WILLINGNESS OF VISITORS TO PAY FOR CONSERVATION OF GIANT PANDA AT ZOO NEGARA, MALAYSIA

MUHAMAD ZHARIF LUQMAN BIN HASHIM

IKDPM 2018 4

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By

MUHAMAD ZHARIF LUQMAN BIN HASHIM

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Master of Science

November 2018

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DEDICATION

I would like to dedicate my work to:

My father, Hashim Bin Haji Ismail
My mother, Noridah Binti Mohd Badri
My late grandmother, Kasiah Binti Md Idris

I love all of you so much.

Thank you so much

Alhamdulillah, thank you Allah s.w.t

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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November 2018

Chariman : Professor Ahmad Shuib, PhD
Institute : Agricultural and Food Policy Studies

As a symbol of 40 years diplomatic relation between Malaysia-China, in year 2014 China Wildlife Conservation Association (CWCA) and Malaysian government have make a deal to loan two Giant Pandas. The arrival pair of Giant Panda has increased the number of visitors to the Giant Panda Conservation Centre (GPCC) in past three years. Facilities for Giant Panda are available at GPCC located in the Zoo Negara The general objective of this study was to estimate the conservation value of the Giant Panda at the Zoo Negara. Non-market valuation is used to compute the economic value of environmental resources. Even though several techniques can be used to evaluate the non-market commodities (environmental services), this study used the Contingent Valuation Method. This survey obtained an information in describing visitors' willingness to pay for conservation of Giant Panda. A total of 335 respondents were selected among the visitors at GPCC. The results indicate that visitors to GPCC are willing to pay for the conservation of Giant Panda about RM24.88 per visit, while the conservation value was estimated at RM10.8 million for the year 2016. Findings also show that the factors influenced the WTP are monthly income, attractiveness of Giant Panda, visit experience in GPCC and perception on cost of visit to GPCC. This findings would also be helpful to assist the management authority to determine the admission fee and determining how much they can increase the entrance fee to visitors who enter the GPCC in the future.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KESANGGUPAN PENGUNJUNG UNTUK MEMBAYAR KONSERVASI GIANT PANDA DI ZOO NEGARA, MALAYSIA

Oleh

MUHAMAD ZHARIF LUQMAN BIN HASHIM

November 2018

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Sebagai simbol hubungan diplomatik selama 40 tahun antara Malaysia-China, pada tahun 2014 *China Wildlife Conservation Association* (CWCA) dan kerajaan Malaysia telah membuat perjanjian untuk membiayai dua *Giant Panda*. Kedatangan *Giant Panda* telah meningkatkan jumlah pengunjung yang berkunjung ke *Giant Panda Conservation Centre* (GPCC) dalam masa tiga tahun. Kemudahan untuk *Giant Panda* tersedia di GPCC yang terletak di dalam Zoo Negara. Objektif umum kajian ini adalah untuk menganggarkan nilai pemuliharaan *Giant Panda* di Zoo Negara. Penilaian bukan pasaran digunakan untuk mengira nilai ekonomi sumber alam sekitar. Walaupun beberapa teknik boleh digunakan untuk menilai komoditi bukan pasaran (perkhidmatan alam sekitar), kajian ini menggunakan Kaedah Penilaian Kontingen. Tinjauan ini bertujuan mendapat maklumat dalam menggambarkan kesanggupan untuk membayar pengunjung untuk pemuliharaan *Giant Panda*. Sejumlah 335 responden telah dipilih di kalangan pengunjung di GPCC. Hasilnya menunjukkan bahawa pengunjung ke GPCC sanggup membayar untuk pemuliharaan *Panda Giant* sekitar RM24.88 setiap lawatan, manakala nilai pemuliharaan dianggarkan pada RM10.8 juta bagi tahun 2016. Hasil kajian juga menunjukkan bahawa faktor-faktor yang mempengaruhi WTP adalah pendapatan bulanan, daya tarikan *Giant Panda* pengalaman semasa berada di dalam GPCC dan persepsi mengenai kos lawatan ke GPCC. Hasil kajian ini juga boleh digunakan untuk membantu pihak pengurusan untuk menentukan yuran kemasukan dan menentukan sejauh mana mereka boleh meningkatkan yuran masuk kepada pelawat yang memasuki GPCC pada masa akan datang.

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This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
CITES	Convention on International Trade of Endangered Species
CS	Compensating Surplus
CV	Compensating Variation
CVM	Contingent Valuation Method
CWCA	China Wildlife Conservation Association
DBDC	Double Bounded DC
DC	Dichotomous Choice
ES	Equivalent Surplus
ESA	Endangered Species Act
EV	Equivalent Variation
FA	Factor Analysis
GPCC	Giant Panda Conservation Centre
ICDP	Integrated Conservation and Development Project
IUCN	International Union for Conservation of Nature
KMO	Kaiser-Meyer-Olkin
NOAA	National Oceanic and Atmosphere Administration
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Square
PES	Payments for the Environmental Services
T&E	Threatened and the Endangered
TCM	Travel Cost Method
TEV	Total Economic Value

TIOLI	Take It Or Leave It
WAZA	World Association of Zoos and Aquariums
WTA	Willingness To Accept
WTP	Willingness to Pay
WWF	World Wide Fund For Nature

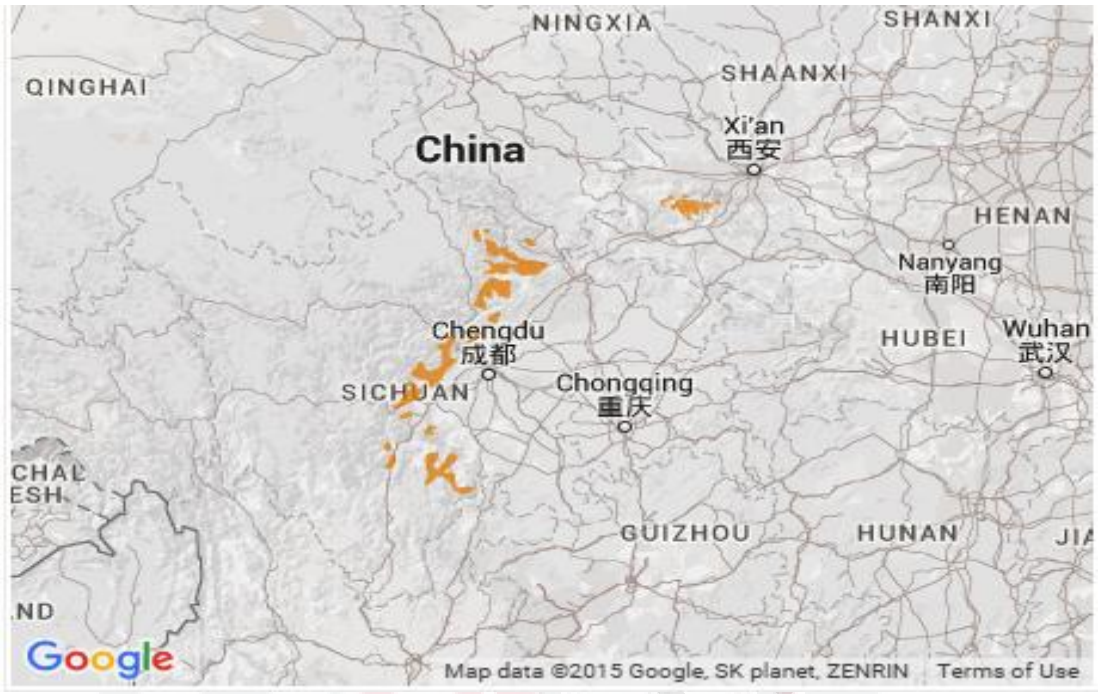
CHAPTER 1

INTRODUCTION

1.1 Giant Panda

As one of China's national treasures, the Giant Panda, otherwise known by its scientific name *Ailuropoda melanoleuca*, is a highly special bear species. Only 1,864 Giant Pandas are known to exist in their natural habitat (IUCN, 2017). Therefore, in order to help sustain the recovery of the Giant Panda population and habitat, several protection acts have been introduced (Wei *et al*., 2015). Additionally, an increase in the land area of the [wild] Giant Panda of 2,720 km^2 has resulted in a further 268 individual pandas added to the overall population between the period of the Third National Panda Survey (1999–2003), and the Fourth National Survey (2011–2014).

Giant Pandas only exist in south-central China and are located in five isolated mountain ranges (Minshan, Qinling, Qionglai, Liangshan, Daxiangling, and Xiaoxiangling) in the Gansu, Shaanxi and Sichuan Provinces (IUCN, 2016) (see Figure 1). The habitat comprises of thick forest vegetation and dense bamboo at an altitude of 1,200–4,100 m asl (IUCN). The Giant Panda depends on dense vegetation and this particular type of bamboo. When winter arrives, the Giant Panda does not hibernate but instead, travels to areas of lower altitude to take up temporary shelter in hollow trees, rock crevices, and caves. Most of the day, around 55 % of each day, the Giant Panda will feed on bamboo and consume about 99 % of bamboo as part of their overall dietary needs. Further, they feed on over 60 species [varieties] of bamboo, however, only 35 species of the bamboo form part of their primary food source (IUCN, 2016). They frequently consume different species of bamboo in different areas in different seasons.



Extant residence of giant panda
Source: IUCN (2016)

Figure 1.1 : Extant residence of Giant Panda

Giant Pandas are solitary animals, often avoiding contact with their own kind except during breeding [mating] season and when offspring [cubs] are born. During the breeding season in March-May, the female Giant Panda may breed with several males. At the time of giving birth, usually around August-September, the female will often deliver her offspring in rock dens, or hollow trees (IUCN, 2016). The female will only raise one baby Giant Panda, (known as a cub); even if more than one cub are born.

The Giant Panda is recognised as a vulnerable and threatened species in China and under the Chinese Wildlife Conservation Law (1988); they are listed in Category 1 (maximum level of protection). In 1989, the Chinese Ministry of Forestry (now SFA) and the WWF drafted a conservation plan to protect the Giant Panda, and in 1992, the plan was implemented which aims to guide the conservation of the species.

1.1.1 Giant Panda Loan Programme

The Giant Panda Loan Programme was one of the initiatives introduced for the conservation of the Giant Panda. From the 1950s, China was using the Giant Panda as a diplomatic symbol, and between 1958 and 1982, China gave 23 Giant Pandas to nine different countries (including Russia, Japan, and the UK). Since 1984, the Giant Pandas have no longer been used as agents of diplomacy mainly because the Giant Panda was fast becoming an endangered species. Instead, China began to offer Giant Pandas to other nations, on ten-year loans which include a loan fee up to US$1 million

per year and the provision that if any cub is born during the loan period, it becomes the property of China (Buckingham *et al*., 2013). There are 3 phases in the Giant Panda Loan Program according to Buckingham *et al.* (2013) where: Phase 1 during the Mao era (in the 1960s and 1970s) took the form of China gifting Giant Pandas to build strategic friendships. Phase 2 followed Deng Xiaoping's rise to power in 1978 when gifts became gift loans involving a capitalist lease model based on financial transactions. In the emerging phase 3, Giant Panda loan programme are associated with nations supplying China with valuable resources and technology and symbolize China's willingness to build guanxi—namely, deep trade relationships characterized by trust, reciprocity, loyalty, and longevity.

Phase 1: Building

Strategic Alliances in the Mao Era Panda diplomacy has a long history: in the Tang dynasty (624–705), two Giant Pandas were presented to the Japanese (Watts, 2007). However, modern panda diplomacy began in the late 1950s as part of a foreign-policy strategy of Chairman Mao Zedong. In brief, the Chinese Communist Party perceived the USSR as its militant revolutionary rival and the United States (US) as its major ideological adversary. Rather than fighting "with both fists" (Scott, 2007), Chairman Mao hoped that by opening up to both these two superpowers, they would recognize China's emerging position and create a triangular power balance, thereby preventing violent conflict (Scobell, 2007). Living pandas had huge popular appeal outside China. The 1936 arrival of Su Lin in the US (brought back by explorer Ruth Harkness) had been a public sensation (Nicholls, 2010), and Chi Chi, acquired by London Zoo from an animal dealer in 1958, became one of the best-loved zoo animals ever: it was the inspiration for the famous logo of the World Wildlife Fund (WWF, founded in 1961).

Recognizing the diplomatic value of the panda's superstar qualities, the People's Republic of China (PRC) began gifting them as part of strategic friend making. The first gifts were in 1965 to President Nikita Khrushchev of the Soviet Union and Kim Il-Sung of the Democratic People's Republic of Korea (DPRK), commonly known as North Korea. Subsequently, Chairman Mao presented US President Richard Nixon and UK Premier Edward Heath with pairs of Giant Pandas during their historic state visits to China in 1972 and 1974, respectively (McGeown, 2005). In all, China gifted 24 Giant Pandas as "goodwill ambassadors" to nine nations during 1957–1983 (Schaller, 1994).

Public interest in the possibility of breeding these Giant Panda gifts in Moscow, Washington, DC, and London served to further enhance the symbolic role of Giant Pandas in international relations. The rarity of Giant Pandas outside China necessitated exchanges between zoos located across ideological divides, notably between London and Moscow, and the difficulty of inducing captive Giant Pandas to mate (and repeated failures) provided the popular media with a rich source of satirical cartoons and nationalist puns—for example, the James Bond movie–inspired From Russia—without Love (Nicholls, 2010). This blend of cuteness, incompetence in love, and

nationalistic banter, combined with its assignment as the emblem of international conservation, served to make the Giant Panda a cultural animal icon in the West. This together with the opening up of relations between China and the West prompted the logic that, if the WWF had the panda as its logo, it should also have field projects concerned with its survival. Through fortuitous connections and after difficult negotiations, the WWF and the Chinese State Forestry Administration embarked on a collaborative conservation project involving the building and equipping of the Wolong research center and systematic research on Giant Panda-species biology (O'Brien, Wenshi, and Zhi, 1994; Schaller, 1994; as cited in Buckingham *et al*., 2013).

Phase 2: State-Controlled

Capitalist Gift Loans Following Deng Xiaoping's rise to power in 1978, China embarked on a program of economic reforms leading to state-led capitalism characterized by an "open-door policy" (to Western investment) and the creation of special economic zones adopting capitalist principles (Sung, 1991). Such principles were extended to Giant Pandas and after 1984 gifts became gift loans involving a capitalist lease model based on financial transactions (Buckingham *et al*., 2013). The purpose of Giant Panda diplomacy moved from an emphasis on geopolitics to a focus on markets: prestigious zoos in nations seen as important markets for Chinese products were offered the opportunity to lease Giant Pandas for six-figure sums plus a percentage of merchandising sales (Peddie, 2010; as cited in Buckingham *et al*., 2013).

This phase commenced in 1984 [the same year the International Union for Conservation of Nature listed the Giant Panda as an endangered species (Imbriaco, 2006)] when China presented two pandas to Los Angeles Zoo during the city's hosting the Olympic Games. This deal prompted "vigorous jostling by North American and European Zoos to obtain pandas for exhibition" (Schaller, 1994). Between 1984 and 1987, pandas were leased to eight zoos for a fee of US$50,000 per month per panda (Imbriaco, 2006). This rent-a-panda program became the subject of intense controversies (Schaller, 1994). Besides animal welfare concerns, conservationists objected because the Convention of International Trade in Endangered Species legislated that, as an Appendix 1 listed species, trade in pandas should be permitted for only scientific purposes and/or to enhance propagation and survival of the species. To meet the latter criteria, Chinese authorities abandoned short-term loans in 1991 in favor of a system, proposed by both Chinese and Western conservationists, of long-term loans (to allow breeding), with lease fees being used to finance implementation of a giant panda management plan that was published by the WWF in 1991 and approved by the Chinese Forest Administration in 1993 (O'Brien, Wenshi, and Zhi, 1994; as cited in Buckingham *et al*., 2013).

Phase 3: Building Guanxi and Trade Relations after the 2008 Earthquake

It seems that the 2008 Sichuan earthquake created an impetus for a third phase of panda diplomacy. This Richter scale 8 quake permanently destroyed an estimated 5.9% (656 km2) of Giant Panda habitat and affected 67% of Giant Panda habitat overall (Ouyang et al., 2008; Zheng et al., 2012). Damage in Sichuan Province, the focus of Giant Panda-conservation activities, was significant: 23% (354 km2) of Giant Panda habitat was damaged, including 249 km2 inside nature reserves. Adding to this setback, the quake hit during the 24- to 72-hour window each spring when female Giant Pandas are fertile. It is assumed that recruitment to the wild and captive populations was interrupted (Ang, 2008; as cited in Buckingham *et al*., 2013). Significantly, the Wolong Nature Reserve and Breeding Center was badly damaged, and all of the center's 60 Giant Pandas required rehousing. The majority were moved initially to the Ya'an Conservation Center in Bifengxia National Reserve (280 km away). However, the center's limited facilities and the limited capacity elsewhere in China to house these "refugee" pandas with their complex husbandry requirements represented something of a crisis for Chinese authorities (Xinhua, 2011).

Repairs to the Wolong nature reserve were expected to take at least four years and expanding Giant Panda loans represented both a lucrative source of funds to assist the rebuilding and development of the Wolong center and a partial solution to the housing problem.

One response was to extend existing gift loans due to expire in 2010, 2015, and 2013 with two US zoos and one Thai zoo, respectively, after which the Giant Pandas would have been returned to China (Pattaya Daily News, 2011; Trindle, 2011; Zabarenko, 2011; as cited in Buckingham *et al*., 2013). A second response was to offer Giant Panda gift-loans to a new group of nations with which China was negotiating important trade agreements. Japan received a pair in March 2011 (Japan Today, 2011; as cited in Buckingham *et al*., 2013), Scotland their first pair in December 2011, and Canada a pair in 2011, with France (Telegraph, 2012; as cited in Buckingham *et al*., 2013), Singapore receiving a pair each in 2012 (AsiaOne, 2012; as cited in Buckingham *et al*., 2013) and Malaysia in 2014 (Zoo Negara News, 2014). Two patterns are discernible in these recent panda transactions: first they involve close Asian neighbour nations that have signed free-trade agreements with China since 2009, and second they involve nations supplying China with natural resources and advanced technologies (Buckingham *et al*., 2013).

1.1.2 Giant Panda in Malaysia

In 2014, as a symbol to recognise the 40-year diplomatic relationship between Malaysia and China, the China Wildlife Conservation Association (CWCA) and the Malaysian government enacted a deal [arrangement] for the loan of pair of Giant Pandas. In a statement by Malaysia's Natural Resources and Environment Ministry at the end of June 2012, "China will loan two Giant Pandas as another example in

strengthening the bilateral relationship between the two countries" (Zoo Negara News, 2014).

Under this arrangement, the Chinese government would loan the two pandas for ten years to Malaysia as a symbolic diplomatic measure to demonstrate the relationship. In addition to Malaysia, the CWCA has also undertaken similar long-term exchange programmes of 51 Giant Pandas with 17 zoos from 12 countries including the United States of America, Canada, Mexico, Scotland, Austria, France, Spain, Japan, Thailand, Taiwan, Australia, Singapore, and Belgium (IUCN, 2016).

The two pandas were named; Fu Wa (male) and Feng Yi (female), both came from the famous Wolong group that attended the Beijing Olympics. On 18th August 2015, the first baby Giant Panda was born and was safely delivered at 1.45 p.m. at Zoo Negara in Kuala Lumpur (Annual Report 2015 The Zoological Society, 2015). However, based on the agreement between Malaysia-China, (i.e. the Giant Panda International Conservation Agreement), a new-born cub can only remain in Malaysia for two years and will then be sent back to Chengdu, China (Zoo Negara News, 2014).

In welcoming the Giant Pandas from China, the Malaysian government allocated RM25 million towards constructing a complex similar to their habitual surroundings, complete with three main exhibits [viewing] areas, and temperatures maintained below 24 °C in order to cater for their comfort and well-being in 1.6 hectares area. In addition, Zoo Negara needed to outlay RM1.5 million per year for administrative expenses, meals and a further US$1 million (approximately RM4.27 million[1]) per year to the Chinese Government for the pair of Giant Pandas and $600,00 (RM2.56 million[1]) for the new born cub of Giant Panda born in GPCC.

The complex contains an exercise area, food preparation area, veterinary clinic, holding den, storage room, laboratory, incubator room, monitoring room and nursery (The Sunday Daily, 2014). Four workers from Zoo Negara were selected as keepers' for the Giant Panda for the next ten years. Importantly, the Dujiangyan Panda Base in China guided the keepers' in the care and maintenance of the Giant Pandas while in Malaysia.

1.2 Economic Value of Wildlife Conservation

Economic valuation is different from monetary economic valuation. Monetary economic valuation is reasonably more straightforward for ecosystem service aspects that are traded in markets, or that can be related to markets. This is because market

[1] US$1 = RM4.27 (27th January 2016)

prices are available, which is a signal that the scarcity of these environmental goods can be used as proxy for their value (Lienhoop et al., 2015).

On the other hand, economic valuations are normally used for measuring resource conservation in developed countries; although this is gradually filtering into developing countries. Economic valuation is also one of the ways to value the changes in the level of goods and services provided by the environment (Shahwahid, 2008). This method can be classified as the provision of economic values, and these environment functions offer direct use values, indirect use values, option values and non-use values.

Furthermore, economic value is one of the many possible ways to define and measure value of all goods and services. Although the other types of value are often important, economic values are useful to consider when making economic choices that involve trade-offs in allocating resources. Notwithstanding, the measures of economic value are based on what people prefer. Thus, the theory of economic valuation is based on individual preferences and choices. To illustrate, people express their preferences through the choices and trade-offs they make, such as on income or available time. Thus, economic value can be measured in terms of other goods and services, by someone who is willing to give up the most. In a market economy, monetary value is replaced for measuring economic value; this is because as money, it can be easily calculated by how much someone is willing to pay to obtain goods or services (Heal *et al*., 2005).

Additionally, economic, monetary valuation of biodiversity can occur in different ways. For instance, using market price information and eliciting consumers' preferences using a wide range of non-market valuation methods. Monetary indicators of biodiversity values are based on market price valuation mechanisms such as the value of the financial [commercial] revenues from tourism activities related to visitations to natural areas and the value of contracts signed by firms and governmental agencies. Known in the literature as bioprospecting contracts, such contracts are characterised as the search among the genetic codes in living organisms, for the development of chemical compounds of commercial value, i.e. market priced value (Simpson *et al*., 1996). Value is a cultural and psychological concept and is related to the question of how human beings perceive things. Indeed, something has a value if it contributes to the welfare of someone or others. Therefore, goods do not have a value per sale, but instead, their value is related to the perceptions of people (Heal *et al*., 2005).

1.3 Problem Statement

The arrival of the Giant Panda to Zoo Negara is one of the ways that the Chinese government wants to increase the awareness of conservation of the Giant Panda to the public in Malaysia. The number of visitors to the Giant Panda Conservation Centre

(GPCC) increases every year (Table 1.1) which shows the positive impact in terms of increasing the awareness of conservation. From the start of GPCC opening in 2014, the centre attracted 235,134 visitors, within six months starting July 2014. This increase continues the following year when the GPCC has received 240,556 visitors; this is attributed to the birth of baby Giant Panda on 18 August 2015 and being exhibited to the public on November 17th of the same year. The increase continues in 2016 with an increase of 81.22% (435,940 persons).

Table 1.1 : Total Number of Visitor at GPCC

Month	2014	2015	2016
January	-	17,283	30,882
February	-	22,689	43,735
March	-	19,748	30,325
April	-	16,752	23,117
May	-	22,514	34,669
June	-	21,299	29,519
July	41,632	16,394	40,197
August	35,057	20,085	35,707
September	44,668	16,603	40,683
October	33,057	12,616	41,307
November	34,151	23,587	33,948
December	46,569	30,986	51,851
TOTAL	235,134	240,556	435,940

Source: Zoo Negara Malaysia (2017)

This increasing trend shows may be affected by visitors' satisfaction with the Giant Panda at the centre. In a study reported by Poh Yee and Shazali (2016) 90.5% of the respondents were satisfied with the overall facilities in GPCC. The high satisfaction index of the facilities in the GPCC could be due to the new facilities at the centre since as it has just been launched not more than a year ago. Besides, the facilities provided are of international standard which have cost RM25 million to the government. The study only focused on the satisfaction index of the visitors but did not translate the satisfaction of the visitors into a monetary value. The present study by using the willingness to pay (WTP) based on the satisfaction of the visitors filled up the gap.

Nurshazwani *et al*., (2017) stated in another study that the monetary value to the visitors for the conservation of the Giant Panda was RM20.28 per visitor; they used the single bounded dichotomous choice willingness to pay technique. The estimation that the authors made between the periods of June 2014 until December 2014 for the overall value of the Giant Panda in Malaysia was RM5.04 million. These studies conducted based on two Giant Pandas where only a few months in the facility and the Giant Panda is still classified as endangered species. Compared with the study conducted by Nurshazwani *et al.,* (2017), this study was made after two years of Giant Panda live in GPCC and used the double bounded dichotomous choice willingness to

pay technique. As mentioned previously, the first Giant Panda cub was born in Malaysia in August 2015, and this event and new born cub added increasing value towards the attraction of the pandas at the zoo and to the Giant Panda Conservation Centre (GPCC). Researchers were keen to understand whether the newly born cub would provide additional value towards the conservation efforts of the Giant Panda in Malaysia. In 2016, the Giant Panda has been reclassified as a vulnerable instead of endangered species by the IUCN in terms of the conservation programme. Thus the present study would also want to know whether the change in the classification of the species would reduce the value of the Giant Panda in Malaysia.

The importance of determining the satisfaction of visitors toward GPCC cannot be denied. The changes in the satisfaction may have impacts on the number of visitors in the future. The management of GPCC has expressed the needs to maintain the number of visitors and even to attract more visitors to the GPCC so that the management can sustain and cover their cost to maintain the GPCC for next ten years, the loan period for the Giant Panda (per.comm with Director of GPCC, 2016).

Hence, the management of GPCC should acknowledge the significance of studies related to satisfaction of visitors in GPCC. Perhaps one way to accomplish this goal is through the use of economic valuation. Once the satisfaction of visitors in GPCC has been properly valued in monetary units, they become amenable to standard cost and benefit comparisons. This will not only help in justifying the significance of maintaining the GPCC, but the management can also lobbied for larger budget allocations to improve their services at the GPCC to attract more visitors to the GPCC, thus indirectly attract more visitors to Zoo Negara.

1.4 Objective

The general objective of this study was to estimate the conservation value of the Giant Panda at the Zoo Negara by using Contingent Valuation Method (CVM) in order to investigate the changes of conservation value after two years Giant Panda was kept at GPCC. The specific objectives of the study were:

1. To assess the willingness to pay of visitors for the Giant Panda Conservation Centre (GPCC).
2. To determine factors that influence visitors' willingness to pay for the conservation of Giant Panda.
3. To estimate the conservation value of Giant Panda at GPCC placed by the visitors.

1.5 Significance of Study

This study has been done to investigate the benefits of the Giant Panda conservation programme at the Giant Panda Conservation Centre (GPCC), Negara Zoo. Survey was carried out to explore the reasons for visiting the GPCC, determining the various factors which influence the visitor's willingness to pay and for estimating the conservation value of the Giant Panda at the GPCC.

The results of the survey would be very helpful to the Negara Zoo management, the decision makers, and the tourism operators, as they could identify and address the real concerns, which would help in developing and implementing the strategic plan for the satisfaction of the visitors in the future. Furthermore, these results would help in identifying different factors that affect the visitors' satisfaction, with regards to the Giant Panda conservation programmes.

The public education-related research tools are very important in understanding the Giant Panda conservation efforts. Hence, these types of projects must be encouraged as they can improve the knowledge and the awareness about these conservation efforts and encourage the society and people to sustain resources for further generations. The results obtained from this survey can contribute towards the literature regarding the Giant Panda conservation and could initiate more research.

1.6 Organization of Thesis

This thesis has been divided into five chapters. Chapter one presents the general background regarding the habitat of the Giant Panda in Malaysia. This chapter presents the problem statement. Chapter two provided review of some earlier relevant studies.

Chapter three presents the methods used in this study and identifies the main elements involved in the design, implementation and the analysis of the dichotomous choice of the CVM survey. Furthermore, this survey includes many sources, questionnaires, models and finally, data analysis.

Chapter four presents the empirical results like the respondents' profile, the respondents' attitude towards the maintenance of sustainability, and the estimated WTP values, based on various samples. The final chapter presents all the concluding remarks and summary.

REFERENCES

Ahmad, S.A., 2009. *Visitors' willingness to pay for an entrance fee: a case study of marine parks in Malaysia* (Doctoral dissertation, University of Glasgow).

Ahmed, S. U., & Gotoh, K. (2006). Effect of Question Format on WTP in CV Studies. *Cost-Benefit Analysis of Environmental Goods by Applying the Contingent Valuation Method: Some Japanese Case Studies*, 131-137.

Alwin, D. F. (2000). Factor Analysis. Edited by E.F. Borgatta and R.J.V. Montgomery. *Encyclopedia of Sociology. 2nd ed.* Macmillan, New York. Pp.906-922.

Anonymous. (2002). Methods for the Valuation of NTFPs and Environmental Services. In A Model Project for Cost Analysis to Achieve Sustainable Forest Management. Vol.II Main Report, ed. N. Abdul Rahim. *Forestry Research Institute Malaysia & International Tropical Timber Organization*. pp. 115-161.

Arrow, K., Solow, R., Portney, P.R., Leamer, E.E., Radner, R. and Schuman, H., 1993. Report of the NOAA panel on contingent valuation. Federal register, 58(10), pp.4601-4614.

Asenso-Okyere, W.K., Osei-Akoto, I., Anum, A. and Appiah, E.N., 1997. Willingness to pay for health insurance in a developing economy. A pilot study of the informal sector of Ghana using contingent valuation. *Health policy*, *42*(3), pp.223-237.

Asgary, A., Willis, K., Taghvaei, A.A. and Rafeian, M., 2004. Estimating rural households' willingness to pay for health insurance. *The European Journal of Health Economics, formerly: HEPAC*, *5*(3), pp.209-215.

Atim, C. (1999). Social movements and health insurance: a critical evaluation of voluntary, non-profit insurance schemes with case studies from Ghana and Cameroon. *Social Science & Medicine*, *48*(7), 881-896.

Awang Noor, A.G., Mohd Shahwahid H.O., Rusli M., Shukri M., Faridah H. and M. Zakaria. (1998). Economic Valuation of Forest Goods and Services in Malaysia. Paper presented in the Forestry Economics and Policy: R&D towards Achieving Sustainable Forest Management Workshop. 10-11 November, 1998. Forest Economics and Policy Research Group, Faculty of Forestry, Universiti Putra Malaysia.

Ayob, A. M., Rawi, S. B., Ahmad, S. A., & Arzemi, A. (2002). *Valuing environmental goods using contingent valuation method: Case study Pulau Payar*. Research Report.

Barbier, E.B., Acreman, M. and Knowler, D., 1997. Economic valuation of wetlands: a guide for policy makers and planners. Gland, Switzerland: Ramsar Convention Bureau.

Bateman, I. J., Langford, I. H., Munro, A., Starmer, C., & Sugden, R. (2000). Estimating four Hicksian welfare measures for a public good: a contingent valuation investigation. *Land Economics*, 355-373.

Beardsworth, A., & Bryman, A. (2001). The wild animal in late modernity: The case of the Disneyization of zoos. *Tourist Studies*, *1*(1), 83-104.

Bennett, E. L., & Tisen, O. B. (2001). A master plan for wildlife conservation. Sarawak Gazette , 1543, 4-10.

Boman, M., & Bostedt, G. (1999). Valuing the wolf in Sweden: Are benefits contingent on the supply?. In *Topics in environmental economics* (pp. 157-174). Springer, Dordrecht.

Brinckmann, J. A., Luo, W., Xu, Q., He, X., Wu, J., & Cunningham, A. B. (2018). Sustainable harvest, people and pandas: assessing a decade of managed wild harvest and trade in Schisandra sphenanthera. *Journal of ethnopharmacology*.

Brouwer, R. and Slangen, L.H., 1998. Contingent valuation of the public benefits of agricultural wildlife management: the case of Dutchpeat meadow land. European Review of Agricultural Economics, 25(1), pp.53-72

Brunson, M. W., & Shindler, B. A. (2004). Geographic variation in social acceptability of wildland fuels management in the western United States. *Society and Natural Resources*, *17*(8), 661-678.

Buckingham, K. C., David, J. N. W., & Jepson, P. (2013). Environmental reviews and case studies: diplomats and refugees: panda diplomacy, soft "cuddly" power, and the new trajectory in panda conservation. *Environmental Practice*, *15*(3), 262-270.

Burton, M. (1999). An assessment of alternative methods of estimating the effect of the ivory trade ban on poaching effort. *Ecological Economics*, *30*(1), 93-106.

Calia, P. and Strazzera, E., 1998. *Bias and Efficiency of Single Vs. Double Bounded Models for Contingent Valuation Studies: A Monte Carlo Analysis*. Working Paper.

Carson, R. T., & Hanemann, W. M. (2005). Contingent valuation. *Handbook of environmental economics*, *2*, 821-936.

Chase, L.C., Lee, D.R., Schulze, W.D. and Anderson, D.J., 1998. Ecotourism demand and differential pricing of national park access in Costa Rica. Land Economics, pp.466-482.

Cheng, H. K. (1994). *The Economics of Conservation in Perak: Integrating Environmental Economics Analysis Into Resource Use and Planning: a Series of Four Case Studies*. WWF Malaysia.

Cummings, R. G., Brookshire, D. S., & Schulze, W. D. (Eds.). (1986). Valuing environmental goods: An assessment of contingent valuation method. Totowa, NJ: Rowman and Aallanheld.

Damania, R., & Bulte, E. H. (2007). The economics of wildlife farming and endangered species conservation. *Ecological Economics*, *62*(3-4), 461-472.

Desvousges, W. H., Reed Johnson, F., Dunford, R. W., NICOLE WILSON, K., & Boyle, K. J. (1993). Measuring natural resource damages with contingent valuation. In *Contingent valuation: A critical assessment* (pp. 91-164). Emerald Group Publishing Limited.

Dong, H., Kouyate, B., Snow, R., Mugisha, F. and Sauerborn, R., 2003. Gender's effect on willingness-to-pay for community-based insurance in Burkina Faso. *Health Policy*, *64*(2), pp.153-162.

Driver, B. L. (Ed.). (1974). *Elements of outdoor recreation planning*. University of Michigan Press.

Dublin, H. T., Milliken, T., & Barnes, R. F. (1995). *Four years after the CITES ban: Illegal killing of elephants, ivory trade and stockpiles*. IUCN--the World Conservation Union, Species Survival Commission.

Dusik, Jiri & Diem, Doan & Thu Hoa, Le & Tham Hong, Phuong & Phu Hung, Nguyen & Hunt, Steven & Rastall, Richard & Smutny, Martin & Chandrasekharan Behr, Diji. (2011). Using Strategic Environmental Assessment to inform the Forestry Master Plan 2010–2020 of Viet Nam.

Fan, J., Li, J., Xia, R., Hu, L., Wu, X., & Li, G. (2014). Assessing the impact of climate change on the habitat distribution of the Giant Panda in the Qinling Mountains of China. *Ecological Modelling*, *274*, 12-20.

FAO. (2010). Global Forest Resource Assessment 2010 Main Report. FAO Forestry Paper 163. Food and Agriculture Organization of the United Nations, Rome, Italy

Firestone, R. S. (2016). Aliens, Humans, Animals, & Luck: Animal Treatment & Human Morality.

Garrod, G., & Willis, K. G. (1999). Economic valuation of the environment. *Books*.

Gelso, B. R., & Peterson, J. M. (2005). The influence of ethical attitudes on the demand for environmental recreation: incorporating lexicographic preferences. *Ecological Economics*, *53*(1), 35-45.

Giant panda enclosure almost ready (2014, January 27), *The Sun*: http://www.thesundaily.my/news/941457 (Accessed October 2015)

Grey-Ross, R., Downs, C. T., & Kirkman, K. (2010). An assessment of illegal hunting on farmland in KwaZulu-Natal, South Africa: implications for oribi (Ourebia ourebi) conservation. *South African Journal of Wildlife Research-24-month delayed open access*, *40*(1), 43-52.

Groff, K., & Axelrod, M. (2013). A baseline analysis of transboundary poaching incentives in Chiquibul National Park, Belize. *Conservation and Society*, *11*(3), 277-290.

Hammitt, J.K., Liu, J.T. and Liu, J.L., 2001. Contingent valuation of a Taiwanese wetland. Environment and Development Economics, 6(2), pp.259-268.

Hanley, N. (2000). Contingent valuation as a means of valuing the conservation of coral reefs: An assessment of the method. *Integrated coastal zone management of coral reefs: Decision support modeling*, *1*, 241.

Hannah, L., Roehrdanz, P. R., Ikegami, M., Shepard, A. V., Shaw, M. R., Tabor, G., ... & Hijmans, R. J. (2013). Climate change, wine, and conservation. *Proceedings of the National Academy of Sciences*, *110*(17), 6907-6912.

Heal, G. M., Barbier, E. B., Boyle, K. J., Covich, A. P., Gloss, S. P., Hershner, C. H., ... & Shrader-Frechette, K. (2005). Valuing ecosystem services: toward better environmental decision-making.

Herman, S., A'in, N., Ahmad, S., & Ramachandran, S. (2014). Willingness to pay for highlands' agro-tourism recreational facility: A case of Boh Tea plantation, Cameron Highlands, Malaysia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 19, No. 1, p. 012009). IOP Publishing.

Herman, S., Shuib, A., & Richards, A. (2012). The need for recreational economic valuation at Perlis State Park. *The Malaysian Forester*, *75*(1), 73-80.

Hull, V., Zhang, J., Zhou, S., Huang, J., Vina, A., Liu, W., ... & Huang, Y. (2014). Impact of livestock on giant pandas and their habitat. *Journal for Nature Conservation*, *22*(3), 256-264.

Imbriaco, A. (2006). *The Giant Panda: Help Save this Endangered Species!*. Enslow Publishers, Inc..

IUCN. (2016). The IUCN Red List of Threatened Species. Version 2016-2. Available at: www.iucnredlist.org. (Accessed: September 2016).

Jakobsson, K. M., & Dragun, A. K. (2001). The worth of a possum: valuing species with the contingent valuation method. *Environmental and Resource Economics*, *19*(3), 211-227.

Jamal, O. and Rusmani M. (2003). The Economic Value of Viewing Fireflies. Paper presented at the *International Ecotourism Conference* 2003: *Sustainability of Ecotourism Development in a Competitive Global Environment*. 15-17 April, 2003.

Jamal, O., & Shahariah, A. (2003, April). The Economics of Wetlands Conservation: Case of Paya Indah Wetlands, Malaysia. In *International Ecotourism Conference*.

Johansson-Stenman, O. (1998). The importance of ethics in environmental economics with a focus on existence values. *Environmental and Resource Economics*, *11*(3-4), 429-442.

Kellert, S. R. (1997). *The value of life: Biological diversity and human society*. Island Press.

Kontoleon, A. and Swanson, T., 2003. The willingness to pay for property rights for the giant panda: can a charismatic species be an instrument for nature conservation?. Land Economics, 79(4), pp.483-499.

Kotchen, M. J., & Reiling, S. D. (2000). Environmental attitudes, motivations, and contingent valuation of nonuse values: a case study involving endangered species. *Ecological Economics*, *32*(1), 93-107.

Kozak, M. (2000). A critical review of approaches to measure satisfaction with tourist destinations. *Tourism Analysis*, *5*(2-3), 191-196.

Kramer, R.A. and Mercer, D.E., 1997. Valuing a global environmental good: US residents' willingness to pay to protect tropical rain forests. Land Economics, pp.196-210.

Krishnan, D., Ismail, S. M., Kaffashi, S., & Chamhuri, S. (2017). Household involvement in pioneering payment for ecosystem services in Langat Basin, Malaysia. *Environmental Conservation, Clean Water, Air & Soil (CleanWAS)*, 32.

Kriström, B. (1997). Spike models in contingent valuation. *American journal of agricultural economics*, *79*(3), 1013-1023.

Lampietti, J. A., & Dixon, J. A. (1995). *To see the forest for the trees: A guide to non-timber forest benefits*. The World Bank.

Leong, P. C. (2005). Environmental Attitudes And Willingness To Pay For Highland Conservation: The Case of Fraser's Hill, Malaysia. *Unpublished M. Sc. thesis, Universiti Putra Malaysia, Selangor, Malaysia*.

Li, R.Q., Fan, W., Tian, G., Zhu, H.M., He, L., et al. (2010). The sequence and *de novo* assembly of the giant panda genome. *Nature* 463: 311-317.

Li, X., Jiang, G., Tian, H., Xu, L., Yan, C., Wang, Z., ... & Zhang, Z. (2015). Human impact and climate cooling caused range contraction of large mammals in China over the past two millennia. *Ecography*, *38*(1), 74-82.

Li. Y.M., Guo, Z.W., Yang, Q.S., Wang, Y.S. and Niemela, J. (2003). The implications of poaching for giant panda conservation. *Biological Conservation* 111: 125-136.

Lienhoop, N., Bartkowski, B., & Hansjürgens, B. (2015). Informing biodiversity policy: the role of economic valuation, deliberative institutions and deliberative monetary valuation. Environmental Science & Policy.

Liu, J., Li, S., Ouyang, Z., Tam, C., & Chen, X. (2008). Ecological and socioeconomic effects of China's policies for ecosystem services. *Proceedings of the National academy of Sciences*.

Liu, J., Linderman, M., Ouyang, Z., An, L., Yang, J., & Zhang, H. (2001). Ecological degradation in protected areas: the case of Wolong Nature Reserve for giant pandas. *Science*, *292*(5514), 98-101.

Liu, W., Vogt, C. A., Luo, J., He, G., Frank, K. A., & Liu, J. (2012). Drivers and socioeconomic impacts of tourism participation in protected areas. *PLoS One*, *7*(4), e35420.

Loomis, J. B., & González-Cabán, A. (1998). A willingness-to-pay function for protecting acres of spotted owl habitat from fire. *Ecological Economics*, *25*(3), 315-322.

Loomis, J., Kent, P., Strange, L., Fausch, K. and Covich, A., 2000. Measuring the total economic value of restoring ecosystem services in an impaired river basin: results from a contingent valuation survey. *Ecological economics*, 33(1), pp.103-117.

Lopez-Feldman, A. (2012). Introduction to contingent valuation using Stata.

Lü, Z., Johnson, W. E., Menotti-Raymond, M., Yuhk, I N., Martenson, J. S., Mainka, S., Shi-Qiang, H., Zhihe, Z., Li, G., Pan, W., Mao, X. and O'Brien, S.J. (2001). Patterns of genetic diversity in remaining giant panda populations. *Conservation Biology* 15: 1596-1607.

Mackinnon, J. (2008). Species richness and adaptive capacity in animal communities: lessons from China. *Integrative zoology*, *3*(2), 95-100.

Macmillan, D.C., Philip, L., Hanley, N. and Alvarez-Farizo, B., 2002. Valuing the non-market benefits of wild goose conservation: a comparison of interview and group based approaches. Ecological economics, 43(1), pp.49-59.

Mahat, T. J. (2004). *Economic valuation of environmental resources: A case study of the central zoo of Nepal* (Doctoral dissertation, TRIBHUVAN UNIVERSITY KATHMANDU).

Marikan, D. A. A., Radam, A., & Siti Baizura, J. Z. (2006). The economics of recreational park conservation: A case study of Bako National Park. *Staff Paper 4/2006, Faculty of Economics and Management, University Putra Malaysia, Malaysia*.

Mathews, T., & Katzman, B. (2006). The role of varying risk attitudes in an auction with a buyout option. *Economic Theory*, *27*(3), 597-613.

Mayaka, T. B., Hendricks, T., Wesseler, J., & Prins, H. H. (2005). Improving the benefits of wildlife harvesting in northern Cameroon: a co-management perspective. *Ecological Economics*, *54*(1), 67-80.

McGeown, K. (2005, Mei 3). China's Panda Ambassadors. *BBC News*: http://news.bbc.co.uk/2/hi/asia-pacific/4508873.stm

Mitchell, R.C. and Carson, R.T., 1989. Using surveys to value public goods: the contingent valuation method. Washington, D.C.

Mohd, R. Y., Alias, R., Khairil, W., & Ahmad, S. (2009). Contingent valuation of ecotourism in Marine Parks, Malaysia: implication for sustainable Marine Park revenue and ecotourism management. *World Applied Sciences Journal*, *7*(12), 1474-1481.

Mohd. Shahwahid Hj. Othman. (2008). Mainstreaming the Environment: Incorporating Economic Valuation and Market-based Instruments in Decision Making. *Penerbit Universiti Putra Malaysia*

Mukanjari, S., BEDNAR- FRIEDL, B. I. R. G. I. T., Muchapondwa, E., & Zikhali, P. (2013). Evaluating the prospects of benefit sharing schemes in protecting mountain gorillas in Central Africa. *Natural Resource Modeling*, *26*(4), 455-479.

Mukrimah, A., Mohd, P.M., Mohd, R.Y., Alias, R. and Fui, L., 2015. Estimate the conservation value of biodiversity in national heritage site: a case of Forest Research Institute Malaysia. *Procedia Environmental Sciences*, *30*, pp.180-185.

Mustrapha, R. A. (1993). Valuing outdoor recreational resources in Tasik Perdana using dichotomous choice contingent valuation method. *Malaysian Journal of Agricultural Economics*, *10*, 39-50.

Nicholls, H. (2011). *The way of the panda: the curious history of China's political animal*. Open Road Media.

Nicholls, H. (2011). *The way of the panda: the curious history of China's political animal*. Open Road Media.

Noss, R. F. (1990). Indicators for monitoring biodiversity: a hierarchical approach. *Conservation biology*, *4*(4), 355-364.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory (McGraw-Hill Series in Psychology)* (Vol. 3). New York: McGraw-Hill.

Nurshazwani A.R., Syamsul, H.M.A., A. Shuib, and Sridar, R., 2017 Estimating the Conservation Value of Giant Panda Conservation Centre in Zoo Negara, Malaysia using Contingent Valuation Method. *World Applied Sciences Journal*, 35, pp.16-19

Nuva, R., Shamsudin, M. N., Radam, A., & Shuib, A. (2009). Willingness to pay towards the conservation of ecotourism resources at Gunung Gede Pangrango National Park, West Java, Indonesia. *Journal of Sustainable Development*, *2*(2), 173.

Ölander, F. (1977). Can consumer dissatisfaction and complaints guide public consumer policy?. *Zeitschrift für Verbraucherpolitik*, *1*, 124-137.

Olsen, J.A., Donaldson, C. and Pereira, J., 2004. The insensitivity ofwillingness-to-pay'to the size of the good: New evidence for health care. *Journal of Economic Psychology*, *25*(4), pp.445-460.

Ouyang, Z.,W. Xu, X.Z.Wang,W.Wang, R. Dong, H. Zheng, D.H. Li, and Q. Lizhi. (2008). Impact assessment of Wenchuan earthquake on ecosystems. *Acta Ecol Sin*, *28*, 5801-5809.

Pan, W., Lü, Z., Zhu, X., Wang, D., Wang, H., Long, Y., Fu, D. and Zhou, X. (2001). A chance for lasting survival. Thesis, Peking University Press.

Parker, I. S., & Graham, A. D. (1989). Elephant decline: downward trends in African elephant distribution and numbers (Part II). *International Journal of Environmental Studies*, *35*(1-2), 13-26.

Pearce, D., 1998. Cost benefit analysis and environmental policy. Oxford review of economic policy, 14(4), pp.84-100.

Pearce, D., Markandya, A., & Barbier, E. B. (1989). Blueprint for a Green Economy. London: Earthscan Publications Ltd.

Pearson, K. (1901). LIII. On lines and planes of closest fit to systems of points in space. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, *2*(11), 559-572.

Penning, M., Reid, G., Koldewey, H., Dick, G., Andrews, B., Arai, K., ... & Tonge, S. (2009). Turning the tide: a global aquarium strategy for conservation and sustainability. *Bern, Switzerland: World Association of Zoos and Aquariums. p*, *78*.

Pratt, D. G., MacMillan, D. C., & Gordon, I. J. (2004). Local community attitudes to wildlife utilisation in the changing economic and social context of Mongolia. *Biodiversity & Conservation*, *13*(3), 591-613.

Qin, Q., Li, D., Zhang, H., Hou, R., Zhang, Z., Zhang, C., ... & Wei, F. (2010). Serosurvey of selected viruses in captive giant pandas (Ailuropoda melanoleuca) in China. *Veterinary microbiology*, *142*(3-4), 199-204.

Reaves, D. W., Kramer, R. A., & Holmes, T. P. (1999). Does question format matter? Valuing an endangered species. *Environmental and Resource Economics*, *14*(3), 365-383.

Reid, D. G., Jinchu, H., Sai, D., Wei, W., & Yan, H. (1989). Giant panda Ailuropoda melanoleuca behaviour and carrying capacity following a bamboo die-off. *Biological Conservation*, *49*(2), 85-104.

Richardson, L., & Loomis, J. (2009). The total economic value of threatened, endangered and rare species: an updated meta-analysis. Ecological Economics, 68(5), 1535-1548.

Samdin, Z. (2008). Willingness to pay in Taman Negara: A contingent valuation method. *International Journal of Economics and Management*, *2*(1), 81-94.

Saunders, C. D. (2003). The emerging field of conservation psychology. *Human Ecology Review*, 137-149.

Schaller, G. B., Hu, J., Pan, W. and Zhu, J. (1985). *The giant pandas of Wolong*. University of Chicago Press, Chicago, IL, USA.

Schaller, G.B. 1994. *The Last Panda*. University of Chicago Press, Chicago.

Scobell, A. (2007). China's soft sell: Is the world buying. *China Brief*, *7*(2), 7-10.

Scott, D. (2007). *China stands up: The PRC and the international system*. Routledge.

Sekaran, U. and Bougie, R., 2016. *Research methods for business: A skill building approach*. John Wiley & Sons.

Shahwahid, M., Awang Nor, A. G., Rusli, M., Shukri, M., Faridah, H., & Mohamed Zakaria, H. (1998). Valuing the recreational benefits of the Air Hitam Forest Reserve, Selangor.

Shan, L., Hu, Y., Zhu, L., Yan, L., Wang, C., Li, D., ... & Wei, F. (2014). Large-scale genetic survey provides insights into the captive management and reintroduction of giant pandas. *Molecular biology and evolution*, *31*(10), 2663-2671.

Sichuan Forestry Department. (2015). The 4th survey report on giant panda in Sichuan Province.

Songer, M., Delion, M., Biggs, A., & Huang, Q. (2012). Modeling impacts of climate change on giant panda habitat. *International Journal of Ecology*, *2012*.

Songer, M., Delion, M., Biggs, A., & Huang, Q. (2012). Modeling impacts of climate change on giant panda habitat. *International Journal of Ecology*, *2012*.

Spearman, C. (1904). " General Intelligence," objectively determined and measured. *The American Journal of Psychology*, *15*(2), 201-292.

State Forestry Administration. (2015). The fourth national survey report on giant panda in China.

Sung, Y. W., & Song, E. (1991). *The China-Hong Kong connection: The key to China's open door policy*. Cambridge University Press.

Swaisgood, R. R., Wei, F., Mcshea, W. J., Wildt, D. E., Kouba, A. J., & Zhang, Z. (2011). Can science save the giant panda (Ailuropoda melanoleuca)? Unifying science and policy in an adaptive management paradigm. *Integrative Zoology*, *6*(3), 290-296.

Swaisgood, R. R., Wei, F., Wildt, D. E., Kouba, A. J., & Zhang, Z. (2010). Giant panda conservation science: how far we have come.

The Arrival of Giant Panda (2012), *Zoo Negara News*: http://www.zoonegaramalaysia.my/arrival-panda.html (Accessed October 2015)

Tolley, G. S., & Fabian, R. G. (1998). Issues in improvement of the valuation of non-market goods. *Resource and Energy Economics*, *20*(2), 75-83.

Tuanmu, M. N., Viña, A., Winkler, J. A., Li, Y., Xu, W., Ouyang, Z., & Liu, J. (2013). Climate-change impacts on understorey bamboo species and giant pandas in China's Qinling Mountains. *Nature Climate Change*, *3*(3), 249.

Turner, R.K., Pearce, D. and Bateman, I., 1994. *Environmental economics: an elementary introduction*. Harvester Wheatsheaf.

Usher, M. (Ed.). (2012). Wildlife conservation evaluation. Springer Science & Business Media.

Usher, M. B. (1986). Wildlife conservation evaluation: attributes, criteria and values. In *Wildlife conservation evaluation* (pp. 3-44). Springer, Dordrecht.

Vina, A., Bearer, S., Chen, X., He, G., Linderman, M., An, L., ... & Liu, J. (2007). Temporal changes in giant panda habitat connectivity across boundaries of Wolong Nature Reserve, China. *Ecological Applications*, *17*(4), 1019-1030.

Wang, F., McShea, W.J., Wang, D. and Li, S. (2015). Shared resources between giant panda and sympatric wild and domestic mammals. *Biological Conservation* 186: 319-325.

Wang, F., McShea, W.J., Wang, D., Li, S., Zhao, Q., Wang, H. and Lu, Z. (2014). Evaluating landscape options for corridor restoration between giant panda reserves. *PloS ONE* 9.

Watts, J. (2007, September 14). 1,300 Years of Global Diplomacy Ends for China's Giant Pandas. *The Guardian* (London): https://www.theguardian.com/world/2007/sep/14/china.conservation (Accessed December 2018)

Wei, F., Swaisgood, R., Hu, Y., Nie, Y., Yan, L., Zhang, Z., ... & Zhu, L. (2015). Progress in the ecology and conservation of giant pandas. *Conservation biology*, *29*(6), 1497-1507.

Wei, F., Swaisgood, R., Hu, Y., Nie, Y., Yan, L., Zhang, Z., ... & Zhu, L. (2015b). Progress in the ecology and conservation of giant pandas. *Conservation biology*, *29*(6), 1497-1507.

Wei, F.W., Swaisgood, R.R., Hu, Y.B., Nie, Y.G., Yan, L., Zhang, Z.J., Qi, D.W. and Zhu, L.F. (2015a). Progress in the ecology and conservation of giant pandas. *Conservation Biology* 29: 1497-1507.

Wei, F.W., Swaisgood, R.R., Hu, Y.B., Nie, Y.G., Yan, L., Zhang, Z.J., Qi, D.W. and Zhu, L.F. (2015a). Progress in the ecology and conservation of giant pandas. *Conservation Biology* 29: 1497-1507.

White, P. C., Bennett, A. C., & Hayes, E. J. (2001). The use of willingness- to- pay approaches in mammal conservation. *Mammal Review*, *31*(2), 151-167.

Whittington, D., Briscoe, J., Mu, X. and Barron, W., 1990. Estimating the willingness to pay for water services in developing countries: A case study of the use of contingent valuation surveys in southern Haiti. *Economic development and cultural change*, *38*(2), pp.293-311.

World Association of Zoos and Aquariums (WAZA), 2005. Building a Future for Wildlife: The World Zoo and Aquarium Conservation Strategy. WAZA Executive Office, Berne, Switzerland.

Xinhua (2008, July 22). *Special Report: Reconstruction after Earthquake: Evacuation Completed for Pandas from Quake-Hit Sichuan*: http://news.xinhuanet.com/english/2008-07/22/content_8749581.htm

Yee, T. P., & Johari, S. (2016). Visitor Satisfaction towards Facilities of the Giant Panda Conservation Centre, Zoo Negara Malaysia: An Exploratory Analysis. *Asia-Pacific Journal of Innovation in Hospitality and Tourism APJIHT*, *5*(3), 71-88.

Zhang, B., Li M., Zhang, Z., Goossens, B., Zhu, L., Zhang, S., Hu. J., Bruford, M.W., and Wei, F. (2007). Genetic viability and population history of the giant panda, putting an end to the ''Evolutionary Dead End''? *Molecular Biology and Evolution* 24: 1801-1810.

Zhang, L., Wu, Q., Hu, Y.B., Wu, H. and Wei, F.W. (2015). Major histocompatibility complex alleles associated with parasite susceptibility in wild giant pandas. *Heredity* 114: 85-93.

Zhang, L., Yang, X., Wu, H., Gu, X., Hu, Y. and Wei, F.W. (2011). The parasites of giant pandas: individual-based measurement in wild animals. *Journal of Wildlife Diseases* 47: 164-171.

Zhang, Z., and Wei, F.W. (2006). *Giant panda ex-situ conservation: theory and practice*. Science Press, Beijing.

Zhang, Z., Swaisgood, R.R., Wu, H., Li, M., Yong, Y., Hu, J. and Wei, F. (2007). Factors predicting den use by maternal giant pandas. *Journal of Wildlife Management* 71: 2694-2698.

Zhang, Z.J., Sheppard, J., Zhu, J., Wei, F.W., Swaisgood, R.R., Wang, G., Nie, Y.G., Wei, W. and Wei, F.W. (2014). Ecological scale and seasonal heterogeneity in the spatial behaviors of giant pandas. *Integrative Zoology* 9: 46-60.

Zhang, Z.J., Swaisgood, R.R., Zhang, S., Nordstrom, L.A., Wang, H., Gu, X., Hu, J. and Wei, F.W. (2011). Old-growth forest is what giant pandas really need. *Biology Letters* 7: 403-406.

Zhao, S., Zheng, P., Dong, S., Zhan, X., Wu, Q., Guo, X., ... & Zhu, L. (2013). Whole-genome sequencing of giant pandas provides insights into demographic history and local adaptation. *Nature Genetics*, *45*(1), 67.

Zheng, W., Xu, Y., Liao, L., Yang, X., Gu, X., Shang, T., & Ran, J. (2012). Effect of the Wenchuan earthquake on habitat use patterns of the giant panda in the Minshan Mountains, southwestern China. *Biological conservation*, *145*(1), 241-245.

Zhu, L., Hu, Y., Qi, D., Wu, H., Zhan, X., Zhang, Z., ... & Zhang, L. (2013). Genetic consequences of historical anthropogenic and ecological events on giant pandas. *Ecology*, *94*(10), 2346-2357.

Zhu, L., Zhang, S., Gu, X., & Wei, F. (2011b). Significant genetic boundaries and spatial dynamics of giant pandas occupying fragmented habitat across southwest China. *Molecular Ecology*, *20*(6), 1122-1132.

Zoo Negara to cut ticket prices by 27% (2016, February 13), *The Star Online*: https://www.thestar.com.my/news/nation/2016/02/13/zoo-negara-to-cut-ticket-prices-by-27/ (Accessed April 2016)

Zoos Forum Handbook 2008. Chapter on conservation, education and research contribution made by zoos: www.defra.gov.uk/wildlife-countryside/pdf/protection/zoohandbook/2.pdf (Accessed January 2016)