delivery in the Emergency and Trauma Department (ETD). The objective of the study was to evaluate patients' satisfaction factors towards ambulance and ETD services provided by Sabah Women And Children's Hospital (SWACH). This study was carried out using questionnaires as instrument, adopted from two journals which was Patients' Perception of Ambulance Services at Hospital University Sains Malaysia, and Emergency Department Patients' Satisfaction Survey in Imam Reza Hospital, Tabriz, Iran. Descriptive and analytical statistics were used throughout for data analysis using SPSS version 22. Fifty respondents answered the questionnaires, giving an alpha cronbach of 0.973 which indicated excellent reliability. The highest satisfaction factor obtained was in response time of ambulance to an emergency (in ambulance response time) with mean statistic 2.78, most of patients had good perception of ambulance service where it showed mean of 2.58, level of competency of staff with mean 2.56, while adequacy of explanation by staff of their actions and efficiency of staff had mean of 2.54; in terms of vehicle, patients were more satisfied in comfort of ride in the ambulances, and adequacy of ambulance equipment with mean statistics 2.48. However, patients' satisfaction with the comfort and pleasantness of the waiting area was with mean 2.58, care provider's efforts to include you in decisions about your treatment with mean 2.58, the most satisfied factor was the amount of time the care provider spent with you with mean statistics 2.78, and overall cleanliness of the care provider practice with mean 2.58. As a conclusion, the findings of this study had indicated the need for evidence-based interventions in emergency care services in comfort and pleasantness during examination, explanations the care provider gave and frequency of being visited by physicians. In addition, results also indicated the need for evidence-based interventions in ambulance on the aspects, like cleanliness of the ambulances, gentleness of staff, feeling of safety when staff arrive, professional look of staff, availability of staff at the times and speed of admittance to hospital. Thus, further research can been conducted on EMS design and operational decision making in order to improve the quality of EMS systems.*

Keywords: Emergency medical services, satisfaction factors, patient perception, interventions, operational decision-making.

Introduction

In Malaysia, the emergency medical and trauma services (EMTS) is divided into two parts which are ambulance services or pre-hospital care and emergency department. Emergency medical and trauma services (EMTS) is significant to support emergency and accident cases to promote early recovery, prevent serious complications and ensuring quality health care (National Audit Department Malaysia, 2012). There were a few types of ambulance services in Malaysia which were land ambulance, air ambulance, water squad and motorcycle and bicycle squad. In Malaysia, there were several agencies that provide emergency ambulance services such as government and private hospitals, Malaysian Civil Defense Department, St. John Ambulance Malaysia, Malaysia Red Crescent Society and many more (Safurah *et al.*,2013).

The main objective of emergency medical and trauma services (EMTS), "Enhancing Healthcare Delivery and Reducing Disease Burdens" is in line with the Ninth Malaysian Plan to "Achieve Greater Health through Consolidation", to initiate an emergency care which includes resuscitation, stabilization and treatment to the needs to prevent further suffering or mortality from year 2005 till year 2010 (Mathyvany *et al.*, 2005; Ministry of Health Malaysia, 2010). Later in year 2011, they came out with the Tenth Malaysian Plan which was "Ensure Access to Quality Healthcare and Promote Healthy Lifestyle", so as to increase the efficiency and effectiveness of the delivery system by transforming the health sector delivery system (Ministry of Health Malaysia,2010).

By and large, it is a convenient way when the administration is identified with the reaction time of an emergency call. This is on the grounds that the power needs to dispatch a rescue vehicle after the closest station to ensure the patients can get the treatment in the most limited period (Damitha *et al*., 2013).

From year 2004, the Ministry of Health Malaysia had carried out a new initiative to start an ambulance dispatch control centre in several states. The sites were Hospital Seberang Jaya, Hospital Kangsar, Hospital Ipoh, Hospital Melaka, HTAR Klang, Hospital Temerloh and Hospital Batu Pahat (Mathyvany *et al.*, 2005). The amount of hospitals had increased to 25 hospitals in the year 2007, and functioning as Medical Emergency Coordinating Centre to manage all emergency calls in their respective states in order to achieve the target response time of within 15 to 30 minutes (Ministry of Health Malaysia, 2007, 2009).

The Ministry of Health Malaysia has focused to have emergency physicians in all specialist hospitals in accordance with the Tenth Malaysia Plan. This is because of the quantity of patients looking for administrations from Emergency Department is expanding yearly. For example, there is an expansion of 29.08% in number of patients getting treatment in year 2009 compared to earlier year from 5,225,798 to 6,745,721 (Ministry of Health Malaysia, 2009).

Literature review

Operational Research (OR) is a rule of logical management to issues and opportunities. It is a system for an optimization issue. It had been created into various sorts of methodologies, calculations, studies and the sky is the limit from there. This is a result of its relevance in all parts including administration arranging, strategic, fund, generation arranging and etc. Emergency Medical and Trauma Care Service (EMTS) is one of the popular points for OR (Pesch and Woeginger, 2012). There are various researches done about the Emergency Medical and Trauma Service (EMST) for example, queuing model, resource allocation problem and the shortest path issue.

There are three types of logistics decisions regarding ambulance which are associated with the response time. First, the location of the ambulance's station needs to be optimized in terms of coverage. Second, the relocation plan to maximize the coverage area. Third, the strategy of ambulance dispatching in order to assign ambulance to the patients (Lee, 2014). The first and second logistics decisions can be solved by using the shortest route method, while the third one involved the decision making to assign a suitable destination hospital. The ambulance deployment problem is often solved by using the Daskin's Maximal Expected Coverage Location Problem (MEXCLP). It is an integer linear programming model used to solve the allocation problem for Emergency Medical and Trauma Care Service (EMST) (Zati et al., 2012).

Methodology

Data Collection

This study was carried out in the government owned Sabah Women And Childen Hospital (SWACH) where the satisfaction factors can be determined. Using questionnaires, 50 respondents in Kota Kinabalu were collected. The questionnaires comprised of three sections of 50 items, where Section A represented the items on the respondent background, while Section B items were on the ambulance service and Section C items were on the emergency department.

Data Cleaning and Filtering

Data cleaning were done on corrupted data, information with missing values, data with inappropriate information and etc. with the intention to improve the database (Dasu & Johnson, 2003). Several criteria for doing so had been suggested by Ballou & Tayi (1999) which were namely for: accuracy, integrity, completeness, reliability, consistent, uniformity, confidence and uniqueness.

Modelling processes developed would include data sampling, data filtering and rescaling, variable selection using factor analysis, variable transformation into dummies and finally model-building procedures to obtain the best model. Data cleaning and filtering would involve two stages, i.e. filtering through column by column and row by row methods. Information which had no numerical values, data with similar categories and unexplained data, such as data with negative values would have to be removed. Errors during model building can hence be reduced and consequently, the misinterpretation of the model's outcome can be avoided.

Factor Analysis and Statistical Tests

According to Huck (2012), factor analysis is a statistical procedure performed to reduce the number of variables in a data set besides relating their relationships. While according to Hair et al. (1995), factor analysis is a statistical method which is part of the multivariate analysis. Its main objective is to identify the basic structure in a data matrics; thus the corelations between the variables known as factors. However, Zainodin et al. (2011) had considered factors as variables. There were 17 variables that could be used as independent variables in this study.The number of possible models without interactions can

be calculated using the following formula: $N = \sum_{j=1}^{q} C_j^q$ … (2.0) where '*q*' is the number of independent variables and *j=1,2,…q*. In this paper, q=3, hence, the total number of models without interactions are: $N = C_1^3 + C_2^3 + C_3^3 = 7$ models … (3.0). Gujarati & Porter (2009) had implicated that the number of observations (n) has to be greater than the number of parameters (np) so as to satisfy the regression assumptions. Zainodin *et al.* (2014) had shown the formula used to calculate the number of parameters which thus imply the appropriateness of a regression model.

Model-Building

Zainodin et al. (2011) had shown the four phases in model-building while the multicollinearity remedial techniques and coefficient test on variables with absolute correlation coefficients more than 0.95 (i.e. $|r| \geq 0.95$) had been carried out as in Noraini & Zainodin (2013). The coefficient test of the multiple regression models was carried out to remove any insignificant factors which had p-values greater than 0.05 (Zainodin et al., 2014). The removals of insignificant factors were carried out until the factors that remained in the model would have all the p-values being less than 0.05. The best model was then chosen from the selected models that had remained, based on the Eight Selection Criteria (8SC) (Ramanathan, 2002).The model which had the minimum and satisfied most the selection criteria would be chosen as the best.

Results and Discussion

A total of 50 questionnaires had been collected. Majority of the respondents were of mixed-Malay ethnicity (36.0%) and only 2.0% were Chinese, while the others were of mixed ethnicity. This essentially reflected the demographical proportion of the urban population who went to the government owned hospital in Kota Kinabalu for treatment. In terms of age group, the highest number of Sabah Women And Children's Hospital (SWACH) ambulance service users was from the age group between 18-24 years (50.0%). The lowest number of users was from the 45-54 years and 65-74 years age groups which was 2.0% respectively. In terms of educational level, 21 respondents were with a university Degree education (42.0%), and the smallest group of 2 respondents (4.0%) was with a PMR secondary school education. In terms of marital status, 34 respondents (68.0%) were single and 16 respondents (32.0) were married.

Ironically, despite the many problems faced by the ambulance service in Malaysia, the mean score for each of the questions on patients' perception ranged from 2.34 to 2.78 (see Table I) for section B (ambulance service), while for Section C (emergency department) the mean ranged from 2.34 to 2.72 (see Table II). In section B, the lowest mean score was 2.34 for the question relating to cleanliness of the ambulance, calmness of staff and feeling of safety when staff arrives. The question with highest mean score, which was 2.78, was related to availability of staff at all times. In section C, the smallest mean score was 2.34 for the questions relating to comfort and pleasantness during examination. The highest mean score, which was 2.72 for the question relating to length of wait before going to an exam room.

Generally, most of the subjects gave a very high score for each item in the questionnaire assessing the ambulance service. Based on the mean scores, availability of staff at all times and length of wait before going to an exam room time, had rated the highest, both with a mean score of 2.78 and 2.72 respectively. This should be seen as an encouragement to

the ambulance team, and for them to continue to create a positive image as well as a friendly environment to the public. The speed of admittance to hospital showed the efficiency of service of the team. In terms of ambulance response time, it was rated at 2.62. One of the main problems of such research in ambulance services in Malaysia was the lack of a specific standard for our public to compare with. Hence, our public had no idea of what an acceptable or appropriate level of pre-hospital care should be. There was also no previous standard of pre-hospital care to benchmark the services provided. Nevertheless, benchmarking multi-faceted ambulance services was more than just looking at the ambulance response time. Unfortunately, in some places, the ambulance response time had become the dominant factor serving as a yardstick to measure pre-hospital care success.

There are various restrictions in this review should be specified. Patient's recognitions can be exceptionally deceptive, subjective and might be socially impacted. Their expectations should always be interpreted in the context of some understanding of the rationale that underlies those expressions rather than taking them at face value. In our setting, high scores could be attributed by the nature at the people here in Sabah, and Kota Kinabalu particularly, where they do not like to appear to be confrontational and offensive by giving low scores to the questionnaire. Another reason could well be because patients and relatives were considered as a vulnerable group and therefore tend not to be too critical of healthcare workers, particularly immediately after an emergency. This would lead to high perception scores if customers were surveyed immediately after their experience. We could have conducted the interview after there was no more perceived “threat” to the quality of care, such as after discharge from the hospital. This would have reduced the bias; however, this would run the risk that the interviewees may not be able to remember the experience vividly at a later date.

Interviewing rather that giving out questionnaires may increase the number of responses, yet the very presence of interviewers may adversely increase the confounding factors including the way the interviews were conducted. The presence of additional independent coordinators might also have added to the “intimidation factor” of the interviews. However, besides the expected low rate of response with using a questionnaire, we felt that with the generally lower educational level of study population, questionnaires may not be effective as an instrument and interviewing may be the best available mode for now. Other limitations of this study would include the small sample size taken which may be a contributing factor in causing a skewed data. The reason why there were only 50 samples was because this study was done merely to look into the public perception on ambulance services in Sabah Women And Children’s Hospital (SWACH). Nevertheless, with this backdrop, we hope that future studies regarding patients’ perception as well as their satisfaction with pre-hospital care or ambulance can be carried out. These studies may be expanded to multi-centre studies in order to reduce bias, improve the power of the studies, and to more accurately reflect the heterogeneous society of Malaysia.

Table I. Descriptive Statistics Result for Section B from Factor Analysis

	N	Minimum	Maximum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic
Vehicle_1	50	1	5	2.40	1.069
Vehicle_2	50	1	5	2.34	1.081
Vehicle_3	50	1	5	2.48	.974
Vehicle_4	50	1	4	2.44	.907
Vehicle_5	50	1	4	2.48	.789
Staff_attitide_1b	50	1	5	2.38	.945
Staff_attitude_2b	50	1	5	2.38	.987
Staff_attitude_3b	50	1	5	2.42	.992
Staff_attitude_4b	50	1	5	2.46	1.014
Staff_attitude_5b	50	1	5	2.36	.985
Staff_performance_1b	50	1	5	2.36	1.139
Staff_performance_2b	50	1	5	2.34	1.136
Staff_performance_3b	50	1	5	2.54	.994
Staff_performance_4b	50	1	5	2.54	.994
Staff_performance_5b	50	1	5	2.34	1.081
Professionalism_1b	50	1	5	2.44	.993
Professionalism_2b	50	1	5	2.40	.969
Professionalism_3b	50	1	5	2.52	1.054
Professionalism_4b	50	1	5	2.56	.993
Professionalism_5b	50	1	5	2.50	.974
Efficiency_1b	50	1	5	2.78	.996
Efficiency_2b	50	1	5	2.62	1.028
Efficiency_3b	50	1	5	2.62	1.028
Image_1b	50	1	5	2.58	.928
Valid N (listwise)	50				

Table II. Descriptive Statistics Result for Section C from Factor Analysis

	N	Minimum	Maximum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic
Administration_1c	50	1	5	2.52	1.092
Administration_2c	50	1	5	2.58	.859
Administration_3c	50	1	5	2.34	1.022
Administration_4c	50	1	5	2.36	1.045
Administration_5c	50	1	5	2.36	.921
Administration_6c	50	1	5	2.48	.931
Administration_7c	50	1	5	2.40	1.050
Staff_performance_1c	50	1	5	2.38	.987
Staff_performance_2c	50	1	5	2.46	.973
Staff_performance_3c	50	1	5	2.46	.973
Staff_performance_4c	50	1	5	2.50	.953
Staff_performance_5c	50	1	5	2.58	.906
Staff_performance_6c	50	1	5	2.58	.992
Staff_performance_7c	50	1	5	2.58	.992
Staff_performance_8c	50	1	4	2.50	.814
Efficency_1c	50	1	5	2.72	1.031
Efficency_2c	50	1	5	2.50	.839
Staff_attitude_1c	50	1	5	2.54	.952
Staff_attitude_2c	50	1	5	2.58	.928
Image_1c	50	1	5	2.44	1.053
Valid N (listwise)	50				

Conclusion

In conclusion, it is hard to generalise such findings for all ambulance services in Malaysia, especially when the patients' perceptions are subjective. It may not accurately reflect the quality of the service provided. However, it is also unfair for the authors as healthcare providers in the area of emergency medical services, to impose their assessments and knowledge of the weaknesses of the ambulance services and judge that the public perception is not accurate. Until and unless further comparable reviews could be carried on the general population view of other emergency vehicle benefits in Malaysia, this review with its independent arrangement of information simply speaks to a numerical measure of the general population impression of the rescue vehicle administrations from Sabah Women And Children's Hospital (SWACH). With respect to review input, this review exhibited certain positive qualities that the emergency vehicle team in Sabah Women And Children's Hospital (SWACH) can be pleased with. They are seen by people in general as a uniform body that dresses cleverly, talks delicately and acts pleasantly to the general population. Then again, the emergency vehicle group ought to likewise be forewarned not to be excessively placated in spite of the high scores achieved, particularly in territories, for example, reaction time, level of preparing in pre-doctor's facility care of the colleagues, and additionally the ampleness of hardware and the sorts of rescue vehicle utilized. Or maybe, it ought to fill in as a catalyst for the group to build up a sound feeling of developing disappointment, to always enhance ourselves that will at last be an advantage to general society.

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A COMPARISON BETWEEN URBAN AND RURAL ADOPTIONOF DIGITAL COMMUNICATION VIA TVRO USAGEIN SABAH, MALAYSIA

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Abstract: *Global information via Information and Communication Technology (ICT) networks are carried with phenomenal speed from within and across geographical boundaries. Globalization, socialization as well as the impact on viewership of telecommunication technologies have contributed to the transnational and transcultural integration of human and non-human activities. Television Received Only (TVRO) system, an unlicensed satellite television reception system have sprouted in Malaysia besides other licensed channels mainly via ASTRO and free-to-air (FTA) services. This study thus attempts to investigate the effects of the viewers' perspectives and preferences on the satellite televison adoption in Sabah. This paper also aims to exhibit the relationship of the aspects of satellite television usage and the viewers satisfaction factors using the multiple regression (MR) technique. A total of 378 respondents were sampled in this study where the concentration of TVRO parabolas were found, indicative of its usage, specifically within the city of Kota Kinabalu versus the rural district of Keningau, Sabah. Questionnaires were administered, followed by the processes of mathematical modelling viz., factor analysis, four-phase model-building, multicollinearity remedial, removals of insignificant variables and identification of the best model based on the eight selection criteria (8SC). The best model was justified through the randomness and normality tests of the standardized residuals. Model comparisons between the two areas of data collection were then made and the common significant factors from the models were composed of television usage, motivation, media information and external factors such as the influence of mobile telephones.*

Keywords: Mathematical modelling, satellite television, multiple regression (MR), significant factors, best model

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Introduction

Massive amounts of information being transferred in a blink of an eye will enable the humankind to advance in a multitude of ways. United Nations Educational, Sciences and Cultural Organization (UNESCO, 2008) had stated that ICT is "the combination of informatics technology with other, related technologies, specifically communication technology". While globalization had been proposed by Al-Rodhan *et al.* (2006) and socialization by Haralambos & Holborn (2004), appreciation on global processes towards

human and non-human development and stability, progress as well as transnational and transcultural integration besides influences in socialization would certainly gave impacts ICT concepts.

In Malaysia, television is the most popular among all components of mass media. Television had become an indispensable household item and watching television program had become a favourite past time activity. With the support if this notion, Media Guide (2004) had identified that television is the most popular as it is able to reach 96% of adult population that ages 15 years old and above among the media available in Malaysia.

Although the rapid proliferation of broadcaster and television channels in the past ten years bodes well for both viewers as well as for local production houses, broadcasting industry has always be controlled by government. For years, ASTRO had held a monopoly on the Malaysian satellite television scene. In order to watch a variety genre of international programmes, viewers are enquired to subscribe to ASTRO. However, with the emergence of the TVRO satellite system, viewers are able to watch programmes without subscribing.

Hence, the purpose of this study is to investigate the satisfaction factors of satellite television usage using the TVRO system through identifying the significant variables that contribute in to the viewers' perspective on satellite television system, TVRO in the state of Sabah.

Literature Review

Jagdish & Kosta (2009) had designed an antenna feed (parabolic dish antenna) with prime concern for the growing conjunction in the mobile networks. Where high directivity and high power density were needed, the parabolic antaenna using the horn feed had evolved as a useful device for point-to-point communications. Different frequency band performance ranging between 4.8 GHz to 5.9 GHz having horn feed, had worked well for the parabolic reflector antenna. Parabolic dish anrtenna is the most commonly and widely used in satellite and radar communication.

The emergence of satellite television with unlicensed satellite reception using TVRO dishes had sprouted in Malaysia especially in the East. With the illegal decoder which cost about RM 450 to RM 900, it comes with a standard viewing package, consumers are able to watch a variety of programmes in different fields like entertainment, news, sports and so forth illegally. With the purchase of the illegal decoder just once, viewers are able to watch programs received by satellite for free. According to Oliver and Ramzah (2011), observations on the ground showed that Sabah can be safely assumed to be one of the states with the highest number of unlicensed TVRO users and this phenomenon has been persistent in Sabah since 1970s (Syed Agil & Azizah, 2007).

Methodology

Data Collection

This study was carried out in two regions viz., 25 residential areas around the city of Kota Kinabalu and in the district of Keningau, in Sabah, Malaysia, where TV satellite programmes using TVRO could be received. Using questionnaires, 206 respondents in Kota Kinabalu and 230 respondents in Keningau were collected. The questionnaires comprised of two sections of 192 items where Section 1 represented the items on the receivability rate and IT awareness, while Section 2 items were on respondents' profiles and approaches.

Multiple Regression (MR) Technique

According to Devore (2012), multiple regression (MR) is an extension of the simple linear regression consisting of two or more independent variables $(W_1, W_2, W_3, ..., W_k)$ relating to the dependent variable (Y). The general MR equation is as shown in equation (1.0) and is given as: $Y = \Omega_0 + \Omega_1 W_1 + \Omega_2 W_2 + ... + \Omega_k W_k + u$ .....(1.0) where Y is the dependent variable, W_j is the j-th independent variable, Ω_0 is the constant regression coefficient, Ω_k is the k-th regression coefficient of independent variable W_j, u is the random residuals and k is the number of independent variables where $j = 1, 2, ..., k$. All these variables were categorical or qualitative; hence, each independent variable would be accompanied by a corresponding dummy variable denoting the satisfaction factors related to the satellite TV usage as shown by Noraini *et al*. (2014).

Data Cleaning and Filtering

Data cleaning has to be done on corrupted data, information with missing values, data with inappropriate information and etc. with the intention to improve the database (Dasu & Johnson, 2003). Several criteria for doing so have been suggested by Ballou & Tayi (1999) which were namely for: accuracy, integrity, completeness, reliability, consistent, uniformity, confidence and unique.

Modelling processes developed would include data sampling, data filtering and rescaling, variable selection using factor analysis, variable transformation into dummies and finally model-building procedures to obtain the best model. Data cleaning and filtering would involve two stages, i.e. filtering through column by column and row by row methods. Information which had no numerical values, data with similar categories and unexplained data, such as data with negative values would have to be removed. Errors during model building can hence be reduced and consequently, the misinterpretation of the model's outcome can be avoided.

Factor Analysis and Statistical Tests

According to Huck (2012), factor analysis is a statistical procedure performed to reduce the number of variables in a data set besides relating their relationships. While according to Hair *et al.* (1995), factor analysis is a statistical method which is part of the multivariate analysis. Its main objective is to identify the basic structure in a data matrics; thus the corelations between the variables known as factors. However, Zainodin *et al*. (2011) has considered factors as variables. There were 9 variables that could be used as independent variables in this study.

The number of possible models without interactions can be calculated using the following formula: $N = \sum_{j=1}^{q} C_j^q$ ... (2.0) where 'q' is the number of single independent variables and $j=1,2,...q$. In this paper, q=3, hence, the total models without interactions are: $N = C_1^3 + C_2^3 + C_3^3 = 7$ models ... (3.0). Gujarati & Porter (2009) had implicated that the number of observations (n) has to be greater than the number of parameters (np) so as to satisfy the regression assumptions. Zainodin *et al.* (2014) had shown the formula used to calculate the number of parameters which thus imply the appropriateness of a regression model.

Model-Building

Zainodin *et al.* (2011) had shown the four phases in model-building while the multicollinearity remedial techniques and coefficient test on variables with absolute correlation coefficients more than 0.95 (i.e. $|r| \geq 0.95$) shown by Noraini & Zainodin (2013). The coefficient test of the multiple regression models was carried out to remove any insignificant factors which will have p-values greater than 0.05 (Zainodin *et al.*, 2014). The removals of insignificant factors were carried out until the factors that remain would have all the p-values were less than 0.05. The best model was then chosen from the selected models that remained based on the Eight Selection Criteria (8SC) (Ramanathan, 2002).The model which had the minimum and satisfied most the selection criteria would be chosen as the best.

Results and Discussions

Initially, there were 436 respondents for both areas under study (i.e. Kota Kinabaluand Keningau). However, in Kota Kinabalu, with 206 questionnaires distributed, only 148 respondents had fully answered so as to qualify for further factor analysis to be carried out. Thus the total number of respondents for analysis was 378 respondents.There were 192 items or variables that can be chosen for analysis for both regions of study. However after data cleaning and filtering using the column-by-column, followed by row-by-row methods, only 17 variables for Kota Kinabalu and 27 variables for Keningau had remained in data sets that can be used for further analysis.Factor analysis based on the principal components was carried out. A 62.7% and 61.1% of total variance wereexplained for Kota Kinabalu and Keningau, had resulted infive components for Kota Kinabalu and two components for Keningau respectively with eigen values greater than 1.0 were obtained. The KMO-Bartlett test for TVRO was 0.691 and 0.732, while the Bartlett's tests of sphericity were significant for the satellite TVRO channels.

For illustration purposes, only the analyses and modelling procedures carried out for Kota Kinabalu were shown. The first component chosen from factor analysis contained four factors, and was represented by the symbols Y, A, B and C as shown in Table 1 below. In this study, the factor on satellite TV usage was chosen as the dependent variable (Yi), while the other three factors were the independent qualitative variables. The independent variables were satisfaction, encouragement and external factors.

Table 1: Summary and Symbols of TVRO Usage Factors

Factor	Description	Category	Variable Type
Y: Usage	Satellite TV Usage	Y	Quantitative
A : Satisfaction $[Y_i=f(W_1)]$	A_1 : Satisfaction- Status & Self-pride A_2: Satisfaction-Entertainment & Tranquility A_3: Satisfaction –Strengthen family ties A_4:Satisfaction–Increase knowledge on Malaysian issues A_5: Satisfaction – Increase knowledge on global issues A_6: Satisfaction – As a support to good services A_7: Satisfaction – Cheap subscripton fee	1=Not Important 2=Less Important 3=Slightly Important 4=Important 5=Very Important	Qualitative
B :Encouragement $[Y_i=f(W_2)]$	B_1: Encouragement-Family B_2:Encouragement- Friends B_3:Encouragement- Promotion of price discounts B_4:Encouragement- Normal price of cheap service B_5: Encouragement- Negligible film censorship B_6: Encouragement- Transparent and free information B_7: Encouragement-Access to sexual materials/content B_8: Encouragement- Offer entertainment materials (like sports, arts, games, etc.)	1=Not Important 2=Less Important 3=Slightly Important 4=Important 5=Very Important	Qualitative

C:External Factors [Y_i=f(W_3)]	C_1:Access- Using internet C_2:Access- Using local newspaper C_3:Access- Using national newspaper C_4:Access- Using house telephone lines C_5: Access- Using moble telephones	1=Not Suitable 2=Less Suitable 3=Slightly Suitable 4= Suitable 5=VerySuitable	Qualitative

Refering to equation (3.0), since there were three independent qualitative/categorical variables (W_1, W_2, W_3), hence the total number of models without interactions were 7 models.Taking model M5:[f (W_1, W_3)] for illustration purposes:

$$M5: Y_5 = \Omega_0 + \delta_1 A_1 + \delta_2 A_2 + \delta_3 A_3 + \delta_4 A_4 + \delta_5 A_5 + \delta_6 A_6 + \delta_7 A_7 + \lambda_1 C_1 + \lambda_2 C_2 + \lambda_3 C_3 + \lambda_4 C_4 + \lambda_5 C_5 + u_5 \quad \text{.....(4.0)}$$

where Y_5 as the dependent factor on TVRO usage, A_j are the j^{th} independent variables of factors on 'Satisfaction' with $j=1,2,...,7$, and C_j are the j^{th} independent variables of factors on 'Encouragement' with $j=1,2,...5$.The j^{th} regression coefficients were given by δ_j and λ_j for the independent variables,A_j and C_j respectively. The random error was given by 'u_5', and 'k_j' is the total number of independent categorical variables with respect to each factor for $j = 1, 2, ..., k$.

The presence of multicollinearity in the models could be identified when there existed absolute correlation coefficients greater than 0.95. The highest absolute correlation value between the independent variables would be subsequently removed (Noraini & Zainodin, 2013). The Pearson Correlation matrix of model M5 had no variables with correlation values greater than 0.95. Hence, no multicollinearity source variables existed. Next, the coefficient test was performed on all the models that had undergone the multicollinearity test. Table 3 below showed that factor C_4 has the highest p-value of 0.979. Hence, factor C_4 was removed from model M5.0.0 and the model was then rerun to become model M5.0.1.

Table 3: Coefficient Test of Model M5.0.0

Model M5.0	Unstandardized Coefficients		Standardized Coefficients	t	P- value
	B	Standardized Error	Beta		
(Constant)	12.894	1.050		12.285	.000
A1	.523	.456	.069	1.147	.254
A2	-.916	.501	-.116	-1.828	.070
A3	.576	.533	.069	1.080	.282
A4	6.763	1.501	.601	4.507	.000
A5	-2.875	1.790	-.231	-1.606	.111
A6	.354	1.213	.027	.292	.771
A7	4.007	1.191	.296	3.364	.001
C1	.447	.546	.059	.819	.414
C2	.277	.731	.031	.379	.705
C3	1.215	.550	.166	2.210	.029
C4	-.012	.463	-.002	-.026	.979
C5	1.310	.986	.092	1.329	.186

Table 4 showed that factor A_6 in model M5.0.1 has the highest p-value of 0.771. Hence, factor A_6 was removed and model M5.0.1 was then rerun to then become model M5.0.2.

Table 4: Coefficient Test of Model M5.0.1

Model M5.0.1	Unstandardized Coefficients		Standardized Coefficients	t	P-value
	B	Standardized Error	Beta		
(Constant)	12.895	1.045		12.343	.000
A1	0.521	.449	.069	1.161	.248
A2	-0.916	.499	-.116	-1.837	.068
A3	0.577	.529	.069	1.091	.277
A4	6.763	1.495	.601	4.523	.000
A5	-2.874	1.783	-.231	-1.612	.109
A6	0.352	1.206	.027	.292	.771
A7	4.008	1.187	.296	3.377	.001
C1	0.447	.544	.059	.822	.413
C2	0.275	.723	.031	.380	.705
C3	1.212	.537	.166	2.257	.026
C5	1.305	.967	.092	1.349	.180

Subsequent removals of nine insignificant variables (C_4, A_6, C_2, C_1, A_3 , A_5 , A_2, A_1 and C_5) were removed from the model until there were no more p-values more than 0.95 remained, to obtain model M5.0.9 (Table 5). Referring to model labelling (Zainodin *et al.*, 2011; Noraini

& Zainodin, 2013), model M5.0.9 thus indicated there was null multicollinearity source variable and nine insignificant variables had been removed.

Table 5: Coefficient Test of Model M5.0.9

Model M5.0.9		Unstandardized Coefficients		Standardized Coefficients	t	P-value
		B	Standard Error	Beta		
	(Constant)	13.769	0.776		17.736	<0.0001
	A4	5.125	0.761	0.456	6.734	<0.0001
	A7	3.655	0.908	0.270	4.025	<0.0001
	C3	1.644	0.428	0.225	3.843	<0.0001

All the possible 7 models had undergone the statistical tests, remedials and model-building phasessuch that the modelsremained were free from multicollinearity and insignificant factors. Table 6 showed the selected models on the TVRO usage in Kota Kinabalu and Keningau respectively.

Table 6: Selected Models on TVRO Usage

Kota Kinabalu	Keningau
M1.0.5	M1.0.6
M2.0.5	M2.0.7
M3.0.3	M3.0.4
M4.0.10	M4.0.12
M5.0.9	M5.0.9
M6.0.9	M6.0.11
M7.0.14	M7.0.16

Finally the best model was chosen based on the model having the majority of the least values of the eight selection criteria (8SC)(Ramanathan, 2002) as shown in Table 7. It can be seen from the table that the best model was model 7.0.14 for Kota Kinabalu and model M6.0.11 for Keningau.

Table 7: Best Model Based on Eight Selection Criteria (8SC)

	Model	R^2	(k+1)	SSE	n	AIC	FPE	GCV	HQ	RICE	SCHWARZ	SGMASQ	SHIBATA
KOTA KINABALU	M1.0.5	0.494	3	863.037	148	6.072	6.073	6.075	6.224	6.077	6.452	5.951	6.067
	M2.0.5	0.462	4	917.696	148	6.545	6.545	6.549	6.764	6.554	7.097	6.372	6.535
	M3.0.3	0.236	3	1303.922	148	9.175	9.175	9.178	9.404	9.182	9.749	8.992	9.167
	M4.0.10	0.624	6	641.752	148	4.702	4.703	4.710	4.940	4.718	5.309	4.519	4.687
	M5.0.9	0.541	4	782.740	148	5.583	5.583	5.586	5.769	5.591	6.053	5.435	5.574
	M6.0.9	0.524	5	813.158	148	5.878	5.879	5.885	6.125	5.892	6.504	5.686	5.865
	M7.0.14	0.647	7	602.193	148	4.472	4.473	4.482	4.737	4.493	5.153	4.270	4.453
KENINGAU	M1.0.6	Not feasible											
	M2.0.7	0.596	4	917.696	230	193.9	193.9	193.9	197.5	194.0	202.3	193.8	193.8
	M3.0.4	0.583	3	1303.922	230	195.8	195.8	193.9	197.2	194.0	202.3	191.1	193.8
	M4.0.12	0.658	6	641.752	230	193.9	193.9	193.9	197.3	194.0	202.3	191.1	193.8
	M5.0.9	0.597	4	782.740	230	195.8	195.8	195.8	195.8	195.8	204.3	193.0	195.7
	M6.0.11	0.417	5	813.158	230	190.3	190.3	190.4	195.3	190.5	202.8	186.3	190.1
	M7.0.16	0.739	7	602.193	230	190.4	190.4	190.5	195.4	190.6	202.9	186.4	190.2

Model M7.0.14 can be given by the equation in (5.0): $\text{M7.0.14}: \hat{Y}_7 = \Omega_0 + \delta_2 A_2 + \delta_4 A_4 + \delta_6 A_6 + \delta_7 A_7 + \lambda_5 B_5 + \lambda_5 C_5$ .....(5.0).Substituting the values of the regression coefficients, equation (5.0) then becomes:

$$M7.0.14: \hat{Y}_7 = 10.951 - 0.986Q_2 + 3.960Q_4 - 2.582Q_6 + 4.826Q_7 + 5.120R_5 + 2.515S_5 \ldots\ldots\ldots (6.0)$$

Substituting the original representation of the research factors into equation (6.0), the best model M7.0.1 was implicated by:Y-Satellite TVRO usage,A_2-Satisfaction Factor: Entertainment and tranquility, A_4-Satisfaction Factor: Increase knowledge on Malaysian issues, A_6-Satisfaction Factor: As support to good services, A_7-Satisfaction Factor: Cheap subscripton fee, B_5-Encouragement Factor: Negligible film censorship, and C_5-External Factor: Using mobile phones. Similarly, the best model in Keningau had significant factors on the B_7-Encouragement Factor:access to sexual materials/content and and C_5-External

Factor: Using mobile phones. Common factor for both regions was using access using mobile phones for communication.

Conclusion

This paper introduced the concept and procedures in mathematical modelling using the multiple regression technique so as to identify significant factors that affect the adoption of digital communication via TVRO usage. Comparison of the significant factors between Kota Kinabalu (urban) and Keningau (rural) shown significant factors affecting the digital communication via satellite TV usage especially through the access of mobile phones for communication. Further research is suggested to be done to ascertain the impact of TVRO by using qualitative research approach especially participant observation which will reveal the real human context making the quantitative figures more meaningful.

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GENEALOGICAL DATA COLLECTION USING PUBLIC DOMAINVISUAL COMMUNICATION SOFTWARE

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Abstract: *This article describes the use and outcomes of utilising Freemind, a public domain visual communication software, as a tool to collect family names and introduced annotations in the siblings and children nodes of the mind map to indicate marriage and genealogical relations. This study is essentially an exercise of repurposing a mind mapping software as a data collection and display tool. It presents templates and annotations developed for collecting names and marriage partners either for single-spouse or multiple-spouse cases. Real examples of representations of family trees using Freemind are also presented as products of the research. This form of visual communication appears to enhance genealogical data collection when done in tandem with written notes. The visual display seems to assist in recall and ease of updating and correcting information. The ease and portability for managing and retrieval of the data using a laptop and projecting screen are also positive features welcomed by key-respondents interviewed for the geneaological information. Most respondents, especially those of advanced age and with impaired with vision, found that larger display screen achievable using LCD projector in place of the 11-15" laptop screen more engaging and pleasurable. This setup can also be utilised in-situ to engage heritage sites tourists where genealogical information enhance knowledge and understanding of historical events.*

Keywords: public domain software, visual communication, family tree, genealogy research

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Introduction

There are several ways of collecting and representing genealogical data. The usual practice in genealogical data collection or also known as family tree construction is the "pen and paper method", that is, by filling forms similar to **Figure 1**, **Figure 2** and **Figure 3** as shown below. For more detailed description, please refer to the website http://www.google.com/patents/US4483680 which contains the document titled 'Genealogical Information Recording and Arrangement Method and Apparatus'. The Internet has added new ways of researching genealogy. Back in 2012, the Culture Tech section of the website Cnet (http://www.cnet.com/how-to/three-ways-to-research-your-family-tree/) gavethree ways of researching and displaying via ancestry.com, myancesstory.com and familysearch.org. By 2016, the webpage http://genealogy-software-review.toptenreviews.com listed the following ten top family tree softwares: *Legacy Family Tree 8.0*, *Family Tree Maker 2014*, *Family Historian 6*, *RootsMagic 7*, *Ancestral Quest 14*, *Heredis 2014*, *Family Tree Heritage Platinum*, *Brother's Keeper 7*, *Genbox Family History 3* and *WinFamily 10*.

This article however, describes the use and results of repurposing*Freemind*[3], a public domain visual communication software for recording and representing family relations using an internet-independent process. It shows how this mindmapping software can assist the job of researching and displaying a family tree.

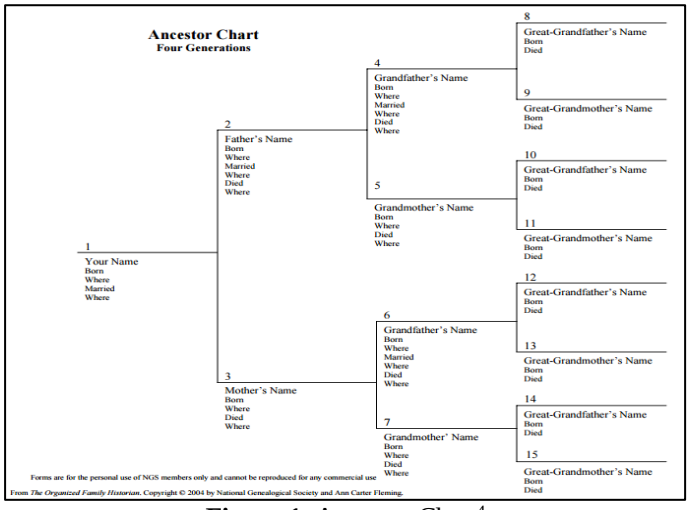

Figure 1. Ancestor Chart[4]

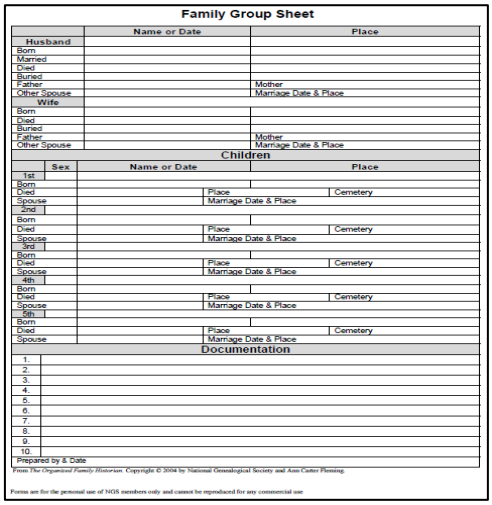

Figure 2. Family Group Sheet Form[5]

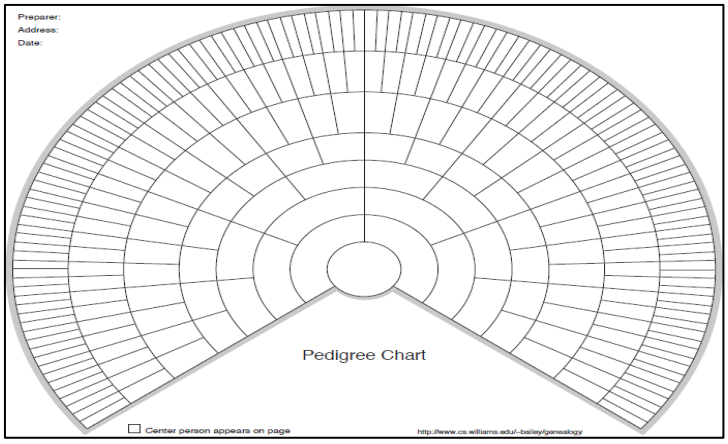

Figure 3. Pedigree Chart Form[6]

Literature review

Definition and concepts and methods in genealogy

One common definition of genealogy is "the study of family history; the history of a particular family showing how the different members of the family are related to each other".[7]The document titled 'Genealogical Information Recording and Arrangement Method and Apparatus' described a patent registered in 1984 and inventoried in the Google patent site

[3] http://freemind.sourceforge.net/wiki/index.php/Main_Page
[4] Source: http://www.ngsgenealogy.org/galleries/research_aids_forms/Fig_1.2_Ancestor_Chart.pdf
[5] Source: http://www.ngsgenealogy.org/galleries/research_aids_forms/Fig_1.6_Family_Grp_Sheet.pdf
[6] Source: http://dept.cs.williams.edu/~bailey/genealogy/index_files/PedigreeFanChart.pdf
[7] http://www.merriam-webster.com/dictionary/genealogy

as "a method and apparatus for recording and displaying genelogical or pedigree information on humans or animals are provided, wherein data on individuals is recorded on a plurality of interconnectable discrete patterns imprinted on transparent, self-adhesive material, the appropriate pattern being selected on the basis of the individual's gender, marital status, and status as a direct or collateral descendant, and then completed patterns are arranged on a display means to illustrate familial or blood-line relationships".[8] The patent depicted in **Figure 4** below appears to be a predecessor to the earlier **Figure 1** and being used by the US-based National Genealogical Society to collect genealogical information.

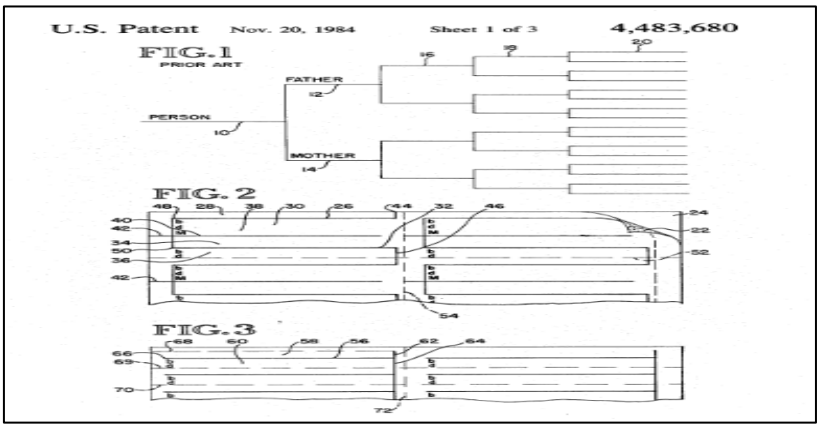

Figure 4. Patented Genealogical Information Recording and Arrangement Method and Apparatus[9]

Gehring (1996, p.20) noted that "in an age where genealogical source material is appearing in electronic format, many give misplaced preference to computerized records, simply because they are easier to use. While speedy search of a computerized census index has genuine appeal in the initial survey stage of research, in the end it is just an index, a secondary source, and uniquely subject to errors in data entry or scanning".

Gi-Chul Yang (2007) discussed "efficient representation of family tree as essential for any system utilizing information in the family tree. His study introduced efficient representation of family tree and retrieval methods, which can handle large number of family trees in the form of conceptual graph." He found that for non-conventional applications "ordinary tree structure is not a suitable approach to illustrate the accurate family tree, since the structure of the family tree is different with the structure of the ordinary tree. An Efficient representation of family tree as well as the indexing and retrieval mechanism … can be used for medical information system as well as other application systems."

Alluding to conventional textual records of ancestoral information, Mérey (1996) in his conference paper titled 'Charts and Text Combined: A Proposed Method for Recording Family History and Genealogy' decribed how it "can become ponderous to read through such a document, constantly having to recall the meaning for each pointer. Then there are family charts with … and names positioned in a such a convoluted way that one may simply avoid the effort needed to unravel the recorded lineage. The various guidelines described … aim to avoid the more common shortcomings and introduce an effective standard in chart design and

[8] http://www.google.com/patents/US4483680
[9] Source: http://patentimages.storage.googleapis.com/pages/US4483680-1.png

the publishing of family histories." (in Auguste Vachon, Claire Boudreau & Daniel Cogné, Eds. 1996).

Stockwell (2004, pp.40-51) is of the opinion that "computer programs for genealogy can be useful for preparing charts, both ascendant and descendant, and for keeping genealogical data in an organized way. They are not essential for the purpose of entering genealogical data into a computer, and some professionals prefer using common word processing and flat database programs, believing these to be equally adequate and somewhat faster." He, however, questioned the userfriendliness of the programs and how compatible they are over the different computer operating systems. He noted that the current standard format for interchanging data between genealogical programs is called GEDCOM (GEnealogical Data COMmunications format).

Methodology

In contrast to the convention illustrated in **Figure 1** above, this exercise reversed the genealogical data collection process by embarking from the selected ancestor/s. The exercise then proceeded with identifying the various living representatives of a selected family. In this case, the researcher have selected the paternal and maternal sides of his grandparents. The initial exploration spanned four generations and has taken the following lines:

1. Great Grandfather> Grandfather of Researcher>Father of Researcher> Researcher
2. Great Grandfather> Grandmother of Researcher>Father of Researcher> Researcher

Using the Great Grandfather as the starting point for *Freemind*, the process of recording and annotating the family relations proceeded guided by the paths depicted in **Figure 5** and **Figure 6**.The exercise to discover and represent the family tree using *Freemind* also followed these scenarios and steps:

Scenario I

1. Setting up of inventory available records in the form of documents, handwritten notes and family tree sketches, notes of informal interview[10]
2. Input information into *Freemind* and use the annotation (+ …) to indicate being the spouse, b. for bin (son of) and bt. For binti (daughter of)

Scenario II

1. Identify key-respondents i.e. the surviving member of selected family[11]
2. Interview the key-respondents and record information in handwritten notes
3. Where possible, set up *Freemind* on portable PC (laptop computer) and input data in tandem with no. 2 above

Scenario III

1. Select key-respondents

[10] Interview with Tuan Haji Awang bin Pengiran Samit (pen name: Wangsa) and referring to a booklet titled *Memurnikan Silaturrahim Sabah-Brunei. Penemuan Salasilah Pengiran Raup*, written and published by him.

[11] Tuan Haji Kemundar bin (Julan bin Koyoh bin Logong) and Puan Eyung binti (Latun bin Buang bin Logong). The persons in bracket are deceased). Note that Koyoh and Buang are siblings. Also popular-known ancestoral names can be the nicknames of the deceased individual i.e. not their actual names. Logong for example referred to the shape of his head and Koyoh referred to his well-to-do and propertied status.

2. Project the *Freemind* version of the family tree with skeleton data on to a bigger screen
3. Update the skeleton data with key-respondents viewing and commenting the projected and enlarged display

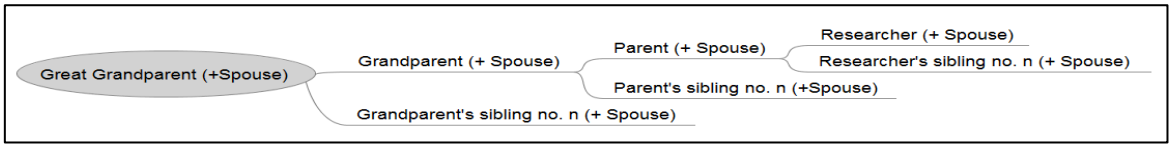

Figure 5. Branching for single spouse cases using *Freemind*

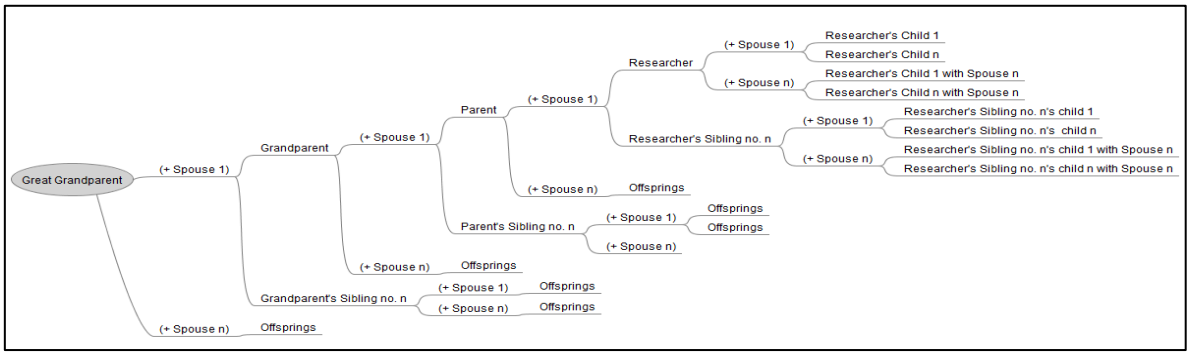

Figure 6. Branching for multiple spouses cases using *Freemind*

Closed and limited access blogs and Whatsapp groups have also been set up to share and spread news of the latest findings to the known and discovered members of family for verifications.[12] The ability of *Freemind* to link between separate family trees in different *.mm files has also been tested to determine whether seamless connection can be achieved. The main focus of this exercise, however, is to explore the usability and the userfriendliness of *Freemind* as a genealogical data collection and display tool.

Findings

This exercise has experimented with *Freemind* as a tool to collect family names and introduced annotations in the siblings and children nodes of the mind map to indicate marriage and genealogical relations. The various names and versions of spelling the names have posed some issues during this exercise. In the end, *Freemind* has offered a form of visual communication usable for genealogical data collection. It proves to have enhance and ease data collection when done in tandem with written notes and sketches.

[12] To protect the privacy of the families, the names of these blogs and Whatsapp groups are not stated in this paper.

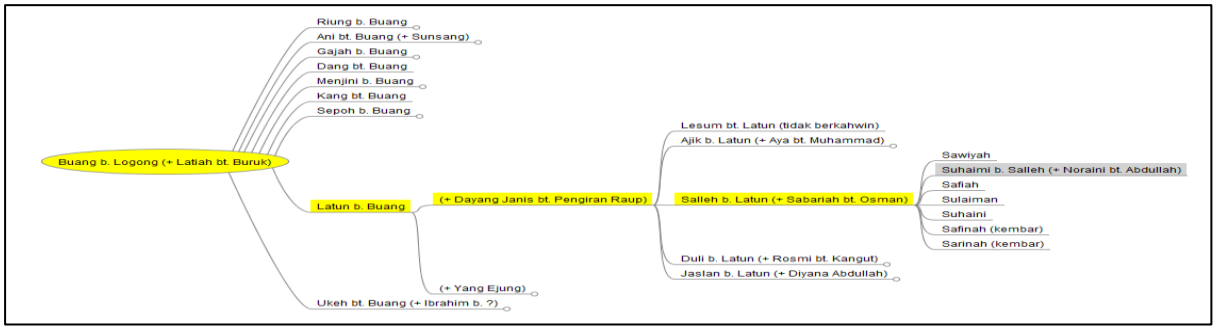

Figure 7. Great Grandfather, Grandfather, Father and Me (Grandfather Side)

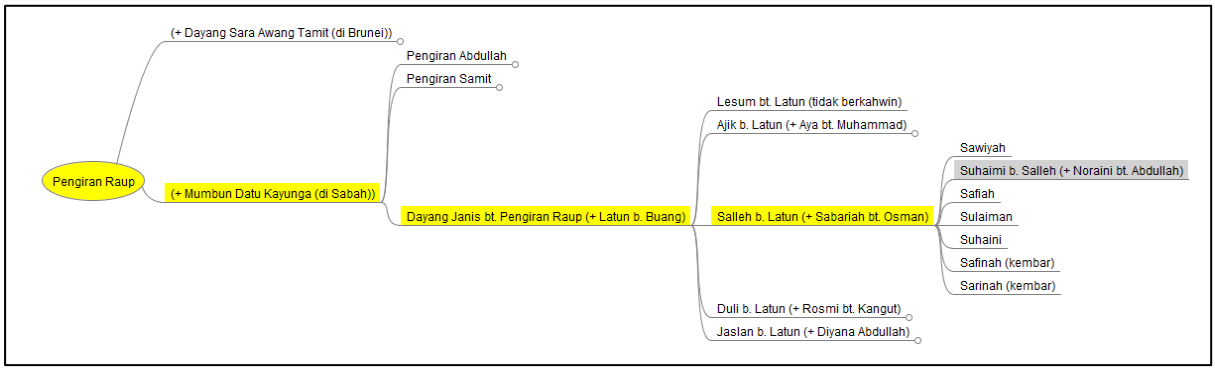

Figure 8. Great Grandfather, Grandmother, Father and Me (Grandmother Side)

Interviews of key-respondents have indicated that the visual display have assisted in recall and ease of managing and retrieval of the data. Larger display screen achievable using LCD projector in place of the 13-15" laptop screen have proven to facilitate visual communication, more engaging and pleasurable for data collection and editing. Key-respondents of advanced age and with impaired with vision are found to be inclined especially towards ***Scenario III*** during the exercise.

Conclusions

This articles reports on templates and annotations used in *Freemind* in collecting names and marriage partners. It is usable both for single-spoused and multiple-spoused cases. In tandem with the traditional "pen and paper" handwritten notes, the exercise is able to produce an acceptable representation of a family tree. Coupled with internet-enabled medium particularly blogs and Whatsapp groups, data gathering, verifications and distribution were greatly enhanced. This exercise in the end has not repurposed *Freemind* but rather has enlarged its usefulness from a software to capture ideas and display as mindmaps into a user-friendly genealogical data gathering, display, verification as well as a sharing[13] tool.

[13] A portable version of Freemind is also achievable by setting it up on a usb drive. Important links to download the relevant portable platform and portable *Freemind* are:
(a) http://portableapps.com/download (the platform)
(b) http://portableapps.com/node/10952 (*Freemind*)

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HOMESTAY PROMOTER: A COMPARATIVE STUDY

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Abstract: *Homestay program in Malaysia becomes a potential sector to improve the development of economy, infrastructure, social, and the environment factors in tourism industry. This program really needs the most suitable promoter to ensure that anybody may get the information and also the location easily. The purpose of this study is to determine the best promotion tool in promoting Homestay program. 500 Homestay customers at West Pahang region were randomly selected and the data was analyzed using SPSS version 24. Result shows that promotion via internet become the most powerful tool to attract customers compared other tools. The study also shows that the customers via internet are more satisfied towards the Homestay facilities provided by the host. This positive perception embarked more than 80 percent of them having good intention to return to the same Homestay in the future and to recommend their selected ones to others. Therefore, it is recommended that all registered Homestay in Malaysia will promote their Homestay using the internet because this tool may advertise attractively and also will reduce the marketing cost.*

Keywords: Homestay, Internet, Facility, Service

Introduction

Internet is a medium that is most dominant in navigating, search of information and communication network connectors worldwide. According to Kaplan and Haenlein (2009), they stated that the online social media technologies allowing tremendous number of people to have social interaction and communications. The use of internet must be along with smart gadgets such as personal computer (PC), laptop, mobile devices and etc. Their study also stated the devices connected with internet leads this social networking activates with interface for establishing social connections and relationship. Statistically, Asia region showed numerous internet usages that are 1,622,084,293 users, followed by Europe that is 604, 147,280 users and the increment are expected year to year (Internet World Stat, n.d.).

Begin as main social phenomenon, this social media technologies ever-growing part of companies' promotional expenditure. Thus, internet becomes an effective advertising media even though it is necessary to fully understand the determinants of consumer response

to online advertisements. One of the popular sectors advertised in internet is tourism. The business person who involve in tourism sector such as owner of hotels, homestays, and travel agencies much prefer advertise their services on internet since it is accessible at anytime and anywhere using mobile devices. Their ads normally display at online social network such as Facebook, Twitters, Instagram and the like since it is a place where most people love to chat, build new ties, viewing and navigating their list of connection and those made by others in the system (Boyd and Ellison, 2007). Surprisingly, through this facilities the business person will do zero cost of marketing strategy but they are able to reach to millions of people. In order to place of booking, the customer normally will view the room images, price offered, date and facilities provided. These features make the business person feel that internet give boom impact to marketing interaction and it is suit to customers want surveying the point of interest without need to be there. This is supported by Ana Maria (2014) and Soares, Pinhoand Nobre (2012) indicated that the internet gives a deep impact on advertising and it is vital to marketers.

Nowadays, tourist either from abroad or local prefers to choose Homestay as their place to stay compared to hotels because of the attractions itself such as unique and several of food (Meimand, Khalifah&Hakimi, 2013). This uniqueness may attract anybody from any place to come and visit the homestay. Therefore the promotion becomes very important role to attract tourist to come and stay at the Homestay. This study will identify the best promotion tool in promoting Homestay program in Malaysia, focus in West Pahang region. The criteria of choosing this region is because according to Tourism Pahang, Malaysia (2013), the Homestay program was started in 1980s at Pahang with a student exchange program. The students stayed with adopted family with different culture and background with the objective is to promote a greater understanding of Malaysia cultural and social.

Literature review

Homestay program in Malaysia becomes a potential sector to improve the development of economy, infrastructure, social, and the environment factors especially in tourism sector (Pusiran& Xiao, 2013). Wipada (2007) defined that the homestay is one type of lodging that tourists share with the homeowner with the intention to learn culture and lifestyle from the homeowner, who prepared lodging and food. The growth in Homestay program provide huge opportunities to the rural communities where it has significant contribution to the rural socioeconomic development, social capital development, conservation effort and enhancement of rural areas, as stated by Ibrahim and Abdul Razzaq (2010). United Nations World Tourism Organisation (UNWTO) barometer declared that Homestay program in Malaysia being ranked in 9th position from 2009 to 2011, and 10th positon in 2012. Malaysia also awarded first prize for UNWTO Ulysses Award 2012 for innovative in public policy and governance for homestay experience programme (Othman, Wee & Hassan, 2014). Based on such achievements, it indicated the government efforts in developing and managing homestay as one of the tourism products proves to be successful and properly guided.

Since Malaysia is rich with multicultural value and resources, there are many attractions that could promote Homestay program. There are also program set by the Malaysian Ministry of Tourism that is Plant A Tree (PAT) program as part of the initiatives in promoting environmental awareness and conservation (Ismail, 2012). His study t also stated that the PAT may encourage tourist to repeat visit when they came back to see the

development of the trees planted by themselves (Ismail, 2012). Meanwhile Othman et al. (2014) asserted, branding image also have significant role in promoting tourism. Their study mentioned that the tagline "Malaysia truly Asia" has created an identity where tourists can associate as well as added valuable experiences while experiencing holiday in Malaysia.

Promotion is an important aspect that can influence customer to visit Homestay and become an important factor for marketing process (Miraz, Ramli, Ku Muhammad, Albarune& Islam, 2015). As outlined in the Ninth Malaysian Plan (2006-2010), one of the plans is to strengthen the importance of sustainable tourism development. Among the suggestion theme regarding sustaining tourism effort in this plan are to develop domestic tourism through marketing and promotion activities (Marzuki, 2010). Realizing the potential growth and economic impact of Homestay tourism, the government of Malaysia through its related agencies plays important role in publicity and marketing promotions effort (Pusiran& Xiao, 2013). As such, one of the endeavours by the Malaysian Ministry of Tourism is by the endorsement of the go2homestay website, http://www.go2homestay.com/ as the official website for Homestay directory in Malaysia and the social network medium like Facebook and Twitter. By embracing e-marketing promotion from the used of internet and technology, it provide a platform for tourist to make reservations or enquiries of their desired destination in simpler and easier way. Besides, another initiative is by developing mobile application for smartphone which can amplified the segment of potential tourist from the global community connectivity which is highly accessible since there are vast smartphone users globally. Despite the fact that e-marketing is among the top marketing strategies used in promoting tourism products (Othman et al., 2014).

Research Methodology

This study sample comprised of 500 customers of Homestay at West Pahang region. The questionnaire was adopted by Ministry of Tourism and Culture Malaysia (2014) and distributed to the selected customers. The questionnaire consisted four sections; Section A, B, C and D. Section A focused on customer background, Section B about the promotion tools used to promote Homestay program, Section C about the loyalty and recommendation of the Homestay to others (Yes or No), and Section D consisted questions used Likert scale ranging from 1 (very poor) to 5 (very good) about the facilities and services provided by the Homestay host. This study aimed to determine the best promotion tool in promoting Homestay program in Malaysia.

The data obtained were analysed using statistical procedures executed by the IBM SPSS 24 including descriptive statistics, cross-tabulation, normality test and independent t-test. Firstly, descriptive statistics used to describe the customers' demographic profile and the Homestay promotion tool used. Next, the independent t-test will be conducted to determine whether there exist significance difference for facilities and services provided by the Homestay host between two groups of customer getting information of Homestay program; via internet or other promotion tools.Finally, the analysis continued by the cross-tabulation analysis to determine the association between promotion used and the loyalty also recommendation of selected Homestay.

Findings and Discussion

In total, 255 (51.00%) male and 245 (49.00%) female customers took part in the study. 390 (70.00%) of them were less than 35 years old, 95 (19.00%) are between 35 and 45 years old, and the rest (55, 15.00%) are above 45 years old. Table 1 shows the Homestay promotion tools used by the customer to get the information about the selected Homestay. According to Miraz et al. (2015), promotion is an important aspect that can influence customer to visit Homestay. Therefore, this study aimed to identify the best promoter of Homestay program. This study revealed that internet (51%) become the most important tools to promote the Homestay program compared to other promotion tools used by the customer whereby, family and friends (20%), radio or television same ranked as brochure or billboard or newspaper (65, 13%), and from travel agency with only 3% (15 customers). The customer used website or social networks such as Facebook and twitter to get information about the Homestay program. The information gathered from the internet is about the location, facilities and services provided by the Homestay hosts. All the information given can attract the customer to visit the Homestay.

Table 1: Homestay Promotion Tools

Promotion Tools	Frequency (%)	Rank
Internet (Website/ Social network)	255 (51%)	1
Family/ Friends	100 (20%)	2
Radio/ Television	65 (13%)	3.5
Brochure/ Billboard/ Newspaper	65 (13%)	3.5
Travel agency	15 (3%)	5

Customers will have a positive intention to come again to the same Homestay in the future or recommend it to others based on the facilities or services provided by the Homestay hosts. Next analysis will examine whether there exist a significant difference on two factors; facilities and services, between they got the information about the selected Homestay via internet or other promotion tools. Normality test showed that the data was normally distributed because the *p*-value obtained was greater than 0.05. The independent t-test was conducted and the result indicates that there exist significance differences between the groups for services factor since the *p*-value was less than 0.05, as shown in Table 2.The mean difference for this factor is .1718, shows that the customer group used internet to get the information about the Homestay is more satisfied about the facilities provided by the Homestay host, as advertised in the internet. Meanwhile, the Homestay hosts should concern about the services provided so that the customers will return to their Homestay in the future and also recommend the Homestay to the others.

Table 2: Results of Independent t-Test

Factors/ Group of Test	**Mean**	**Standard Deviation**	**t-value**	**p-value**
Facilities				
Internet ~ Other promotion tools	2.4902, 2.3184	.9764, .8188	2.135	.033*
Services				
Internet ~ Other promotion tools	2.6275, 2.7092	1.0110, 1.0063	-.906	.366

*Significance at 5% level of significance

Table 3 shows that the intention among the customers to return in the future to the same Homestay based on different promotion tools used. The analysis found that the best Homestay promotion tool; internet is the highest tendency of customers to return in the future (220, 86.30%) out of 255 customers. In addition, 215 (84.30%) of them will recommend their selected Homestay to the others, as stated in Table 4. These findings revealed that the customers easily to recommend the Homestay to others by using the internet. It revealed that internet gives a deep impact on Homestay advertising, supported by Ana Maria **(**2014**)** and Soares et al. (2012).

Table 3: Cross Tabulation Table of Return in the Future to the Homestay

Promotion Tools	Return in the Future		Total
	Yes	No	
Internet (Website/ Social network)	220 (86.30%)	35 (13.70%)	255
Family/ Friends	80 (80.00%)	20 (20.00%)	80
Radio/ Television	50 (76.90%)	15 (23.10%)	65
Brochure/ Billboard/ Newspaper	55 (76.90%)	10 (23.10%)	65
Travel agency	15 (100%)	0	15

Table 4: Cross Tabulation Table of Recommendation of Homestay to Others

Promotion Tools	Recommendation		Total
	Yes	No	
Internet (Website/ Social network)	215 (84.30%)	40 (15.70%)	255
Family/ Friends	80 (80.00%)	20 (20.00%)	80
Radio/ Television	50 (76.90%)	15 (23.10%)	65
Brochure/ Billboard/ Newspaper	55 (76.90%)	10 (23.10%)	65
Travel agency	15 (100%)	0	15

Conclusion and Recommendation

It can be concluded that internet becomes the best Homestay promoter at West Pahang region compared to other promotion tools with more than 50 percent of the customers got the information about the Homestay program from the internet. In addition, more than 80 percent will return in the future and also will recommend the Homestay to the others because of the good services provided by the Homestay host. Future study is highly recommended to examine the effectiveness of internet usage in promoting Homestay program in Malaysia especially the official website for Homestay directory in Malaysia; http://www.go2homestay.com/ in wider region.

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A STUDY ON THE EFFECT OF TANGIBLE SERVICE QUALITY TOWARDS CUSTOMER SATISFACTION: A CASE STUDY OF HOMESTAY PROGRAMME

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Abstract: *A homestay programme gives local and international tourists an opportunity to stay with a chosen family, interact and experience the daily life of their Homestay family. They can also learn the culture and lifestyle of the rural communities in Malaysia. This programme is much related to the service quality provided by the Homestay families, including a tangible component. The tangible component refers to the physical facilities and equipment provided, and also the appearance of the Homestay family members. Therefore, the purpose of this study is to determine the effect of tangible service quality on customer satisfaction. In total, 102 customers were selected and they stated that on the average, the tangible quality was rated as 4.95 out of 10 points. This figure indicated that the overall tangible quality provided did not meet the customers' needs. Correlational analysis shows that there is a strong positive significant relationship between the variables, and 37% of customer satisfaction was influenced by tangible quality itself. These findings revealed that the tangible has significant direct effect towards customer satisfaction (β = .608, p = .000). The study is hoped to provide a direction for service quality improvement especially in tangible dimension to the Homestay programme and the service industry in general. In addition, the findings could also be used for future research in the subjects of other service quality dimensions.*

Keywords: Homestay programme, Tangible, Customer Satisfaction

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Introduction

Tourism industry is a service sector that has been recognized to give a greater impact to the economy of a nation (Le Na, 2010). In Malaysia, tourism industry placed as the second largest contributor to the economy after manufacturing sector (Abdul Aziz, Lim &Mahdzar, 2006; Ibrahim & Abdul Razzaq, 2010). In fact, tourism was selected as one of the National Key Economic Areas (NKEA) under the National Transformation Programme (NTP) in 2010 as part of the Malaysia's growth plan to achieve high income status (Jala, 2016). As one of

the tourism products, homestay program plays a crucial role to the economy since it can be considered as the fast growing segments of tourism market (Wang, 2007).

Foreign tourists visit the Malaysian homestay program to experience its uniqueness. Boasting a wide range of attractions, it offers tourists with such a beautiful nature, art and crafts, musical and cultural activities, habitat and vernacular architecture, historical significance, traditional food and beverage, agriculture projects or activities, and special phenomena (Ibrahim & Abdul Razzaq, 2010). With these reputations and its role in Malaysian economy, it can be surmised that homestay operators should envisage a high service quality to maintain survival and competitiveness of their business (Liao, 2012). Furthermore, Kasuma, Esmado, Yacob et al. (2016) stated that homestay program is a highly competitive in tourism market, hence demanding the homestay provider to offer a right quality service at a right time in order to gain customer satisfaction.

The quality can be defined as the attributes and features of products and services that could satisfy users. There are different perception towards quality in products and quality in service. The quality in products could be gained whenever the users feel satisfied and believe the products could fulfil their needs. On the other hand, the service quality could be different because it is based on perception upon the users received the services. In addition, the service cannot be maintained as production as it comes from the good or poor performance served by the organization. Parasuraman, Zeithaml& Berry(1988) mentioned that the quality services used to satisfy customers since it could dictate the poor or good services by users'perception that already experienced it. In other words, customer satisfaction is vital to the organization as they know it could create customer loyalty. Thus, the providers try to serve them with the best and high quality services. However, in the case of homestay, the different standards of perception by visitors have always provided key challenges to the providers to suit to the customers' satisfaction.

Literature review

Studies on service quality and customer satisfaction started becoming the limelight in the 1980s (Williams &Uysal, 2003; Kayat, 2007). It is generally held that Swan and Comb (1976) are the early authors that concerned with the issues of measuring services quality and the factors of services quality (El-garaihy, 2013). Service quality is referred to the perceived quality or judgment by the consumers about an entity's overall excellence or superiority (Zeithaml, 1988). It is the relationship of what is desired and received by customers from the service. Researchers and practitioners have put their interest and emphasizes on service quality as it has significantly influenced the business performance, customer satisfaction, employee retention and profitability (Ali, 2015; Amin, Ismayatim, Nasharuddin et al., 2013; Ali, Khan &Rehman, 2012; Sultan & Wong, 2013;Che Muhammad, AbdJabar, Syed Wahid et al., 2015) and ensuring customer loyalty, high return on investment and gaining competitive advantage (Kim & Lee, 2010; Le Na, 2010). On the other hand, customer satisfaction is defined as the extent of pleasure or contentment level felt by the visitors as a result from the experience of consuming a service (Severt, Wong, Chen et al., 2007). In tourism context, consumersare deemed to attain satisfaction when they perceived experiences services which are beyond their expectations (Aliman, Mohamed Hashim, Mohd Wahid et al., 2016). In addition, customer satisfaction resulting from high service quality in tourism will lead to positive word-of-mouth endorsements, repeat visits and referrals, which eventually affect the financial performance of suppliers associated with the tourism industry (Ismail, Hanafiah, Aminuddin et al., 2016).

For homestay business, service quality is one of the critical success factors because it leads to customer satisfaction, stimulates repeated visits and encourages recommendations by the tourists (Kasuma et al., 2016). The renowned theoretical construct in measuring service quality and customer satisfaction is the SERVQUAL model developed by Parasuraman, Zeithamland Berry (1985) which considers ten basic factors of quality. It is then concentrated and reduced to only five dimensions by these authors in 1988 to gauge the service quality consist of tangibles, assurance, empathy, reliability and responsiveness (Ali, 2015; Osman, 2013). These five dimensions are often used by many researchers and scholars to measure customer satisfaction towards service quality whether in tourism (Sriyam, 2010; Yator, 2012) or other various industries (Ali, 2015). However, Ali (2015) mentioned that, various studies also reported issues on applicability and universality of SERVQUAL model which lead scholars and researchers to start modifying the model with different dimensions and terminologies.

The tangibles dimension is described as the physical quality such as facilities, equipment and personnel appearance (Parasuraman et al., 1988). According to Yator (2012), facilities like well-furnished reception desk or trained personnel can influence customer perceptions about tangibles service qualities. Meanwhile, Alsaqre (2011) in his study recommended that great attention must be given to all tangible factors of service quality because such factors have their influence on customers' loyalty and can bring more profits to the organization. This is also highlighted by Abdullah, Abdul Razak, Marzuki et al. (2013), measuring five satisfaction assessments such as comfort, safety, cleanliness, sufficiency and functionality towards the facilities provided at Langkawi Island jetty terminals. They find that the operators of tourism products and services should have precise plan and using a specific approach to conduct the maintenance activities of their facilities so that the tourist activities may be carried out without unnecessary hindrances and to maintain satisfaction level.

It is important to understand how the customer perceived the quality of the services rendered since it will be translated into satisfaction level of customer. In this research, one service quality dimensions which is tangibles is used as a tool to measure customer satisfaction of homestay programme in Malaysia since this program has become a potential sector to improve the development of economy, infrastructure, social, and the environment factors especially in tourism sector (Pusiran& Xiao, 2013).

Research Methodology

Respondents

The sample consisted of 102 customers of homestay programme in Malaysia. All customers aged more 20 years old participated on a voluntary basis by answering a questionnaire.

Instrument

The data was collected through a self-developed questionnaire which included three sections; Section A, B and C. Section A focuses on demographic questions, Section B comprises five items of tangible service quality and Section C is based on eight items of customer satisfaction. Interval scales were used to record the responses for Section B and C that ranges from 1 = *Strongly Disagree*to 10= *Strongly Agree*.

Procedure

The Statistical Procedures for Social Sciences (IBM SPSS) 24.0 was used to code and analyze the data. The reliability tests to signify the consistency of the internal component and also the assumptions of parametric statistics were tested on the data. Finally, a regression analysis was conducted to identify whether the tangibles dimension of service quality has any significant effects on customer satisfaction towards homestay programme.

Findings and Discussion

In total, 48 (47.06%) male and 54 (52.94%) female customers were involved in this study. Majority of them are at least diploma holders (43, 42.16%) aged more than 20 years old. As can be seen in Table 1, the reliability statistics for both variables exceeds the minimum value of 0.6, which shows the internal consistency of the variables in the scale. According to Sekaran&Bougie (2010), reliabilities in the 0.70 range are acceptable and those over 0.80 are good. The reliability analysis in Table 1shows the two constructs are found to have good and acceptable reliabilities.

Table 1: Reliability Analysis

Constructs	Number of items	Cronbach's alpha
Tangible service quality	5	0.635
Customer satisfaction	8	0.873

Preliminary assumption testing indicated that both constructs; tangible dimension of service quality (M= 4.95,SD = .6037) and customer satisfaction (M = 5.86, SD = .7274) feedbacks were normally distributed since the p-value of normality test was more than 5% level of significance. In addition, the correlation analysis reveals that there is astrong positive relationship between tangible dimension and customer satisfaction (r = .608, p-value = .000). The results are also significant and suggest regression analysis is appropriate for the next analysis.

In this study, customer satisfaction is selected as the dependent variable to be predicted by one independent variables; tangible service quality. The regression model obtained can be written as

$$Y = \beta_0 + \beta_1 X + \varepsilon_i ,$$

Where Y = customer satisfaction, X = tangible service quality and ε_i is the model error which assumed to be normally distributed with constant variance.A regression analysis shows that the result of the model is significant (F1, 100 = 58.776, p-value < .01) with the predictor is significantly affecting the customer satisfaction towards homestay programme (Table 2). In addition, the R-square of the model is 0.370which indicates the tangible service quality can explain 37.00% of the variation of customer satisfaction towards homestay programme, and the other 63.00% by other predictors. Results also show that the tangible service quality is a significant predictor of customer satisfaction towards homestay programme since the p-value= .000 (p-value< .01) as stated in Table 3. The result of this significant predictors supported by Yator (2012) and Alsaqre (2011) who found that tangibles service qualities can influence customers' perceptions and also customers' loyalty.

Table 2: Analysis of Variance

Model	Sum of squares	Degree of freedom	Mean square	F	*p*-value
Regression	19.781	1	19.781	58.776	.000
Residual	33.654	100	.337		
Total	53.435	101			

In addition, Table 3 also shows the result of collinearity test which the results obtained can conclude that there is no multicollinearity exist since the value of tolerance for each predictor is greater than 0.1 (VIF < 10). Therefore, the results indicate that with better service quality of tangible dimension, the customers tend to have better satisfaction level towards homestay programme, as stated by Kasuma et al. (2016). This will lead an improvement of service quality that increases customers' perception towards the programme.

Table 3: Regression Analysis

Model	Coefficient	Standardized Beta	t	*p*-value	Collinearity Statistics	
					Tolerence	VIF
Constant	2.231		4.677	.000		
Tangible	.733	.608	7.667	.000	1.000	1.000

The estimated regression model for this study can be written as follows.

$$\hat{Y} = 2.231 + 0.733X$$

Conclusion and Recommendation

This study found that on the average, the selected customers scored only 4.95 out of 10 points for the tangible service quality provided. It shows that the physical quality such as the facilities, equipment and the personnel appearance provided did not satisfy the customers. This score will lead the customers to have negative perceptions towards homestay programme and at the same time they will have intention to visit the homestay again in future. In addition, 37.00% customer satisfaction towards the programme was influenced by the tangible service quality indicates that there is enough evidence to prove that the tangible quality affected customer satisfaction.

Therefore, homestay programme operators should take further actions to improve their service quality which is not only limited to tangible quality, but also to other service quality dimensions. Future study may emphasize the other factors influencing customer satisfaction such as reliability, responsiveness, empathy, assurance or safety quality. Thus, it is hoped that the findings from this study provide some useful information to those who are involved in homestay programmes because the quality services are important in satisfying customers since they can dictate the services either poor or good by users who already experience it.

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