

Occurrences of *Vibrio parahaemolyticus* in Retailed Freshwater Fish

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ABSTRACT

Vibrio parahaemolyticus is a causative agent of foodborne outbreaks associated with the consumption of raw or under-cooked seafood. This study aimed to quantify and detect the occurrence of *V. parahaemolyticus* in freshwater fish by performing Most Probable Number (MPN) method in combination with Polymerase Chain Reaction (PCR). In this study, a total of 20 red tilapia (*Oreochromis* sp.) were collected from nearby local wet markets. PCR assay targeting the *toxR* gene in *V. parahaemolyticus* was performed, with the expected DNA amplification size of 368 bp. MPN analysis showed that the estimated microbial load of *V. parahaemolyticus* were more than 1100 MPN/g. The result of the PCR assay confirmed the presence of *V. parahaemolyticus* in 90% of the isolates. This positive detection elucidated the presence of food-borne bacteria in freshwater fish from local wet-market which may affect not only the health of fish stocks but also raise public health concerns.

Keywords: Freshwater Fish, MPN, PCR, *toxR*, *Vibrio parahaemolyticus*

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INTRODUCTION

Fisheries and aquaculture industries have become a significant pillar to uplift the national economic status. Southeast Asian Fisheries Development Center (SEAFDEC, 2015), reported that the fisheries sector in Malaysia has provided employment to 175,980 people and contributed to national GDP at 1.1% in 2015. Freshwater fish production in Malaysia is at 782,855.5 MY/year and the estimated average consumption of fish is 56.8kg/person/year (SEAFDEC, 2015). However, the increase in freshwater fish products has brought and caused unintended problematic scenarios such as the transmission of food-borne bacteria and the emergence of food-borne outbreaks. Apun, Asiah, and Jugang (1999) stated that serious attention must be given to the aquaculture industry as fish can act as a vector for human pathogenic bacteria.

Vibrio parahaemolyticus has accounted for 25% of foodborne diseases as compared to other *Vibrio* spp. (Feldhusen, 2000). This gram-negative halophilic bacterium is a natural inhabitant of marine and estuarine environments around the world (Meador *et al.*, 2007). It is capable of causing fish and human diseases (IFAS, 2009). In Taiwan and Japan, reported outbreaks of food poisoning caused by *V. parahaemolyticus* were due to the consumption of two popular Japanese food, sashimi and sushi (Novotny, Dvorska, Lorencova, Beran & Pavlik, 2004). In Malaysia, a study by Letchumanan, Yin, Lee and Chan (2015) had demonstrated a high level of *V. parahaemolyticus* contamination in shrimps purchased from a local wet market. The presence of human pathogenic bacteria in fish can be linked to direct contact with a contaminated water environment and ingestion of bacteria from sediments or contaminated feed. Thus, bacteria detection in fish reflects the condition and safety of aquatic environments.

In Sarawak, limited studies on pathogens in fish products have been conducted and the potential of freshwater fish as a vector for *V. parahaemolyticus* transmission is not well documented. It is necessary to study the prevalence of pathogens in freshwater fish products to ensure a better understanding of the ecology and distribution of pathogens in the food chain. Combination of Most Probable Number with species-specific Polymerase Chain Reaction (PCR) method provides a better alternative for the enumeration and detection of pathogens in food products as compared to the conventional method (e.g. gram staining and glucose fermentation). *toxR* gene is used to identify various *Vibrio* species due to its properties to activate *cfx* expression, which resulting in the direct binding to a specific element at the promoter. Hence, this study aims to enumerate and detect the presence of *V. parahaemolyticus* in freshwater fish from the local wet market.

MATERIALS & METHODS

Sample Collection and Processing

Ten samples of red tilapia (*Oreochromis* sp.) were purchased from every two locations which were Kota Sentosa and Stutong wet market in Kuching. The fish samples were placed in an icebox after collection and brought to the Molecular Microbiology Laboratory, Faculty Resource Science and Technology, Universiti Malaysia Sarawak (UNIMAS) for processing. Briefly, 10g-portion of sample intestine was homogenized with 90 ml of Tryptic Soy Broth (TSB) with 3% sodium chloride (NaCl), in a sterile stomacher bag (Kaysner, DePaola & Jones, 2004). The homogenized sample was pre-enriched at 37°C for 18 h to 24 h.

Enumeration by Most Probable Number (MPN)

The pre-enriched samples were subjected to three-tube MPN analysis where dilution series of up to 10⁻⁷ was performed using Salt Polymyxin Broth (SPB). One millilitre of the 10⁻⁵, 10⁻⁶, and 10⁻⁷ fold dilutions were transferred into new three sterile tubes and incubated at 37°C for 18 h to 24 h. After incubation, the turbid tubes were chosen for DNA extraction

DNA Extraction

Approximately 1 ml of the enriched bacterial cultures in the broth was centrifuged (Hettich EBA 21 Zentrifugen, Germany) at 12,000 rpm for 2 min. The supernatant was discarded, and the cell pellet resuspended in 500 µl of sterile distilled water and was vortexed (Labnet International, USA). The cell suspension was boiled for 10 min and immediately cooled at -20 °C for 10 min before being centrifuged again (Hettich EBA 21 Zentrifugen, Germany) for 3 min at 13,000 rpm.

Detection of *V. parahaemolyticus* by PCR Assay

PCR assay was performed as described by Tunung *et al.* (2010). The primer set for the detection of *toxR* gene is summarized in Table 1.

Table 1. Primers used for the detection of *V. parahaemolyticus*

Targeted gene	Primer	Nucleotide sequences (5' – 3')	Amplicon Size (bp)	Reference
<i>toxR</i>	<i>toxR</i> -F	GTCTTCTGACGCAATCGTTG	368	(Tunung <i>et al.</i> , 2010)
	<i>toxR</i> -R	ATACGAGTGGTTGCTGTCATG		

The amplification was performed in an Eppendorf Mastercycler® Personal (Hamburg, Germany). An initial denaturation was started at 96 °C for 5 min, followed by 35 cycles each of denaturation at 94 °C for 1 min, primer annealing at 63 °C for 1 min and 30 sec and extension at 72 °C for 1 min and 30 sec. A final extension was performed at 72°C for 7 minutes. The presence of amplified *toxR* gene fragment was detected by using gel electrophoresis with 1% of agarose gel, 1X TBE buffer at 85 V for 1 h before visualization under UV transilluminator.

RESULTS & DISCUSSION

The findings from pre-enrichments indicated that all fish samples (*n*=20) showed turbidity in TSB. MPN analysis revealed that all samples were contaminated with more than 1100 MPN/g of presumptive *V. parahaemolyticus*. Table 2 summarizes the results of *V. parahaemolyticus* enumeration and detection from the samples.

Table 2. Enumeration and detection of *V. parahaemolyticus* from freshwater fish.

Sampling site (Total isolates)	MPN/g (No. of positive isolates)	PCR Detection of <i>V. parahaemolyticus</i> (Percentage of Positive Isolates)
7 th Milem (<i>n</i> =10)	>1100 (<i>n</i> =20)	18/20 (90%)
Stutong (<i>n</i> =10)		
Total: 20/20 (100%)		Total: 18/20 (90%)

The agarose gel image for the detection of *toxR* (*V. parahaemolyticus*) gene in freshwater fish samples is shown in Figure 1. The result of gel electrophoresis shows the product of DNA amplification at 368 bp.

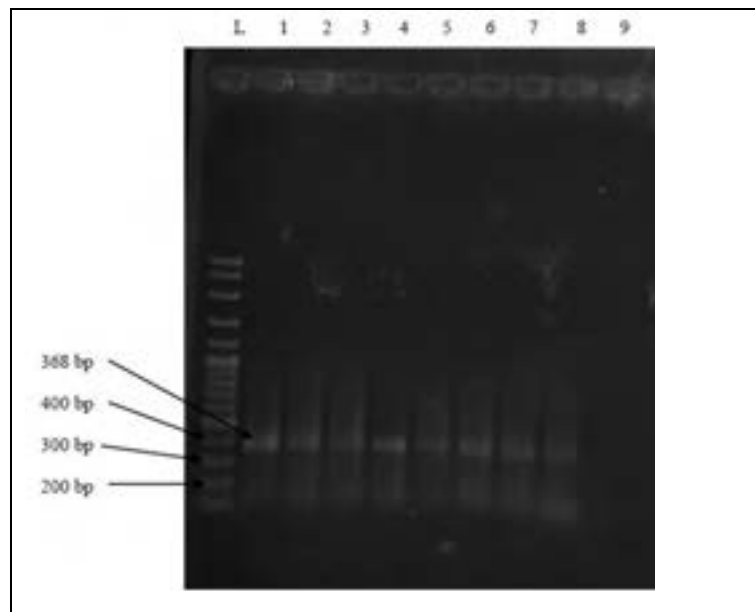


Figure 1. Representative gel image of PCR amplification of *toxR* gene detection from fish samples collected from two wet markets. M1: 100-bp DNA ladder; Lane 1: *V. parahaemolyticus* positive control, lane 2 to 8: isolates from fish samples, lane 9: *V. parahaemolyticus* negative control.

Fish from natural environments are known to harbour various bacterial species (Pillay, 1990). Bacterial colonization can be observed on fish skin and gills due to constant exposure to contaminated water, while the digestive tract may be affected through contaminated feed or water. Hence, our first goal in this study was to enumerate the concentration of presumptive *V. parahaemolyticus* from fish samples by the MPN method. The result indicated that 100% (20/20) of the samples were showing a microbial load of more than 1100 MPN/g. The isolates were subjected to PCR assay to confirm the presence of *V. parahaemolyticus* by targeting *toxR* gene. The findings from PCR analysis show that 90% (18/20) of the isolates harboured *toxR* gene and confirmed the presence of *V. parahaemolyticus* on the fish samples.

Vibrios are abundant in aquatic environments, and these bacteria were also observed on the skin, gills, and the intestinal tracts of fish or shellfish. High numbers of *V. vulnificus* and *V. parahaemolyticus* were described in fish intestines in comparison to water and sediment samples (Givens, Bowers, DePaola, Hollibaugh & Jones, 2014). Novotny *et al.* (2004), discussed the influence of seasonal variation in natural reservoirs towards the distribution of *V. parahaemolyticus*. It is frequently isolated from fish, molluscs, and crustaceans throughout the year in tropical climates and can be found in warm water with a lower salinity (Huehn *et al.*, 2014). The tropical climate of Sarawak encouraged the proliferation of *V. parahaemolyticus* in the freshwater habitat. Our study proved the presence of this bacteria from local freshwater fish through the positive detection of *toxR* gene. *Vibrios* most frequently are found in marine fish; however, these pathogens are also observed in freshwater fish. Noorlis *et al.* (2011) reported that 24 % of catfish and 40% of red tilapia samples were contaminated with *V. parahaemolyticus*. When fish and fish products are consumed raw or undercooked, they can cause food-borne illnesses. However, the pathogenicity of *V. parahaemolyticus* strains detected in our study was not determined.

Cross-contamination is considered as a contributing factor for the presence of *V. parahaemolyticus* in this study. The use of contaminated ice to cover fresh fish in the wet market may act as a vector of transmission from handler to the fish samples. This is supported by Yang *et al.* (2008), which reported that 14.9% of frozen and iced seafood samples were contaminated with *V. parahaemolyticus*. The pivotal role of the natural environment as the source of bacterial infection in fish should also not be ruled out. The presence of *V. parahaemolyticus* in our study can be linked to direct contact of freshwater fish with contaminated water environment and ingestion of bacteria from

sediments or contaminated feed. Positive detection of *V. parahaemolyticus* in our study reflects the condition and safety of aquatic environments. Novoslavskij *et al.* (2016) highlight the presence of human pathogenic microorganisms in fish and fish products may be affected by various factors, including cultural practices, environmental conditions, processing, and distribution of products. For the case of unhygienic conditions, the increasing possibilities of contamination the fish and the fish products are may due to poor sanitary handling, rotation of unassigned tasks of the workers, and surrounding airborne microorganism during packing of the product (Novotny *et al.*, 2004).

CONCLUSION

In summary, our study detected the presence of *V. parahaemolyticus* in 90% (18/20) of the total samples, highlighting the possibility of this bacteria to entering the food chain and lead to cross-contamination of premises, equipment, and end-product, ultimately facilitating the distribution of this pathogenic bacteria. However, more studies are needed to understand the pathogenicity of this *V. parahaemolyticus* and comparative studies of different parts of the fish need to be conducted in order to better understand the mode of contamination of the fish samples.

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Expression Analysis of Ribosomal Protein Genes, *eL13* and *eL14* in Nasopharyngeal Carcinoma Cell Lines

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ABSTRACT

Increasing evidence of the association between ribosomal protein (RP) genes with nasopharyngeal carcinoma (NPC) have been derived from findings of their differential expression patterns in NPC cell lines. Nevertheless, expression data from a comprehensive list of RP gene family members is still lacking. This paper reports the assessment of two RP genes, *eL13* and *eL14*, with regards to their expression patterns in several NPC cell lines (TW04, TW01, HK1, HONE1 and SUNE-1) relative to a non-malignant control (NP69). A conventional Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) assay was employed. Analysis of *eL13* has never been explored before this, whereas investigation of *eL14* represents an extended study. We found a general over-expression trend of *eL14* in 40% (2 of 5; TW01 and HONE-1) of the NPC cell lines studied, with higher upregulated level in only one (TW01) of them. However, this pattern of expression level is not statistically significant. Expression of *eL13* was not detected in any of the cell lines used. The inconsistency of these expression patterns demonstrates an elusive nature of RP activities in the malignancy of the nasopharynx.

Keywords: *eL13*, *eL14*, nasopharyngeal carcinoma, ribosomal protein, RT-PCR

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INTRODUCTION

Nasopharyngeal carcinoma (NPC) is a subset of human head and neck squamous cell cancer with unique endemic distribution and etiological factors (Hildesheim & Levine, 1993), and represents a malignancy that arises from the surface epithelial lining at the upper part of the throat and behind the nostrils – the nasopharynx (Brennan, 2006). NPC is prevalent in Southern China and South East Asia with a higher incidence among the Chinese compared to other ethnicities, notably with the Cantonese dialect group (Armstrong, Kutty, Dharmalingam & Ponnudurai 1979; Li, Yu & Henderson, 1985). In the East Malaysian state of Sarawak, the Bidayuh community is the highest risk group (Devi, Pisani, Tang & Parkin, 2004; Sim, Tiong, Selva, Ong & Teh, 2010a; Tiong & Selva, 2005), with family history as a strong predictor (Yeo, Beh, Tan & Pei Jye, 2018). Etiological factors of NPC can include Epstein-Barr Virus (EBV) infection, genetic predisposition, dietary and other environmental influences (Chang & Adami, 2006). WHO Classification of NPC divides it into 2 major types: Type 1, the keratinizing squamous cell carcinoma; and Type 2, non-keratinizing carcinoma. Type 2 is further divided into Type 2a, undifferentiated carcinoma; and Type 2b, differentiated carcinoma. Type 2 is the most common and constitutes 95% of NPC cases in high-incidence areas (Peterson & Nelson, 2013). Type 1 is rare and more common in non-endemic populations (Li & Zong, 2014). Type 2 is associated with positive EBV serology, more radiosensitive, and frequently associated with lymph node and distant metastasis (Peterson & Nelson, 2013). A major concern of NPC is that 63.6% of diagnosed cases are discovered at later stages (Azizah, Saleha, Hashimah, Asmah & Mastulu, 2015). It remains one of the most misdiagnosed cancers because early signs and symptoms were often mistaken as common illnesses such as nasal congestion, headache and sore throat, hence the urgency for accurate early detection biomarkers (Cho, 2007). To facilitate closer biomolecular studies, NPC cell line models have been established since 1975 (Gullo, Low & Teoh, 2008).

For over two decades, the functions of ribosomal protein (RP) genes have been linked to activities beyond ribosome-mediated protein synthesis (Wool, 1996). These extra-ribosomal roles include apoptosis, cell cycle arrest, cell proliferation, cell migration and invasion, and DNA damage repair (Wang *et al.*, 2015; Xu, Xiong & Sun, 2016). Their association and involvement with various cancers have been extensively discussed (de las Heras-Rubio, Perucho, Paciucci, Vilardell & LLeonart, 2013; Goudarzi & Lindström, 2016; Xu *et al.*, 2016). In NPC, association of malignancy with specific RP genes is increasingly evident (Dolezal, Dash & Prochownik, 2018; Fang *et al.*, 2008; Sim, Toh & Tiong, 2008; Sim, Ang, Ng, Lee & Narayanan, 2010b; Sim, Chan, Ng, Lee & Narayanan, 2016; Sim, Ng, Lee & Narayanan, 2017; Sim, Chee, Vasudevan, Ng & Chan, 2018; Yang *et al.*,

2005). Despite this, the functional significance of putative NPC-associated RP genes remains elusive due to inconsistency in their expression patterns among studies (Ma *et al.*, 2012). This highlighted the complexity of their mechanism in tumor development and malignant transformation of NPC cells. The two RP genes studied herein are *eL13* and *eL14*, both encoding components for the 60S (large) subunit of the ribosome complex. *eL13* and *eL14* are found in chromosomal positions 16q24.3 and 3p21.3, respectively. Correlation between upregulation of *eL13* and cancers was demonstrated in gastrointestinal cancer (Kobayashi *et al.*, 2006), melanoma (Kardos, Dai & Robertson, 2014), colorectal cancer (Takemasa *et al.*, 2012; Xu *et al.*, 2017). However, it remains relatively ubiquitous in clear-cell renal carcinoma irrespective of clinico-pathological characteristics (Wierzbicki *et al.*, 2014). Expression behavior of *eL13* in NPC has not been reported in literature. Early evidence of *eL14*'s involvement in cancers was from observation of loss of heterozygosity (LOH) in the loci of *eL14* in the lung, oral squamous cell, and renal cell carcinomas (Shriver *et al.*, 1998). This was also found in esophageal squamous cell carcinoma (He *et al.*, 2007), and breast cancer (Aarøe *et al.*, 2010; Huang *et al.*, 2006). Interestingly, decreased expression of the gene was also observed in a majority of breast carcinomas (Huang *et al.*, 2006). Findings of similar expression behavior were seen in a Type 2b (differentiated non-keratinizing) NPC cell line (Sim *et al.*, 2018). Such observation remains to be identified in other types of NPC cells. In this paper we explored the association of *eL13* and *eL14* with NPC by assessing differential expression patterns between NPC and non-malignant nasopharyngeal epithelial cell lines.

MATERIALS & METHODS

Cell Culture

The NPC cell lines used in this study were HK1 (Huang *et al.*, 1980), HONE1 (Glaser *et al.*, 1989), TW01, TW04 (Lin *et al.*, 1993), and SUNE1 (Teng, Ooka, Huang & Zeng, 1996). HONE1, SUNE1, and TW04 were from Type 2a NPC, HK1 was from Type 2b, and TW01 was from Type 1. The normal nasopharyngeal epithelial cell line, NP69 (Tsao *et al.*, 2002) was the normal control. All NPC cell lines were cultured in RPMI-1640 media supplemented with 10% foetal calf serum (FCS), 10 U/ml penicillin and 10 µg/ml streptomycin. The NP69 cell line was cultured in keratinocyte serum-free media (DKSFM) supplemented with 5% fetal calf serum, 100 U/ml penicillin, 100 µg/ml streptomycin. All cells were maintained at 37°C in a humidified atmosphere with 5% CO₂.

RNA Extraction and Reverse Transcription

Total cellular RNA was extracted from the cell cultures using TRIzol Reagent (Invitrogen, USA) according to the manufacturer's protocol. Cells (in each culture flask) were rinsed with cold Phosphate Buffer Saline solution and treated with TRIzol reagent to be dislodged and homogenized. The homogenate was then transferred to 1.5 ml tube and mixed with chloroform (0.2 ml per 1 ml TRIzol). After incubation for 5 min, the mixture was centrifuged (10000 × g for 15 min at 4°C). The upper aqueous layer containing RNA was transferred to a new 1.5 ml tube and mixed with isopropanol. Following precipitation, the RNA was pelleted via centrifugation, washed with 75% ethanol, air-dried, and dissolved in nuclease-free water. Assessment of extracted RNAs included agarose gel electrophoresis (AGE) assay, and the optical density measurement at absorbance value of 260 and 280 nm using a UV spectrophotometer (Shimadzu, USA or Ultrospec 1100 pro, UK). RNAs of all cell lines were converted to cDNAs. First strand cDNA was prepared using Moloney Murine Leukemia Virus Reverse Transcriptase (MMLV-RT; Promega, USA). Basically, 2 µg of RNA was reverse transcribed using MMLV in a reaction mixture containing 0.5 µg random primers, 1X reaction buffer, 40 mM dNTPs, 25 U Recombinant RNasin® Ribonuclease Inhibitor, and 200 U M-MLV RT. The reaction was incubated for 60 min at 37°C, and then at 70°C for 15 min. Synthesized complementary DNAs (cDNAs) were checked using AGE assay and kept at -20°C until use.

Polymerase Chain Reaction (PCR)

For each sample, the final PCR mixture (vol. of 25 µL) contained 1X Green Go Taq® Flexi Buffer, 1 mM MgCl₂, 0.2 mM dNTP mix, 0.625 U GoTaq® DNA Polymerase, 0.4 µM each of forward and reverse primers, and 0.25 µg of template cDNA. The cDNA template used was from five NPC cell lines (HK1, SUNE-1, HONE1, TW01, TW04) and one normal human nasopharyngeal cell line (NP 69). Thermal cycling conditions were initial denaturation at 95°C for 2 min; 30 cycles where each comprised denaturation at 95°C for 30 sec, annealing from 51 to 53.5°C (depending on primer type) for 30 sec, and extension at 72°C for 1 min; and a final extension at 72°C for 5 min. The sequences of primer pairs were 5'-CTTTCCGCTCGGCTG TTG-3' (forward) and 5'-GCCTTACGTCTGCGGATC-3' (reverse) with expected amplicon size of 163 bp for *eL13*; 5'-TTCTTCTTCTCGCTAACG-3' (forward) and 5'-CCTCCTAAC TTCAGCCTCAA-3' (reverse) with expected amplicon size of 773 bp for *eL14*; and 5'-AGATCATCAGAATGCCTC-3' (forward) and 5'-TACCAGGACATGAGCTTGAC-3' (reverse) with expected amplicon size of 511 bp for *GAPDH*. Duplicates were done for each test.

Data Acquisition and Analysis

Results of PCR assays were assessed using agarose gel electrophoresis (AGE) method. Band intensity was documented and measured using ImageQuant gel documentation system via the TotalLab Quant software. Subsequently, observed amplicon bands were gel extracted, purified, and sent to a DNA sequencing service provider for the acquisition of sequence data. After sequence verification, expression data (band intensity value) of each ribosomal protein gene were normalized by comparative assessment with associated expression data of the housekeeping gene, *GAPDH*. The derivation of normalized value was based on the formula below.

$$\text{Normalised value of test A} = \frac{\text{Average value of } GAPDH \text{ band intensity}}{\text{Intensity value of } GAPDH \text{ for test A}} \times \text{Intensity value of test A}$$

Statistical analysis of difference between detectable transcript expression was carried out using single factor ANOVA test. Significance (if any) of *eL14* differential expression among the NPC cell lines (TW01, TW04, and HONE-1) was taken at $p < 0.05$.

RESULTS

Following AGE analysis, bands representing amplicons of RP genes can only be detected for *eL14*. However, this is only observable for samples from TW01, TW04, and HONE-1 in Replicate Test 1; and TW01, and HONE-1 in Replicate Test 2 (Figure 1). The consistency of PCR assays for *eL14* in both sets of replicates was only relevant in TW01 and HONE-1 cell lines. There are no bands detected for *eL13* in all the cell lines studied. Bands for *GAPDH* were clearly detected in all cell lines studied. Observed bands for *eL14* and *GAPDH* were gel extracted, purified and sent for sequence analysis. The DNA sequences obtained verified that the band within the vicinity of 750 bp is the bone fide amplicon for *eL14* gene. Likewise, sequences for the band in the region of 500 bp verifies it to be the *GAPDH* gene. The validity of these amplicons allowed us to proceed further with extraction of band intensity values.

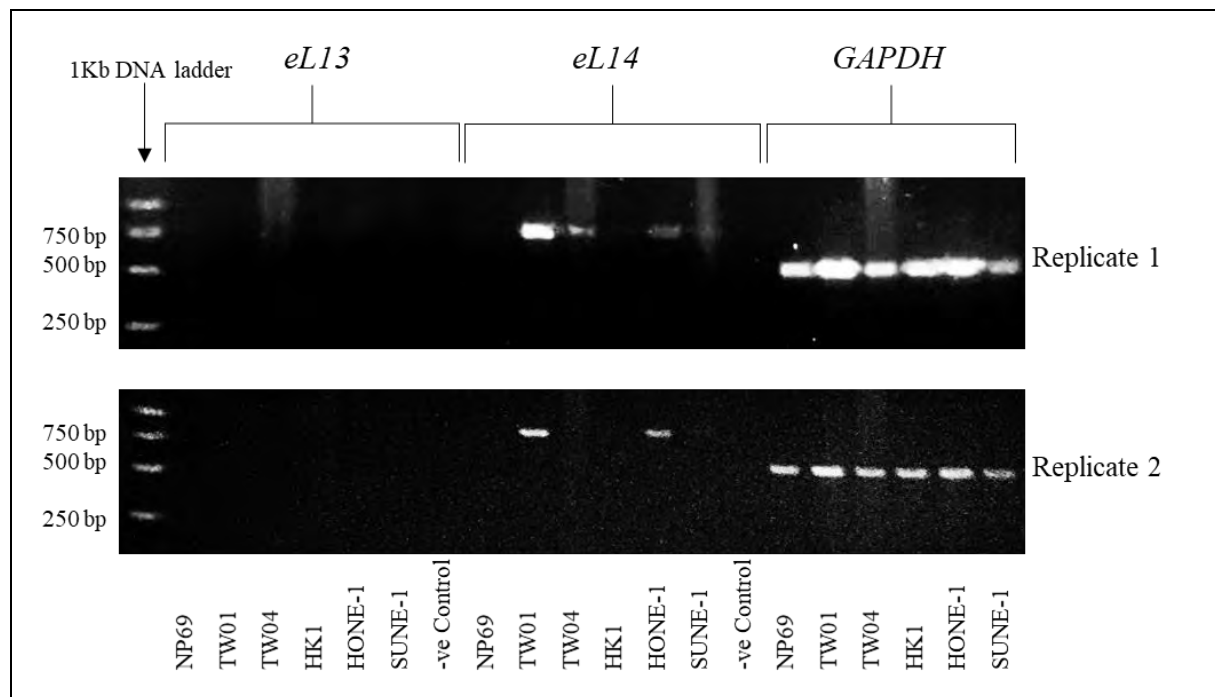


Figure 1. AGE analysis results of PCR amplicons for *eL13*, *eL14*, and *GAPDH* expressed transcripts in the NPC and normal control cell lines.

Raw band intensity values were only extractable for *eL14* amplicons in samples from TW01, TW04, and HONE-1 in Replicate Test 1; and TW01, and HONE-1 in Replicate Test 2 (Table 1). No values can be procured from *eL13* in all the cell lines studied. The band intensity values for the amplicons of the housekeeping gene, *GAPDH* were extracted from all the cell lines studied. Following the process of data adjustment of *eL14* against *GAPDH* values, normalized intensity data was derived for samples from TW01, TW04, and HONE-1 in Replicate Test 1;

and TW01, and HONE-1 in Replicate Test 2 (Table 1). From the normalized data, average value and standard deviation information were obtained also. A bar chart of the normalized data for *eL14* expression in all the cell lines was plotted (Figure 2). This indicated a general trend of *eL14* over-expression in TW01, TW04, and HONE-1 relative to the normal control cell line, NP69 (Figure 2). Nevertheless, based on assessment of the error bars alone, it can be inferred that only the expression in TW01 cell line is markedly different from the normal control (NP69).

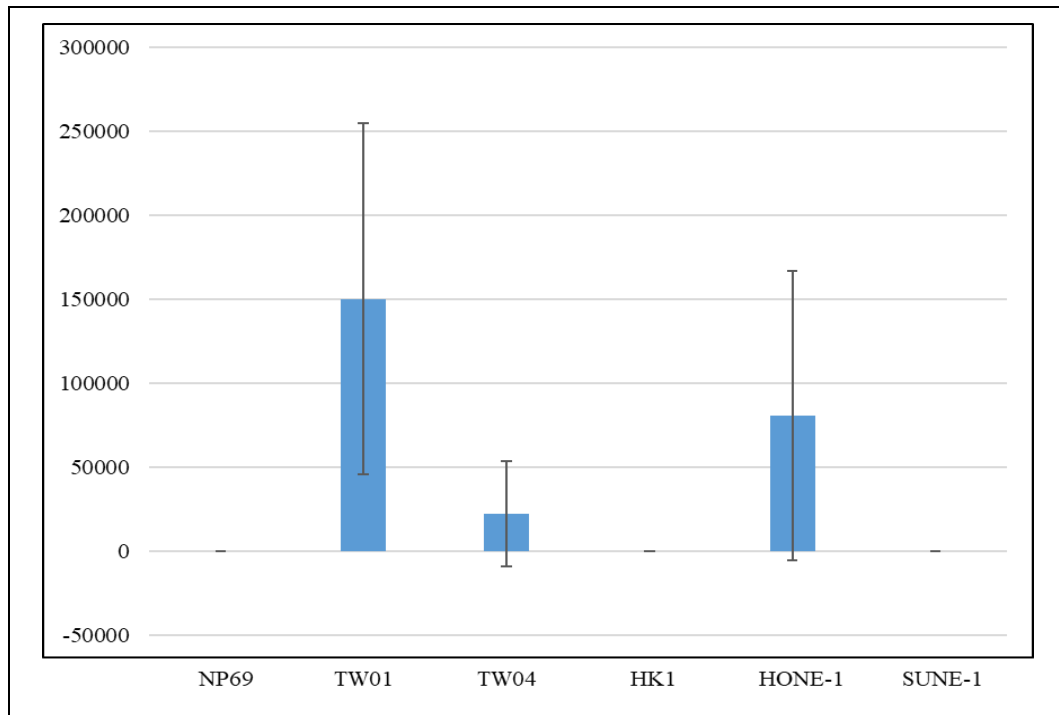


Figure 2. Bar chart of normalized band intensity values for *eL14* amplicons in the 5 NPC cell lines and one normal cell line studied. The y-axis and x-axis represent band intensity values and type of cell lines respectively. Error bars are standard deviation value of the average intensity data.

A single factor ANOVA test was carried out on the normalized data for *eL14* in samples TW01, TW04, and HONE-1, as shown in Table 2. This statistical analysis reveals no significant difference in expression levels among the three NPC cell lines ($p = 0.397$, Table 2). Since *eL14* levels in TW04 and HONE-1 are not markedly different from NP69 (normal control) (Figure 2), and that statistical analysis cannot prove that its level in the three cell lines (TW01, TW04, and HONE-1) is significantly different, it should be deduced that the observed general over-expression trend (Figures 1 and 2) cannot be not conclusively defined.

DISCUSSION

Our findings cannot demonstrate a clear association of *eL14* with NPC tumorigenesis. Firstly, we could not prove conclusively that it is significantly differentially expressed in NPC cell lines compared to a normal control, albeit the observation of a general over-expression in two of the NPC cell lines. In our previous study (Sim *et al.*, 2018), *eL14* was shown to be significantly down-regulated in HK1 cell line (Type 2a-NPC) but in this report, this was not the case. In fact, its expression was not detected at all in HK1 cells. Strangely, it was also not detected in the normal or non-malignant cell line, NP69. Its expression, was however, detected in another Type 2a-NPC cell lines, HONE-1. The expression level is not remarkably differential in this cell line. The only markedly different (over-expression) pattern was observed for TW01. This is the first report that reveals an abundance of *eL14* expressed transcript in a Type 1 NPC category cell. Nonetheless, it is now necessary to reproduce similar exploration of *eL14* expression in TW01 cells and/or investigate its activity in Type 1 NPC tissues in order to have a more conclusive inference.

Table 1. Raw and normalized intensity values of amplicons observed in the AGE analysis of *eL14* in the 5 NPC cell lines and one normal control cell line studied.

Cell lines	<i>eL14</i> band intensities value for Replicate 1				<i>eL14</i> band intensities value for Replicate 2				Average nomalized	Error diff
	Raw	GAPDH	Average GAPDH	Normalized	Raw	GAPDH	Average GAPDH	Normalized		
NP69	0	103053		0	0	340144		0	0	0
TW01	110367	176572		76104	289902	511475		224224	150164	104737
TW04	36156	99924		44056	0	328327		0	22028	31152
HK1	0	147687	121756	0	0	445450	395599	0	0	0
HONE-1	22147	135855		19849	164653	459855		141637	80743	86118
SUNE-1	0	67446		0		288344		0	0	0

Table 2. Single Factor ANOVA test result of *eL14* expression data in the three NPC cell lines with observable amplicon bands.

Summary						
Cell lines	No. of replicate	Sum	Average	Variance		
TW01	2	300328.2	150164.1	1.1E+10		
TW04	2	44055.64	22027.82	9.7E+08		
HONE-1	2	161485.9	80742.97	7.42E+09		
ANOVA						
Source of variation	SS	df	MS	F	p-value	F crit
Between cell lines	1.65E+10	2	8.23E+09	1.27532	0.397345	9.552094
Within cell lines	1.94E+10	3	6.45E+09			
Total	3.58E+10	5				

It is clear that our findings herein further obfuscate a pivotal hypothesis on the unequivocal association of RP genes (specifically, *eL14*) to the context of NPC carcinogenesis. However, this confusing scenario of their inconsistent expression behaviors between studies is not unprecedented. In 2008, we found *eS26* and *eS27* to be down-regulated in NPC tissues relative to normal samples (Sim *et al.*, 2008), but only to conclude that these two RPs have no association with NPC in a later study (Ma *et al.*, 2012). Similarly, when we reported the under-expression of *eL27*, *eL41* and *eL43* in NPC cell lines (Sim *et al.*, 2010b), the observation was subsequently refuted in a later study by us (Sim *et al.*, 2016), whereby these three RP genes were found to be over-expressed in NPC situation instead. Such discrepancy in findings between studies implies the complexity and subtlety of RP's involvement in NPC tumorigenesis and malignancy. As such, functional significance of RPs in NPC carcinogenesis remains a potent area for deeper molecular research.

The RP gene, *eL13* has never been studied in the context of NPC, and this paper is the first to explore its association with the cancer. We found no detectable expression of its transcripts in any of the cell line studied, including the normal/non-malignant NP69 cells. To infer its inactiveness in neoplastic cells/tissues may be a premature conjecture. In fact, its ubiquitous state of expression in clear-cell renal carcinoma is evident regardless of clinicopathological presentation (Wierzbicki *et al.*, 2014). Perhaps, this RP gene is specifically not active in the cells from the epithelium of the nasopharynx region, and is also not dysregulated when cells in that region are in a neoplastic situation. To suggest that its non-association with nasopharyngeal organogenesis or tumorigenesis requires further research, particularly in the interrogation of its expression in NPC tissues.

On overall, our data is limited by some inconsistency, particularly in the result of *eL14* in TW04. Therefore, an experimental repeat of *eL14* expression in this cell line is necessary. In fact, more replicates should be applied for all cell lines should this study be carried further. An additional caveat to our work here is the limitation of our methodology. Our use of the conventional RT-PCR technique should suggest a cautionary interpretation of our results. This technique lacks accuracy as far as measurement of real time gene amplification is concerned. Hence, it is only useful for the relative assessment of expression level based on end-point quantification of amplicon (Walker, Worst & Vrana, 2003). It also lacks sensitivity in the detection of trace level expressed transcripts. Future studies on *eL13* and/or *eL14* in NPC cells or tissues will have to consider the more accurate and sensitive technique of quantitative PCR (or Real Time PCR) method.

CONCLUSION

Expression at transcript level of ribosomal protein gene, *eL14* was detected in three nasopharyngeal carcinoma cell lines, namely TW01 (Type 1-NPC), and HONE-1 (Type-2a-NPC). The highest level was observed for TW01 cell line. However, the expression pattern was not significantly differential among the three cell lines, and not distinctly diverse to non-malignant scenarios. Besides this, the expression of the ribosomal protein gene, *eL13* was not detected in all the cell lines studied. Taken together, our results cannot provide a conclusive finding on any evident association between *eL13* or *eL14* and tumorigenesis or malignancy of the human nasopharynx. Instead, we suggest a vastly tenuous nature of relationship between ribosomal proteins and oncogenesis of NPC.

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Comparative Analysis of Ribosomal Protein Gene, *eL14* Expression between Two Types of Colorectal Carcinoma Cell Lines

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ABSTRACT

Association between the expression of ribosomal protein (RP) genes and cancer is widely known. More specifically, the extra-ribosomal functions of RPs have been linked to carcinogenesis. The ribosomal protein gene, *eL14* has been reported to be associated with malignancy of the colorectum, albeit of mechanism yet unclear. Its expression in cells derived from different tissue origin of colorectal carcinoma (CRC) has never been explored. Therefore, this study aims to comparatively analyse the expression pattern of *eL14* between two different CRC cell lines (DLD-1 and HCT116). It involved a conventional gene expression analysis, the Reverse-Transcriptase PCR (RT-PCR) assays. Products of RT-PCR assay were resolved via an agarose gel electrophoresis method, and band intensities of amplicons were documented and quantified using TotalLab Quant software. We observed differential expression patterns of *eL14* between DLD-1 and HCT116 cells, but statistical analysis revealed insignificant differences. Therefore, the relevance of *eL14* as a biomarker to distinguish between different colorectal cancer cells is suggestive but not conclusive.

Keywords: Colorectal carcinoma, *eL14*, gene expression, ribosomal protein genes, RT-PCR

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INTRODUCTION

Ribosomal protein (RP) genes are necessary and ubiquitous components of ribosome structures essential in the process of protein biosynthesis. Increasing evidences have also pointed to the linked between RPs many diseases, including cancer (Chen *et al.*, 2016). In fact, aberrancies in ribosome biogenesis may be partly responsible for cancer and/or susceptibility to cancer (Ruggero & Pandolfi, 2003). Beyond ribosome-related context, the extra-ribosomal roles of RPs have also been established, of which perturbation(s) of such roles has been linked to carcinogenesis also (Wang *et al.*, 2014).

Ribosomal protein *eL14* is a member of the RPs for the large ribosomal subunit (60S) group. It is located at Chromosome 3, in the position of 3p22.1, and consists of 6 exons and 5 introns (Huang *et al.*, 2006). *eL14* contains a variable-length polyalanine tract that is encoded by a highly polymorphic trinucleotide repeat array (Shriver *et al.*, 1998). Studies have demonstrated the down-regulated pattern of *eL14* in lung and oral cancers (Shriver *et al.*, 1998), and oesophageal cancer (Huang *et al.*, 2006). The *eL14* gene lies with a genomic region (3p21) that has a high frequency of alteration (including translocation, deletion and allelic loss) that may contribute to the transcriptional loss. These are possible scenarios responsible for malignancy in lung and oral tissues (Shriver *et al.*, 1998). Indeed, loss of heterozygosity (LOH) in *eL14* is linked to lung and oral carcinomas (Shriver *et al.*, 1998). In the case of oesophageal cancer, genetic alteration and LOH in *eL14* have been reported (Huang *et al.*, 2006). Besides these cancer types, *eL14* has also been shown to be associated with hepatocellular carcinoma or liver cancer (Liu *et al.*, 2007).

To date, involvement or connection of *eL14* to cancer of the colon and rectum region (colorectal carcinoma) has not established. Prior to this study, expression analysis of *eL14* in any cancer model of colorectal carcinoma (CRC) has not been reported in the literature. Therefore, this study is among the first exploration to investigate expression behaviour of *eL14* in cases of CRC. In our case, the CRC cell lines were the cancer model used.

MATERIALS & METHODS

Cell Culture

Colorectal carcinoma cell lines used in the study were DLD-1 and HCT116. These commercially-available cell lines were procured from ATCC. DLD-1 was derived from a Stage C cancer tissue at the sigmoid colon of a 50-year old male, and is a non-metastatic cell with moderate cellular differentiation (Dexter *et al.*, 1981; Schneider *et al.*, 2012). HCT116 is a human epithelial colorectal carcinoma cell line derived from a Stage D tumour at the ascending colon, and is poorly differentiated and metastatic (Brattain, Fine, Khaled, Thompson & Brattain, 1981; Wahab *et al.*, 2017). All cell lines were grown at 37°C, 5% CO₂, and 95% humidity until the confluent stage of 70-90% before harvested for total RNA.

RNA Extraction

The TRIzol method (Chomczynski & Sacchi, 1987) was used for RNA extraction. Basically, monolayer cells in culture flask were rinsed with ice-cold PBS prior to the addition of 1ml TRIzol reagent. Then, the cells were gently scraped, and mechanically lysed by repeated pipetting before incubation for 5 min at room temperature. Subsequently, the lysate was transferred to a 1.5 ml sterile microcentrifuge tube, followed by the addition of 0.2 ml chloroform. This mixture was thoroughly mixed by vortexing for 15 sec, and then incubated at room temperature for 3 minutes. Then, the homogenate was centrifuged at 12,000 rpm for 15 min at 4°C. The aqueous phase was transferred into a new 1.5 ml sterile microcentrifuge tube, followed by the addition of 0.5 ml isopropanol. This was incubated at room temperature for 10 min, and then centrifuged at 10,000 rpm at 4°C for 10 min. The supernatant was removed, and the resulting RNA pellet was washed once with 1ml of 75% ethanol. It was air dried for 10 min, prior to dissolution 30 µl nuclease-free. The RNA solution was stored at -80°C until use. Quantity and quality check were carried out using spectrophotometric analysis.

Reverse-transcription and Polymerase Chain Reaction

Complementary DNA (cDNA) was synthesised using Moloney Murine Leukemia Virus Transcriptase (M MLV-RT). Two microlitre of random primers was added to 2 µg of RNA sample in a sterile 1.5ml tube. Nuclease-free water was then added to make the total volume of 15 µl. The mixture was incubated for 5 min at 70°C, and cooled on ice for 1 min. Then 1.25 µl of 10mM dNTPs, 5 µl M-MLV 5X reaction buffer, 0.6 µl of Recombinant RNAsin® Ribonuclease Inhibitor and 1 µl of M-MLV RT were added. The tube was flicked gently to mix the solution. Then, nuclease-free water was added to make the total volume to 25 µl. This was incubated at 37°C for 60 min, and then at 70°C for 15 min. Polymerase Chain Reaction assay was carried out according to the protocol for GoTaq® Polymerase (Promega, USA). The primer pair for *eL14* consists of the forward (5'- TTCTTCCTTCTCGCCTAA CG-3') and reverse (5'-CCTCCTAACTCCAGCCTCAA-3') primers, and the pair for *GAPDH* comprises 5'-AGATCATCAGCAATGCCTC-3' and 5'-TACCAGGACATGAGCTTGAC-3' as the forward and reverse primers, respectively. Expected amplicon size for *eL14* and *GAPDH* is 877bp and 507bp, respectively. The *GAPDH* gene functioned as an internal control for consideration of the equalizing amount of loaded sample, and allowed normalisation of data among the test results. For each PCR test, the components included 0.5 µg of template DNA, 1X Green Go Taq® Flexi Buffer, 1.0 mM MgCl₂, 0.2 mM dNTP mix, 0.4 µM each of the forward and reverse primers, and 1.25 U of Go Taq® Polymerase. Nuclease-free water was added to each mixture to a total volume of 25 µl. The thermal cycling conditions were initial denaturation at 95°C for 2 min, followed by 35 cycles of denaturation at 95°C for 30 sec, primers annealing (53°C for *eL14*, and 58°C for *GAPDH*) for 30 sec, and extension at 72°C for 1 min. A final extension of 5 min at 72°C was also included. PCR was done using a SensoQuest (Germany) PCR machine. The PCR products were resolved using agarose gel electrophoresis (AGE) method, and visualised using EtBr-stained gel on a UV transilluminator. Biological replicates were applied for each test.

Data Analysis

Band intensities of PCR products from AGE were measured using TotalLab Quant Software (TotalLab, USA) for the analysis of differential expression levels of both RPeL14 and GAPDH. The normalised value of each gene in each cell line was calculated based on the formula by Sim, Chee, Vasudevan, Ng and Chan (2018).

$$\text{Normalised value of test A} = \frac{\text{Average value of } GAPDH \text{ band intensity}}{\text{Intensity value of } GAPDH \text{ for test A}} \times \text{Intensity value of test A}$$

Validation of relative quantification of gene expression patterns can be done using Paired Student's *t*-test with a confidence interval of 95%. A significant difference was taken at $p < 0.05$.

RESULTS

Observable transcript expression, as far as RT-PCR products, was detected for *eL14* and *GAPDH* (internal control) in both DLD-1 and HCT116 cells (Figure 1). Eye-balling assessment (based on band intensities) revealed a general difference in the expression level of *eL14* between DLD-1 and HCT116 cells. The expression is apparently higher in DLD-1 compared to HCT116 cell lines.

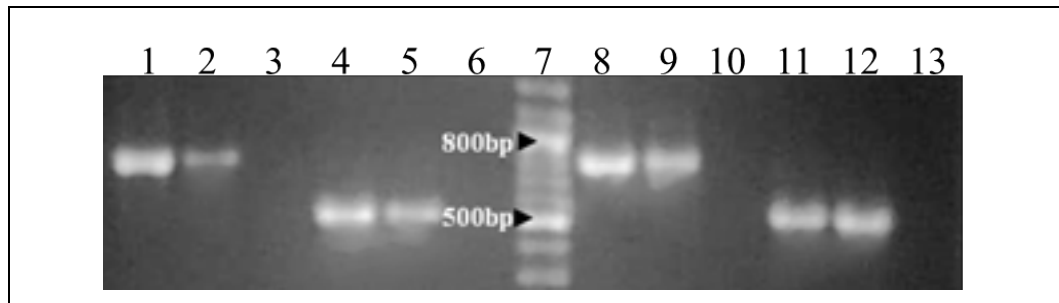


Figure 1. AGE analysis representation of RT-PCR assays of *eL14* and *GAPDH* expression pattern in DLD-1 and HCT116 cell lines. Lanes 1 and 8 are *eL14* in DLD-1 cells, Lanes 4 and 11 are *GAPDH* in DLD-1 cells, Lanes 2 and 9 are *eL14* in HCT116 cells, Lanes 5 and 12 are *GAPDH* in HCT116 cells, Lanes 3 and 10 are negative controls for *eL14*, Lanes 6 and 13 are negative controls for *GAPDH*, and Lane 7 is the size marker, 1kb DNA ladder. Lanes 1 to 6, and Lanes 8 to 13 represent Replicate 1 and 2, respectively.

The band intensities of both *eL14* and *GAPDH* in DLD-1 and HCT116 were documented and analysed using TotalLab Quant Software (TotalLab, USA). The result of both raw and processed data (normalised band intensities) are presented in Table 1. The normalised data of *eL14* expression in both DLD-1 and HCT116 is illustrated in a bar chart (Figure 2). Based on the bar chart, the band intensity of *RPeL14* in DLD-1 is observably higher than in HCT116. Statistical analysis via Student's *t*-test was applied to the normalised band intensity data. The results indicated that the difference in expression of *eL14* between DLD-1 and HCT116 cell lines is not significant ($p = 0.069$).

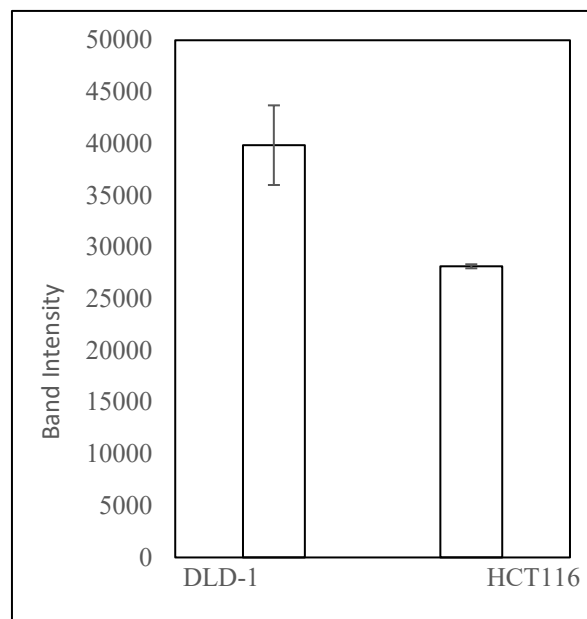


Figure 2. Bar chart of the normalised band intensities of *eL14* amplicons in DLD-1 and HCT116 cell lines.

Table 1. Band intensities of *eL14* and *GAPDH* (and the normalized value of *eL14*) for the CRC cell lines used.

Cell lines	Replicate	Band Intensity				Standard Deviation	
		<i>eL14</i>	<i>GAPDH</i>	Average <i>GAPDH</i>	Normalised Average		
DLD-1	1	38228	34697	38646	42579	39857	3850
	2	39937	41561		37135		
HCT116	1	22569	30834	28286	28148	195	
	2	34422	47492				28010

DISCUSSION

Our results indicate observable differential expression of *eL14* between DLD1-1 and HCT116, but the difference is not statistically significant. Nevertheless, expression of *eL14* in both CRC cell lines has been proven and reported for the first time here. Prior to this, its expression has been found in lung, oral (Shriver *et al.*, 1998) and oesophageal carcinoma (Huang *et al.*, 2006), of which was reportedly down-regulated in the diseased situation. In our case, the lack of availability of a normal cell lines for comparative limited our analysis to cancer cell lines. We were unable to infer whether *eL14* is up- or down-regulated in CRC models/cases. Between CRC cell lines of different origin, cell types and stages, the expression of *eL14* was initially observed to be different in level. However, this difference was not substantiated after a statistical analysis. Further studies, involving more different CRC cell lines will have to be carried out before any conclusion regarding the association of *eL14* to CRC scenario can be inferred. More tellingly, a normal control is required to be comparatively analysed with a variety of CRC cell lines for the hypothesis of a connection between *eL14* to CRC tumourigenesis to be accepted. A better model to be studied is, perhaps, actual tumours from CRC patients.

Besides our study, another research involving *eL14* expression in CRC cell lines (HCT116 and SW480) has been done by other members of our research team (Sim, Mutsamy & Teh, 2020). Our data here concurs with this other study, in that expression of *eL14* is detected in CRC cell lines. Our data here indicated higher expression (albeit insignificant) of *eL14* in cells (DLD-1) derived from an earlier stage (Stage C) of CRC compared to that (HCT116) from a more advanced stage (Stage D). In contrast, the findings by Sim *et al.* (2020) demonstrated a different scenario, whereby expressed transcripts of *eL14* is significantly higher in a cell line (HCT116) derived from an advanced stage of CRC compared to that (SW480) that is from an early stage (Stage B) of the cancer. The inconsistency of expression trends in *eL14* between all these studies suggests a comprehensive and simultaneous expression assay on many different CRC cell lines, together with relevant normal controls is warranted.

In addition to more cell lines, future expression study should utilise the quantitative PCR strategy for a more accurate and sensitive assessment of gene expression activity. The use of conventional RT-PCR method entails inaccuracy due to the fact that it is limited to the evaluation of end-point PCR product quantity. Quantitative PCR, however, allows for real-time measurement of the amplification process. Naturally, immunohistochemical techniques on CRC tissues to detect and quantify *eL14* expression would be an even better strategy for future study of its relevance in cancer of the colorectal region.

CONCLUSION

Expression of *eL14* has been detected in two cell lines (HCT116 and DLD-1) derived from CRC tissues. The level of transcripts is observably higher in DLD-1 (from Stage C cancer) than HCT116 (from Stage D). However, this difference in expression level is not statistically significant.

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The Relationship between Task Characteristics and Employee Engagement

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ABSTRACT

The objective of this study is to identify the relationship between task characteristics (variety of skills, task identity, task significance, autonomy, feedback) and employee engagement. The study was conducted in a healthcare service in Sabah, Malaysia. A self-administered questionnaire was used to collect data by using convenience sampling. A total of 78 respondents participated in the study. Data was analyzed using Spearman Correlation. The results revealed a significant and positive relationship between task characteristics (variety of skills, task identity, task significance, autonomy, feedback) and employee engagement in the studied organization. This has important implications to employers. It is recommended that managers, human resource development (HRD) practitioners and supervisors provide employees with more challenging tasks, autonomy and feedback from time to time. Moreover, work designs should include how the tasks may improve employee identity and significance.

Keywords: employee engagement, task characteristics, skills variety, task identity, task significance, autonomy, feedback

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INTRODUCTION

Employee engagement is vital for the success of an organization. Schaufeli and Bakker (2004) described an engaged employee as characterized by vigor, dedication and absorption. Based on the 2018 Trends in Global Employee Engagement Report by Aon Hewitt (2018), although Malaysia recorded an increasing percentage of employee engagement level (63%), it is still lower compared to other neighboring countries like Indonesia (76%) and the Philippines (71%).

Highly engaged employees are passionate and deeply connected to their work (Robbins & Coulter, 2012). They show proactive behavior (Salanova & Schaufeli, 2008), increased satisfaction, commitment, organizational citizenship behavior (Saks, 2006) and encourage effectiveness (Luthans & Peterson, 2002) as well as team performance (Torrente, Salanova, Llorens & Schaufeli, 2012). The lack of engagement may cause burnout among employees and increase the intention for them to leave the organization. Robbins and Coulter (2012) described a disengaged employee may come to work but lacks the energy and passion in completing his or her work. Employee disengagement may be caused by many factors, including emotional, mental and physical work demands (Bakker & Demerouti, 2008). Since employee engagement is important to organizational performance, it is crucial to identify ways to enhance engagement levels among employees.

Understanding task characteristics that are available for the employees is necessary because it is one of the strategies to improve employee engagement (Farndale & Murer, 2015). Task characteristics include skills variety, task identity, task significance, autonomy and feedback (Hackman & Oldham, 1975). Hackman and Oldham (1975) define task characteristics as follows: skills variety is the degree to which the job requires a variety of activities and involves many different skills and talent; task identity refers to the extent a job has a beginning and an end with a tangible outcome for the worker; task significance refers to the perception on the importance of a worker's job, autonomy relates to the extent the job encourages the worker to have freedom and independence and feedback refers to the extent the job activities provide the worker with direct and clear information about his or her performance. Although previous studies have explored the direct relationship between work characteristics and other work outcomes (Mat Ali, *et al.*, 2014; Ahmad Zawawi & Mohd Nasurdin, 2017), studies that examine the role of task characteristics and employee engagement is still limited.

Moreover, the workplace is now diversified with different age groups working together. According to a study of 2019 Millennial Manager Workplace Survey by Akumina Inc, millennials will make up 75% of the entire US workforce by 2030 (Akumina, 2019). In a study by Gallup Organization, 60% millennials are shown to be open to the prospect of changing jobs and only around 29% of millennials show engagement levels at work, while 16% are actively disengaged while 55% of millennials are not engaged at the workplace (Gallup Organization, 2016). Since this generation of workers contribute to the workforce and will increasingly dominate the workplace, new strategies and approach to engage them needs to be considered.

Furthermore, this study was conducted in a healthcare setting. The engagement of healthcare employees is important as they are the ones having direct interaction with customers or patients. Hence, employee engagement in the healthcare service is essential because it is associated with the satisfaction and safety of patients as well as to retain skilled and talented employees (Ganesan, Azli & Fageeh 2017). Additionally, Rad and Moraes (2009) suggested that advancements in medical technology and increasing demands for sophisticated patient-care delivery methods required healthcare employees to be highly skilled while still being engaged in their work.

Therefore, the objective of this study is to examine the relationship of task characteristics and employee engagement. This study may contribute to our understanding of antecedents of employee engagement in a local healthcare context. Figure 1 illustrates the conceptual framework of the study. The framework is based on Hackman and Oldham (1975).

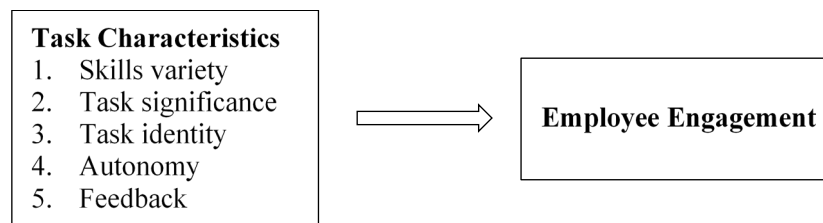


Figure 1. Conceptual framework of the application of Hackman and Oldham's task characteristics model to employee engagement

MATERIALS & METHODS

Population and Sampling

A quantitative method using survey questionnaire was conducted for this study. The population was the employees in one healthcare service located in Sabah. There were 298 employees, including those in the clinical (i.e. emergency unit, pharmacy unit, pathology unit) and non-clinical sections (i.e. medical record unit, administration unit). A formula derived by Luck, Taylor, and Robin (1987) was used to calculate the minimum sample size, which was 54 respondents. Since there was time constraints on the part of the participants, a convenience sampling approach was used to carry out the study. A total of 78 questionnaires were collected and analyzed.

Instrument

The questionnaire was divided into three sections. Section A consisted of demographic questions. Section B contained 17 questions measuring employee engagement dimensions: vigor (6 items), dedication (6 items) and absorption (5 items). The measurement items were adopted from Schaufeli, Salanova, Gonzalez-Roma, and Bakker (2002). Task characteristics items were adopted from Hackman and Oldham (1975), Morgeson and Humphrey (2006), and Oliveira (2015). There were 31 items consisting of skills variety (7 items), task identity (6 items), task significance (6 items), autonomy (6 items) and feedback (6 items). The Cronbach alpha value for each variable is shown in Table 1. Based on the results, all variables exceeded 0.7, indicating reliability for the measures used.

The questionnaire used 5-Likert Scale, ranging from 1 to 5, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree.

Table 1. Summary of research instrument

Measures	Total Items	Source	Cronbach Alpha, α
Employee Engagement	17	Schaufeli, <i>et al.</i> (2002)	0.879
Task Characteristics			
• Skill Variety (7)	31	Hackman and Oldham (1975);	0.910
• Task Identity (6)		Morgeson and Humphrey (2006);	0.708
• Task Significance (6)		Oliveira (2015)	0.895
• Autonomy (6)			0.928
• Feedback (6)			0.850

FINDINGS & DISCUSSION

Demographic information of respondents

The total respondents for the study were 78. Findings showed that most of the respondents in the study were female (64%). The majority was in the age group of more than 46 years old (32%), and married (76%). Most of the respondents (33%) were nurses while the administrative group represented only 13% of the respondents. The respondents were generally experienced, with a majority (35%) having more than 21 years of working experience.

Table 2 shows the value of means, standard deviations and correlations among the variables in the study. Since the data was not normally distributed, Spearman correlation test was performed. The test showed that task characteristics were significantly correlated with employee engagement.

Table 2. Mean, Standard Deviation and Spearman Correlation Test between task characteristics and employee engagement (N=78).

Section	Mean	SD	r_s	p
Skills variety	4.0	0.32	0.53	0.00
Task identity	4.0	0.36	0.49	0.00
Task significance	4.15	0.42	0.44	0.00
Autonomy	3.97	0.35	0.43	0.00
Feedback	3.98	0.34	0.25	0.03
Employee engagement	3.91	0.32	-	-

The results show that skills variety ($r_s = 0.53$, $p < 0.05$), task identity ($r_s = 0.49$, $p < 0.05$), task significance ($r_s = 0.44$, $p < 0.05$), autonomy ($r_s = 0.43$, $p < 0.05$) and feedback ($r_s = 0.25$, $p < 0.05$) were positively and significantly related to employee engagement. This finding is consistent with previous studies by Mohd Nadhir and Puteh (2017), Alzyoud, Othman and Mohd Isa (2015) and Bakker and Demerouti (2008). When an employer considers the motivational aspect of work design for their employees, the employees may respond by being more engaged in their work. Consequently, the Job Characteristics Theory (Hackman & Oldham, 1975) postulated that employees may be more invested in their work when their employers provide them with more freedom and choice in carrying out their tasks.

In the skills variety dimension, the result shows that when skills variety increases, the level of employee engagement also increases. The ability and opportunity for employees to use different skills at the workplace may reduce boredom, thus, increase their engagement. The findings were consistent with several research findings. According to Kim, Han and Park (2019) a job that involves the use of a variety of skills will provide an employee with a sense of challenge in their work, therefore, increasing their motivation, effort and involvement in the tasks

at hand. Similarly, Grant (2008) described skills variety emphasized the utilization and opportunities to learn, thus, enhancing employees' engagement.

In terms of task identity, employees who were given the opportunity to start, manage and complete a particular task by themselves would be more motivated, hence, feel a higher level of engagement. In a study of 95 workers in a telecommunication sector in Malaysia, Bon and Shire (2017) found that task identity intrinsically motivated employees to achieve work goals, thus, encouraged employees to be more engaged. When employees feel that the work that they do provides them with an identity, they feel that their work is more meaningful and with a purpose, hence employees are more motivated to stay with the task and accomplish it (Sonnentag, 2017).

For task significance, different tasks are perceived to have different levels of significance. For instance, the job of a nurse may be perceived to have different significant level and impact to that of a bus driver. If an employee feels that the tasks are unnecessary, it may lead to low task meaningfulness and low motivation (Semmer *et al.*, 2015). Therefore, when the employees who feel that their work is meaningful and has impact on others, they will feel more responsible to complete their work. As such, task significance provides intrinsic motivation that increases the employee's level of engagement, and feeling of meaningfulness towards their job (Peccei, 2013). The level of task significance is able to enhance the employees to be more dedicated for example, in putting in more effort to work on a task or to stay focus for longer periods on a task give. The employees' efforts at work will reflect their engagement level (Suzuki, Tamesue, Asahi & Ishikawa, 2015).

For the dimension on autonomy, the results showed a significant and positive relationship between autonomy and employee engagement, which indicates that a higher autonomy level at work will increase employee engagement. In this context, autonomy provided the employees with opportunities to make their own decision about how to do their work, decide the order to complete their work, and decide the schedule of their work. The findings are consistent with studies conducted by several researchers (Krishnan, *et al.*, 2015; Yong, Suhaimi, Abdullah, Rahman & Nik Mat, 2013; Crawford, Lepine, & Rich., 2010). Autonomy provides employee with the freedom and independence to participate in the organization's decision making process (Yong *et al.*, 2013), hence, may provide the employee with a feeling of being appreciated since the organization considers their viewpoints.

In terms of feedback dimension, the finding indicated a positive significant relationship with employee engagement. Feedback on employees' performance is important in order for them to know that they are doing well or otherwise. Essentially, when employees are being provided with feedback on specific work or task, the engagement level was found to be higher (Breevaart, Bakker & Demerouti, 2014). The study's finding was consistent with results from Alzyoud, *et al.* (2015) and Mohd Nadhir and Puteh (2017). According to Alzyoud *et al.*, (2015), performance feedback received by the employee will enhance the work environment and influences the level of employee contribution.

IMPLICATIONS

This research has shown the influence of task characteristics towards engagement of employees. There are a few implications that could be derived from the results of the study. Firstly, employee perception of their task characteristics is important to encourage employee engagement at work. A positive perception of task characteristics (i.e. skills variety, task identity, task significance, autonomy and feedback) lead to employees' engagement towards their work. Therefore, the employer may need to consider designing jobs that incorporate these task characteristics to promote further engagement of their employees, for example, giving more challenging tasks and providing more autonomy. Secondly, since feedback is important in engaging employees, employers or human resource development (HRD) practitioners may provide training in communication to enhance feedback skills among managers, supervisors and employees. Managers and supervisors should provide consistent and timely feedback so that employees are aware of their performance. When employees feel that management is paying attention to their work, they are likely to be more motivated and engaged.

CONCLUSION

This study showed that there is a significant relationship between task characteristics (variety of skills, task identity, task significance, autonomy, feedback) and employee engagement in a healthcare service in Sabah. Employee engagement is important to ensure a sustainable and successful performance of the individual employee and ultimately the organization. Therefore, it is important for managers, HRD practitioners and supervisors to provide challenging tasks, autonomy and feedback to their employees from time to time. Furthermore, work designs should include how the tasks may enhance employee identity and how employees' work impact others.

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The Academic Self-Efficacy Among Undergraduates: The Role of Gender, CGPA and Trait Emotional Intelligence

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ABSTRACT

Academic self-efficacy is important for students which will help them to perform better in studies. This study aims to explore the level of academic self-efficacy among UNIMAS undergraduates based on gender, CGPA and trait emotional intelligence. The samples of study involved are 50 male and 50 female participants which consists of final year students from Faculty of Cognitive Sciences and Human Development. The academic self-efficacy of the students is measured using the questionnaire adopted from a study by Sachitra and Bandara (2017) and The Short Form (TEIQue-SF) Trait Emotional Intelligence Questionnaire is used to measure the trait emotional intelligence of the undergraduates. The result was analyzed using descriptive analysis and inferential analysis; independent samples *t-test*, One-Way ANOVA and Pearson's correlation. The results of the study have shown that female students have higher academic self-efficacy compared to male students. In addition, students who obtain a higher CGPA also have higher self-efficacy. There was also a small positive correlation between trait emotional intelligence and academic self-efficacy.

Keywords: academic self-efficacy, gender, CGPA, trait emotional intelligence

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INTRODUCTION

Self-efficacy is often attributed to variables like self-trust or self-belief, self-esteem and self-motivation or optimism in doing something. People's trust in their own ability to achieve their objectives or goals which will influence their lives is also defined as self-efficacy. How a person feels, reflect and encourage themselves to achieve a goal is known as self-efficacy (Bandura, 1994a; b). Meanwhile, academic self-efficacy is the beliefs of an individual whether they managed to complete a specific academic task successfully or achieve a specific academic objective. In addition, emotional intelligence that can be defined as the ability to evaluate, regulate and use of emotions was found out to be linked with the academic self-efficacy including academic performance (Hen & Goroshit, 2014).

In academic settings, self-efficacy plays major role to an individual success because it will affect their abilities and the actions that they will perform in a task. Academic self-efficacy is an individual's beliefs on how well they could accomplish an academic work or adapt with the academic performance (Sharma & Nasa, 2014). According to Bandura (1977), academic self-efficacy is grounded in the self-efficacy theory which stated that the task's level of difficulty causes variations in academic self-efficacy. Few individuals believed that they are most effectual on challenging tasks whereas others favour easier tasks (Sharma & Nasa, 2014). The academic self-efficacy affects learning and motivation among students. Therefore, it would be useful in the student's mental-learning efforts. Thus, different factors play different roles in improving academic self-efficacy (Satici & Can, 2016). Family, friends, school and the influence of academic transitions are very important in shaping the effectiveness of academic-self efficacy.

According to Huang (2013), there have been an extensive research on gender differences in academic self-efficacy for the recent decades. The findings were inconsistent even though many researchers had investigated gender differences in academic self-efficacy. Therefore, the differences between male and female in their own perceived self-efficacy suggest that gender need to be taken into consideration for any effort to improve perceived self-efficacy (Chavez, Beltran, Guerrero, Enriquez, & Reyes, 2014). This is because perceived self-efficacy is crucial in human performance, as it does not only directly affect behaviour, but it also affects important aspects such as

goals, targets and opportunities in the social context. Additionally, students with higher academic self-efficacy and better emotional intelligence would somehow feel motivated to involve in academic activities and gain positive attitudes which would lead to success in academics environments (Salami, 2010). They tend to be more committed and motivated to their academic goals compared to students who have low self-efficacy and emotional intelligence.

University students are now facing a learning environment which requires them to have higher self-reliance, determination and better self-regulation. Unfortunately, this learning environment transforms higher education into a stressful and unemotional experience for the undergraduates (Brinkworth, McCann, Matthews, & Nordstrom, 2008). There is extensive proof that high stress leads to unwanted results, which leads to inefficient learning and poor academic performance (Aboalshamat, Hou, & Strodl, 2015). Self-efficacy beliefs are strongly linked to the level of achievement of an individual and ought to be particularly relevant in improving cognitive problem-solving strategies and lessen the withdrawal strategies (Sachitra & Bandara, 2017). As indicated further, the findings have been inconsistent although there has been extensive research on gender differences in academic self-efficacy (Huang, 2013).

Furthermore, there is no strong evidence whether performing well academically improves students' emotional intelligence or whether positive self-efficacy leads to better academic performance (Macroveli & Sanchez-Ruiz, 2011). There are contradictions on past research and limited number of studies in these areas especially among Malaysian students. Besides, there is no research that has really focused on the relationship between gender, Cumulative Grade Point Average (CGPA) and trait emotional intelligence on academic self-efficacy. Further research is needed to bridge the gap and to better understand the relationship of gender, CGPA and trait emotional intelligence on academic self-efficacy.

MATERIALS & METHODS

The data for the study was collected from the Faculty of Cognitive Sciences and Human Development, UNIMAS. The population in this research were the final year students consists of different programs comprising Cognitive Science, Human Resource and Counseling programs. This quantitative research used convenient sampling method with a sample size of 100 (50 female and 50 male students). Academic self-efficacy is measured by using the questionnaire adopted from a study which measure the academic self-efficacy in terms of gender and academic year experience of undergraduates by Sachitra and Bandara (2017). The Cronbach's Alpha value was 0.791 which indicates the appropriateness of the items measured (Sachitra & Bandara, 2017). Meanwhile, trait emotional intelligence is measured by using The Short Form Trait Emotional Intelligence (TEIQue-SF) Questionnaire developed by Petrides (2009). The internal consistency score was 0.81 and test-retest reliability of the total score was 0.86. Furthermore, TEIQue-SF's psychometric properties were found to be satisfactory and applicable which could be used to measure emotional intelligence of students (Deniz, Ozer, & Isik, 2013).

The independent variables were gender, CGPA and trait emotional intelligence whereas the dependent variable was academic self-efficacy. In this study, there are three types of tests that will be used. The independent samples *t-test* is used to determine if there is any significant difference in academic self-efficacy of students based on gender. Meanwhile, One-Way Analysis of Variance (ANOVA) is used to determine if there is any significant difference in academic self-efficacy of students based on CGPA. Pearson's Correlation is used to determine if there is a relationship between academic self-efficacy and trait emotional intelligence of students.

RESULTS & DISCUSSION

Table 1 shows the summary of descriptive statistics of male and female. The mean of academic self-efficacy for female students ($M = 3.54$; $SD = 0.340$) is higher than that of male students ($M = 3.35$; $SD = 0.412$). Based on Table 2, the *p-value* is 0.011 which is less than the significance level, thus H_{01} is rejected. Therefore, there is a significant difference in academic self-efficacy of FCSHD undergraduates in terms of gender.

The results of the independent samples *t-test* showed that there was a significant difference in academic self-efficacy among undergraduates based on students' gender. Gender differences in academic self-efficacy have shown an inconsistent finding although this has been conducted extensively (Huang, 2013). Meanwhile, for this study the results show that female has higher academic self-efficacy compared to males. Thus, the findings indicated that female students show higher academic self-efficacy than male students which obtained the same results from Sachitra and Bandara (2017).

From the results obtained by this study, there are few explanations on why female students have higher academic self-efficacy than male students. In terms of their ability to write additional notes, time planning, asking friends for help or engaging in academic discussion with friends, female students were much more confident compared to male students. According to a study conducted for Malaysian students by Jelas and Dahan (2010), it has been found

H₀₁: There is no significant difference in academic self-efficacy of FSCHD undergraduates in terms of gender.

Table 1. Descriptive Statistics for Academic Self-Efficacy based on Gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Self-Efficacy	Male	50	3.35	0.412	0.058
	Female	50	3.54	0.340	0.048

Table 2. Independent Samples t-test of Academic Self-Efficacy based on Gender

		Levene's Test for Equality of Variances		t-test for Equality of Means						
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
		Lower	Upper							
Self- Efficacy	Equal variances assumed	1.464	0.229	-2.578	98	.011	-.195	.076	-.345	-.045
	Equal variances not assumed			-2.578	94.59	.011	-.195	.076	-.345	-.045

that females appear to perform better on cognitive tasks. Meanwhile, male students seem to be more attentive towards open-ended tasks which requires them to think critically (Jelas & Dahan, 2010).

Table 3 shows the summary of descriptive statistics based on CGPA of students. The statistics for CGPA of the students for pointer 2.5-2.9 (N=24, M=3.33, SD=0.429), followed by pointer 3.0-3.4 (N=49, M=3.41, SD=0.385) and lastly for pointer 3.5 and above (N=27, M=3.62, SD=0.306). This suggests that the mean of students with higher CGPA is higher compared to students with lower CGPA. As shown in Table 4, there was a statistically significant difference between groups as determined by one-way ANOVA [$F(2, 97) = 4.218, p = 0.018$], indicated that the *p-value* is 0.018 which is less than the significance value ($p < 0.05$), thus H_{02} is rejected. Thus, there is significant difference in academic self-efficacy in terms of the students' CGPA.

This was supported by a study conducted by Akram and Ghazanfar (2014), which showed a significant positive relationship between self-efficacy and academic performance in terms of students' CGPA. A study conducted by Galyon, Blondin, Yaw, Nalls, & Williams (2012) stated that the academic performance of high, medium and low CGPA was influenced by the students' self-efficacy. Thus, academic self-efficacy of students is one of the most influencing factors in CGPA. Basically, students with strong beliefs in academic self-efficacy will certainly be more interested in academic activities by setting their own goals and doing the best they can to achieve their goals.

CGPA is widely used to measure the outcome among university students that study the relationship of academic performance and the academic self-efficacy (Honicke & Broadbent, 2016). According to Honicke and Broadbent (2016), academic self-efficacy has been linked to academic performance. Some moderating factors such as regulation of efforts, goal orientations and deep processing strategies have been identified. Other than that, as cited in Honicke and Broadbent (2016), academic self-efficacy has persistently been shown to correlate positively with academic performance despite the educational setting (Richardson et al., 2012; Robbins et al., 2004).

On the other hand, teachers or lecturers can also guide students to improve their academic self-efficacy throughout the tasks provided. Besides, some students are not very confident of their ability to score for specific courses, hence a personal sense to score for specific CGPA score might be important to motivate themselves. Thus, when students are not able to pay attention and remain focus on their studies, this will automatically lead to poor grades and low academic self-efficacy.

H₀₂: There is no significant difference in academic self-efficacy of FSCHD undergraduates in terms of student's CGPA.

Table 3. Descriptive Statistics of Self-Efficacy based on CGPA

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
2.5 – 2.9	24	3.33	.429	.088	3.15	3.51
3.0 – 3.4	49	3.41	.385	.055	3.30	3.52
>3.5	27	3.62	.306	.059	3.50	3.74
Total	100	3.45	.389	.039	3.37	3.52

Table 4. One-Way ANOVA Result for Academic Self-Efficacy based on CGPA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.198	2	.599	4.218	.018
Within Groups	13.769	97	.142		
Total	14.966	99			

Table 5 shows a low positive correlation between trait emotional intelligence and academic self-efficacy, which was statistically significant ($r = 0.316$, $n = 100$, $p = 0.001$). The p -value is 0.001 which is less than the significance value ($p < 0.05$), thus H_{03} is rejected. It can be concluded that there is a positive but weak correlation between trait emotional intelligence and academic self-efficacy of the students.

The present study conducted among undergraduates showed a small positive correlation indicating that trait emotional intelligence has a minor impact on academic self-efficacy. Moreover, the construct for trait emotional intelligence will not show a strong direct association with cognitive capabilities in academic terms (Petrides, 2011). A study conducted by Parker, Summerfeldt, Hogan, and Majeski, (2004) shows a modest correlation between trait EI and academic achievement in high school and university samples. Thus, there is a possibility that trait EI effects vary through educational levels and subjects taken (Premuzic, Stumm, & Furnham, 2011). Besides, a study among Iranian teachers conducted by Nikoopour et al., (2012) also shown a positive correlation between trait emotional intelligence and self-efficacy.

According to Salami (2010), in recent years, there was little concern about how emotional intelligence, self-efficacy or psychological well-being could predict the behaviors or attitudes of the students. Emotional intelligence and self-efficacy as well as the psychological well-being are the essential resources to improve learning, achievement in studies and the quality of education among students. Additionally, students with higher academic self-efficacy and better emotional intelligence would somehow feel motivated to be involved in academic activities and gain positive attitudes which will lead to academic success (Salami, 2010). They tend to be more committed and motivated to their academic goals compared to students who has low self-efficacy and emotional intelligence.

H_{03} : There is no significant relationship between trait emotional intelligence and academic self-efficacy of FCSHD undergraduates.

Table 5. A Pearson’s correlation between trait emotional intelligence and academic self-efficacy of undergraduates

		TraitEI	Self-Efficacy
TraitEI	Pearson Correlation	1	.316**
	Sig. (2-tailed)		0.001
	N	100	100
Self-Efficacy	Pearson Correlation	.316**	1
	Sig. (2-tailed)	0.001	
	N	100	100

CONCLUSION

The level of academic self-efficacy among undergraduates in other institution such as private universities may not be the same as the present study which is a public university due to some factors. Hence, future researchers should carry out this research in other institutions. Different results may be generated which further contribute to this field of research. In addition, this study also contributes to the research methodology in which the methods and instruments used in conducting this study can be used by other researchers to conduct their research. As this study is conducted using quantitative approach, it provides an opportunity for future researchers to conduct a qualitative study using open-ended surveys and interviews.

As a conclusion, this study attempts to measure the academic self-efficacy based on different variables which are gender, CGPA and trait emotional intelligence. Throughout this study, it is found that academic self-efficacy plays a vital role in student’s academic performance as well as trait emotional intelligence. As conclusion, hopefully this study will become a good reference to people especially students, who not only intend to understand about academic self-efficacy but also getting engaged and become aware of their own academic self-efficacy which could help them to succeed in studies.

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Advertising Appeals and Cultural Values of Video Advertising in Thailand

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ABSTRACT

In recent years, Thailand videos advertising is generally known as the leading producer of weep-worthy viral videos in the world. Reasons for Thailand advertisements to stand out from the rest is said to be because of its commonly used advertising appeals, and cultural values focused in majority of Thailand advertisements. This research aims to study advertising appeals and cultural values in Thailand video advertisements. Specifically, the research investigates the reflection of cultural value through advertising appeal through the executional framework in Thailand video advertisements. This exploratory research employs primarily the method of ethnography in order to understand how cultural values are reflected through the advertising appeals in video advertisements from Thailand. The result shows that the most commonly used advertising appeal are Family Appeal, followed by Health Appeal and Effective Appeal. In terms of cultural values, the result shows the Thailand's advertisements are skewed slightly higher towards collectivism and femininity. Majority of the Thailand video advertisements are using executional framework of storytelling.

Keyword: Advertising, Appeal, Cultural Value, Thailand, Video Advertising

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INTRODUCTION

Advertising is a visual or audio form of tools for marketing communication to promote commercial products or services to customers. In recent years, following the growth of technology, media has also undergone revolution from traditional media like printed magazines, newspapers to new media like television and the internet. According to the statistic by Capstone report in 2011, there is a decline in print circulation over the past few years (Rajendran & Thesinghraj, 2014). Since 1995, the number of internet users has been increased, the so-called "Year of Internet" (Rajendran & Thesinghraj, 2014). This has led to the emerging of video advertising, where marketers spot the potential of advertising their product through television commercials, YouTube and other social media.

To design a good storyline of video advertisement in marketing, the advertising appeal and cultural values cannot be overlooked. The influence of culture is particularly important in delivering the advertising strategy across countries because in each market, the patterns of communication are closely related to the cultural norms (Hong *et al.* as cited in Young & Chan, 2004). Particularly in Asia, there are many multi-cultural countries. The cultural values of these countries often being reflected in their advertisements. For instance, Thailand's advertisement managed to wisely imply the cultural values through different advertising appeals in the past decade. The ranking of Thailand's advertising in recent years continues to surprise many.

Thailand's advertising is gradually standing out as major Asia's hub for its creative advertising recently. As cited in Escolar (2019), the Gunn Report of 2007, a publication that annually collects above 60 advertising awards shows results all over the world. Overall, Thailand has its highest finish ever placed, ranked No. 4, after placing No. 6 in 2005 and No. 5 in 2006. Today, every of the top 10 agencies has their offices well-established in Thailand. Most of them choose Thailand as their regional base for Indochina or Southeast Asia region.

The underlying motivations and reasons for Thailand advertisements achieving great performance incite the curiosity of many. Discussions about the advertising appeals and cultural values of Thailand advertisements started to rise, whether the appeals used are reflecting the cultural values that are most salient in Thailand. Albers-Miller and Gelb (1996) mentioned that strong discussion has been going on suggesting Thailand advertisements both influence and reflect cultural values. Thus, this research aims to investigate advertising appeals and cultural values in Thailand's

video advertisements. One of the best ways to study this is to carry out qualitative research as it gives insights to this issue and help develop hypotheses which are potential for quantitative research. Besides, qualitative research also helps dig deeper into Thailand advertising industry, besides uncovering trends in opinions and ideas in order to learn more about this issue.

RESEARCH QUESTIONS

The overall question of this study is about the advertising appeals and cultural values used in Thailand Video Advertising.

The specific questions of this study include:

1. What are the major advertising appeals that are commonly used in most of Thailand video advertising?
2. What are the cultural values that are commonly instilled in Thailand video advertising?
3. How do the cultural values being reflected through the advertising appeal in Thailand video advertising?

MATERIALS & METHODS

The 30 selected Thailand video advertisements are selected through a probability sampling method whereby a systematic random sampling method in which, every 4th video advertisement in YouTube will be selected using the keyword "Thailand Advertisement". In this research, qualitative research, which primarily is ethnography research was carried out to analyse the chosen video advertisements where the researcher will observe and analyse the cultural values reflected through advertising appeals and interpret the results based on the observation. The data analysis was divided into four sections, (1) Structural Information of Video Advertisements, (2) Differentiation of Advertising Appeals according to Alber-Millers and Gelb (1996) and Pollay (1983), (3) Emotional/ Rational Involvement Rate and (4) Effectiveness of Dimensions of Cultural Values. For the measurement of the emotional/ rational involvement, a likert scale rating will be used to analyse the video advertisement. whereby 1 is high rational involvement, 2 is slight rational involvement, 3 is neutral or equal emphasis on rational and emotional involvement, 4 is slight emotional involvement and lastly 5 is high emotional involvement, as refer to Table 4 in Appendix.

Formula below was used to calculate the average rating value for each dimension of cultural value following the scale in Table 1.

$$\text{Mean} = \text{Sum of all rating value of each dimension of cultural value} \div 30$$

The advertisements were selected based on these criteria:

- (i) The video must be a Thailand advertisement
- (ii) The video must be with English subtitle
- (iii) Selection of advertisement cannot repeat with previous chosen advertisement.
- (iv) The advertisement only contains one advertisement, not a compilation of few or more advertisements.

RESULTS

The structural information of video advertisements like name, product category, brand, target audience, message strategy and executional framework are present in detail in Supplementary Table 1.

According to Table 2, the advertising appeals that has the highest frequency is family appeal, with the frequency of 11, used in the video advertisement number 1, 3, 5, 7, 9, 11, 18, 20, 21, 28, 30. It is followed by healthy appeal and effective appeal, with the frequency of 7, whereby healthy appeal is used in the video advertisement number 4, 6, 16, 20, 22, 26, 29 and effective appeal is used in video advertisement number 4, 6, 13, 15, 16, 19, 29.

Table 1. Scale of Each Dimension of Cultural Values

Scale/ Cultural value	1	2	3	4	5
Uncertainty avoidance	Highly uncertainty tolerant	slightly uncertainty tolerant	Neutral	Slightly threatened by uncertainty	Highly threatened by uncertainty
Power Distance	Very justice and equal distribution of power	Slightly justice and the distribution of power is equal	Neutral	Slightly injustice and the distribution of power is unequal	Very injustice and the distribution of power unequal
Individualism vs Collectivism	Highly Individualistic	Individualistic	Equal emphasis on Individualistic and Collectivistic	Collectivistic	Highly Collectivistic
Masculinity vs Femininity	High dominant value focus on assertiveness/rigor and earns money and other material goods	Slight dominant values focus on assertiveness/rigor and earns money and other material goods	Focus on relationship of human being and assertiveness/rigor at the same time	Slight dominant values focus on human being relationship	High dominant values focus on human being relationship

Table 2. Advertising Appeal that is used in selected Thailand video advertisement. The advertising appeal was based on Alber-Millers and Gelb (1996) and Pollay (1983).

Advertising Appeal	Frequency	Number of Video Advertisement*
Family Appeal Nurturance within the family, having a home, being at home, family privacy, companionship of siblings, kinship, getting married	11	1, 3, 5, 7, 9, 11, 18, 20, 21, 28, 30
Healthy Appeal Fitness, vim, vigour, vitality, strength, heartiness, to be active, athletic, robust, peppy, free from disease, illness, infection, or addiction	7	4, 6, 16, 20, 22, 26, 29
Effective Appeal Feasible, workable, useful, pragmatic, appropriate, functional, consistent, efficient, helpful, comfortable (clothes), tasty (food), strength, longevity of effect	7	4, 6, 13, 15, 16, 19, 29
Adventure Appeal Boldness, daring, bravery, courage, seeking adventure, thrills, or excitement	6	12, 17, 23, 24, 25, 29
Frail Appeal Delicate, frail, dainty, sensitive, tender, susceptible, vulnerable, soft, gentle	5	2, 3, 7, 14, 27
Enjoyment Appeal To have fun, laugh, be happy, celebrate, to enjoy games, parties, feasts and festivities, to participate	4	4, 11, 12, 30
Affiliation Appeal To be accepted, liked by peers, colleagues and community at large, to associate or gather with, to be social, to join, unite or otherwise bond in friendship, fellowship, companionship, co-operation, reciprocity, to conform to social customs, have manners, social graces and decorum, tact and finesse	3	4, 14, 28

Table 2. Cont...

Advertising Appeal	Frequency	Number of Video Advertisement*
Distinctive Appeal Rare, unique, unusual, scarce, infrequent, exclusive, tasteful, elegant, subtle, esoteric, hand-crafted	3	4, 27, 30
Nurturance Appeal To give gifts, especially sympathy, help love, charity, support, comfort, protection, nursing, consolation, or otherwise care for the weak, disabled, inexperienced, tried, young, elderly, etc.	3	2, 8, 14
Durable Appeal Long-lasting, permanent, stable, enduring, strong, powerful, hearty, tough	3	14, 27, 28
Community Appeal Relating to community, state, national publics, public spiritedness, group unity, national identity, society, patriotism, civic and community organisations or other social organisations	2	2, 4
Humility Appeal Unaffected, unassuming, unobtrusive, patient, fate-accepting, resigned, meek, plain-folk, down-to earth	2	2, 8
Independence Appeal Self-sufficiency, self-reliance, autonomy, unattached, to-do-it yourself, to do your own thing, original, unconventional, singular, nonconformist	2	7, 14
Convenient Appeal Handy, time-saving, quick, easy, suitable, accessible, versatile	2	10, 29
Relaxation Appeal Rest, retire, retreat, loaf, contentment, be at ease, be laid-back, vacations, holiday, to observe	2	11, 12
Modesty Appeal Being modest, naïve, demure, innocent, inhibited, bashful, reserved, timid, coy, virtuous, pure, shy, Virginal	1	2
Morality Appeal Humane, just, fair, honest, ethical, reputable, principled, religious, devoted, spiritual	1	2
Succorance Appeal To receive expressions of love (all expressions except sexuality), gratitude, pats on the back, to feel deserving	1	2
Youth Appeal Being young or rejuvenated, children, kids, immature, underdeveloped, junior, adolescent generation is shown through	1	4
Magic Appeal Miracles, magic, mysticism, mystery, witchcraft, wizardry, superstitions, occult sciences, mythic characters, to mesmerise, astonish, bewitch, fill with wonder	1	6
Maturity Appeal Being adult, grown-up, middle aged, senior, elderly, having associated insight, wisdom, mellowness, adjustment, references to ageing, death, retirement, or age related disabilities or compensations.	1	8
Wisdom Appeal Knowledge, education, awareness, intelligence, curiosity, satisfaction, comprehension, sagacity, expertise, judgement, experience	1	8
Freedom Appeal Spontaneous, carefree, abandoned, indulgent, at liberty, uninhibited, passionate	1	12

Table 2. Cont...

Advertising Appeal	Frequency	Number of Video Advertisement*
Natural Appeal References to the elements, animals, vegetables, minerals, farming, unadulterated, purity (of product), organic, grown, nutritious	1	16
Untamed Appeal Primitive, untamed, fierce, course, rowdy, ribald, obscene, voracious, gluttonous, frenzied, uncontrolled, unreliable, corrupt, obscene, deceitful, savage	1	17
Cheap Appeal Economical, inexpensive, bargain, cut-rate, penny pinching, discounted, at cost, undervalued, a good value	1	23
Sexuality Appeal romance, intense sensuality, feeling sexual, erotic behaviour, lust, earthiness, indecency, attractiveness of clearly sexual nature	1	26
Neat Appeal Orderly, neat, precise, tidy, clean, spotless, unsoiled, sweet-smelling, bright, free from dirt, refuse, pests, vermin, stains and smells, sanitary	1	27

According to Table 3, it shows that 11 of the Thailand video advertisements are rated 4, which is slight emotional involvement. Besides, 19 of the video advertisement are rated 5, which is highly emotional involvement. However, none of the video advertisement are rated 3 which is neutral or equal emphasis on emotional and rational involvement, and 4, which is slight rational involvement, and lastly 5, which is highly rational involvement.

Table 4 shows the mean of cultural values. The mean of uncertainty avoidance is 3.27, which shows that the uncertainty avoidance of Thailand video advertisement is slightly high. Besides, in term of power distance, the mean is 3.13, which also shows that the power distance in Thailand video advertisement is slightly high. For individualism/collectivism, the mean is 3.50, which is slightly more to collectivism, and lastly, the mean for masculinity/femininity is 3.43, which is also slightly more to femininity.

Table 3. Emotional/ Rational Involvement Rate

Emotional/ Rational Involvement	Rating				
	1	2	3	4	5
Frequency	0	0	0	11	19

Table 4. Mean of Each Dimension of Cultural Values.

Cultural Value	Mean
Uncertainty Avoidance	3.27
Power Distance	3.13
Individualism/ Collectivism	3.50
Masculinity/ Femininity	3.43

DISCUSSION

Research Question 1: What are the major advertising appeals that are commonly used in most of Thailand video advertising?

The finding has shown that the advertising appeals that are most commonly used are Family, followed by Healthy Appeal and Effective Appeal, and then Frail Appeal. For the family appeal, the product category of Insurance received the highest frequency compared to other product categories. This means that in Thailand video advertisement, most of the video advertisement of insurance used the advertising appeal of family appeal. The reason behind this is because the portrayals of families, family type, family roles and relationships, as well as the activities and the sense of happiness as well as the bonding in the advertisements will influence the expectation, perceptions, relationships and sense of happiness of the audience (Aqueel, n.d.). Hence, it is becoming more important that nowadays, the portrayals of families elements in the advertisement in order to capture the audience. Besides, products are present as an integral part of expressing loves and cares for others. The closer the advertiser can tie a product with positive emotions and natural, the advertisement is said to be more successful.

For the healthy appeal and effective appeal, the product category of Beverage is the highest frequency compared to other product category. This means that in Thailand's video advertisements, most of the video advertisement of beverage used the healthy and effective advertising appeals. This is because in recent years, regardless of whether it is goods or beverages, consumer behavior was slowly switching to become more health conscious. People started to get attracted by food and drink advertisement that promotes health benefits and more prone to buy the product. For example, a content analysis showing the comparison of nutrient content claims and types of health in prime-time Spanish and English-Language television advertisement whereby they targeted women in the age of 18-35 years in US. They realized that the Spanish- language broadcasted food advertisements contained significantly more information of the nutrition and 'good for health' claims. Effectiveness appeals also carry the meaning of feasible, workable, useful and functional (Alber-Millers & Gelb, 1996). Hence, along with healthy appeal, effectiveness appeal can improve the audience's response to purchase the food and drink by increasing their desire and interest to try the product.

For emotional/rational involvement, most of the video advertisements are highly emotional involvement followed by slightly emotional involvement. None of the video advertisement are neutral or slight rational or very rational involvement. This does not mean that all of the Thailand video advertisements are in emotional involvement, as the result did not represent all of the Thailand video advertisement. However, it can be said that most of the Thailand video advertisement are emotional involvement. This is because the emotional advertisement will have an impact that is substantial upon the consumer attitudes and their purchase intentions (Williams, 2000).

Research Question 2: What are the cultural values that are commonly instilled in Thailand's video advertising?

The finding of this research according to the scale listed in Table 1 has shown that the uncertainty avoidance of Thailand video advertisement is slight high uncertainty avoidance. Uncertainty avoidance is the reflection of the extent to which individuals in a society are threatened by uncertainty and ambiguity where they feel comfortable or uncomfortable in the unpredicted situation (Hofstede, 2011). The results show a slight high of uncertainty avoidance in Thailand video advertisement explains that why stability and structure are more valued in Thailand culture (Swain & Tanabe, 2009). In Thailand, the subordinates used to not get involved in the process of decision making, they tend to avoid any confrontation with superiors or even the same level employees as the involvement in the process of decision making may causes unwanted responsibilities to the subordinates.

Besides, in term of power distance, the result indicated that the power distance in Thailand video advertisement is slight high. According to Hofstede (2006) cited in Harada and Coetzee (2017), the Power Distance Index of Thailand is ranked above the middle, which is 34-36th among 74 regions and countries. In Thailand, most of them believe there should be a place rank in people in a hierarchy. Therefore, it can be seen that Thailand is a very hierarchical society where they are very respectful to the one at higher authority like their parents, the monks, and the Thai King. In the office, the employees should pay respect to their superiors, and the superiors will give guidance to the employees in return.

For individualism/collectivism, the finding shown that Thailand video advertisement are slightly more toward collective cultural values. In the culture of collectivist, within their in-groups, people are interdependent to each other (family, tribe, nation, etc.), they put priority to the in-groups' goals, behave in a communal way, and on the basis of in-group norms they shape their behaviour. Collectivists are especially concerned with relationships. For instance, it is shown the collectivist are mainly concerned with keeping their relationships with others in conflict situations, while individualists mainly concerned with pursuing justice. In Thailand, it scores in 20 individualism, which is relatively low (Swain & Tanabe, 2009). This is shown in the culture where the Thais like live within a group and share things together. For example, the Thais like to share their food, whether to the monks or to dine with their friends (Swain & Tanabe, 2009).

Lastly, for masculinity/ femininity, the result shown is slightly more toward the feminine cultural values. Femininity refer to the extent to which the society's dominant values focus on the human beings' relationship and life quality (Syed & Kramar, 2017). In Thailand, it scores 34 in masculinity, which is relatively low, whereby the society is higher in femininity. According to Swain and Tanabe (2009), the culture of Thailand emphasis on the femininity value of androgynous behaviour, the nurturing traits, interdependence, as well as the gender equality, which is more apparent than the masculine society. Besides, they also tend to focus more on building relationship with customer in business, instead of directly enter to the business topic. In company management, the Thais expect to maintain the relationship among subordinates and the boss rather than their individual decision.

Research Question 3: How does the cultural values being reflected through the advertising appeal in Thailand's video advertising?

According to Supplementary Table 1, 24 of them which is 80% of the selected video advertisements are using the executional framework of storytelling. According to Baack and Clow (2016), storytelling is the newest type of executional framework. It does not involve an encounter where a brand solves the consumer's problem, instead, it presents a story or movie of a product. This type of executional framework of advertisement let the audience draw own conclusion on the product, instead of using the "hard-sell" approach which directly inform the benefits of the brand to the audience. This is one of the benefit of storytelling executional framework whereby it triggers the audience to actively pondering on the message of the benefits of the brand, instead of instil the benefits coercively to the mind of the audience.

In recent years, heart-warming, heart-rending advertising landscape has become more popular with the tear-jerking storytelling framework. Nowadays, advertisers are desperate for the audience to be emotional, to let them know that they care about bigger things in life and want the audience to be emotionally invested by it (Davidson, 2015). As a consequence, a feel-good ad, a good cry over a bitter-sweet, a pulling at the heartstrings of the most hardened cynics, has now becoming the ultimate recipe for explosive of sharing in the social. This is called by the marketers meaningful marketing. Others named it the trend of *Sadvertising*, whereby after the idea of sadness, as well as stronger feelings generally, can be utilized to associate the audience with brands on a higher profound level (Davidson, 2015).

CONCLUSION

In conclusion, this research is to help the researcher to have a better in-depth understanding on Thailand video advertisement, in term of the advertising appeals and the cultural values. The study of this research helps the researcher to understand what are the advertising appeal that are most commonly used in Thailand's video advertisement. The result shows that Family appeal is the most commonly used, followed by Healthy appeal, and next Effective appeal, based on the Pollay 42's Advertising Appeals. For the cultural values, the result of the research shows that not all of the Thailand video advertisement emphasis or exhibit all the cultural values, but the overall results do reveal what are the cultural values that Thailand video advertisement are incline to. The result shows that most of the Thailand video advertisement reflects a slight high uncertainty avoidance, which means the Thailand society is slightly threatened by uncertainty. Also, the results indicate a slight high of power distance which reflects slightly injustice and unequal power distribution in Thailand. In term of individualism/ collectivism, most of the Thailand video advertisement reflects that Thailand society is collectivists where they prefer to be in groups. Moreover, a slight dominant value focus on human being relationship is observed from most of the Thailand video advertisement, which shows that Thailand society is higher in femininity. Through the result of this research, an in-depth general understanding on the advertising appeals and cultural values of Thailand video advertisement can be obtained and more useful information for future research can be rooted based on the outcomes of this research.

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Supplementary Table 1. Summary of Structural Information of Selected Thailand Video Advertisement. All advertisement used affective message strategy.

No.	Advertisement	Product Category	Brand	Target Audience	Execuational Framework
1.	Silence of love (Official English Subtitle) TVC Thai Life Insurance	Insurance	TVC Thai Life Insurance	Parents	Storytelling
2.	"Unsung Hero" [ภาพยนตร์โฆษณา ปี พ.ศ.2557] [Official TVC 2014: Thai Life Insurance]	Insurance	TVC Thai Life Insurance	Parents	Storytelling
3.	Sister - Saddest Thai Commercial Drama (Eng Sub)	Institute	National Cancer Institute	Everyone and cancer patients	Storytelling
4.	Thai Creative Beverage Advertisement	Beverage	B-ing Bodyline	People with bloated stomach	Storytelling
5.	Another sad Thai commercial "The waiter's mom" [Eng Sub]	Restaurant	BarBQ Plaza	Children	Slice of life
6.	[EngSub] Funny Ads Commercials From Thailand Best Funny Commercial Compilation	Beverage	Coffee 21	People who wants to have healthy and slim body	Storytelling
7.	Garbage Man- Thai Life Insurance	Insurance	TVC Thai Life Insurance	Children	Storytelling
8.	Teacher (Thai Commercial by 7-Eleven)[Subtitle in English by KimTaeKong]	Grocery shop	7-eleven	Teachers	Storytelling
9.	The most emotional ad - Thailand	Insurance	Land and Houses	Parents	Storytelling
10.	Funny Commercial Ad - Thailand	Banking & Finance	Krungsri	People who wants to sell and buy car.	Slice of life
11.	Funny thai commercial..english..	Beverage	Bineley	Fruit juice lover	Storytelling
12.	'Pray for Anna' in Thailand	Tourism	Tourism Authority of Thailand	Tourist	Storytelling
13.	Thai Skin Whitening Advertisement	Beverage	Verena	Ladies	Storytelling
14.	Thai Life Insurance- Opportunity	Insurance	Thai Life Insurance	People interest to buy insurance for their love ones	Storytelling
15.	[HD]Lamptan - Elephant energy (funny ads from Thailand)	Electronic household	Lamptan Setronic	People who prefer to use electric saving household product	Authoritative
16.	Funny Ads Commercials From Thailand - Best Funny Commercial Compilation, Funny TV Ads	Beverage	Malee Healti Plus	People who wants healthy skin	Authoritative
17.	Funny Thai ad for Bridgestone tires	Car spare parts	Bridgestone	Driver who love sporty	Storytelling
18.	Forget me not (Thai Life Insurance) with ENG subtitle- YouTube .FLV	Insurance	Thai Life insurance	People who has the interest to buy insurance for their love ones.	Storytelling
19.	ENO Advertising from Thailand	Beverage	Eno	People who has bloated stomach	Storytelling
20.	Thailand Overworked Ad	Supplement	Scotch	Workaholics	Storytelling
21.	Touching Thai Ads - I need more time "my son"	Insurance	Thai Life Insurance	Parents	Storytelling
22.	Thai Health Promotion Foundation - Smoking Kid (Original Version)	Health Campaign	Thai Health and Promotion Foundation	Smoker	Demonstration
23.	Thailand mall ad	Furniture and household item	HomePro Expo	People who want to buy furniture or household item	Dramatization
24.	Top Charoen Optical Advertisement, Thailand	Optical specialist	Top Chareon Optical	People with eye sight problem	Storytelling
25.	Ghost- Funny Thai bank advertisement	Bank and Finance	Krung Thai Bank	People who pay bills	Storytelling
26.	Thailand Advertisement for Low Fat Tuna	Food	Sealect Tuna	People who wants to have healthy slim body	Storytelling

27.	The Deaf Violin Player -Pantene	Shampoo	Pantene	Ladies	Storytelling
28.	My father is a liar	Insurance	MetLife	Parents	Storytelling
29.	Thai Ocean Skin Commercial	Skincare	Ocean skin	ladies	Storytelling
30.	Krungsri Auto TV: soulmate	Banking and Finance	Krungsri	Driver	Storytelling

Perceptions of Muslim Travellers Toward *Halal* Lifestyle in South Korea

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ABSTRACT

This study aims to investigate the perception of Muslim travellers toward *Halal* lifestyle in South Korea. This study is significant due to a huge growth of Muslim tourists in South Korea over recent years. Statistics has shown an influx of Muslim tourists from Malaysia travelling to South Korea from year-to-year. Interviews were conducted to gain in-depth and comprehensive insights of Malaysian Muslims' perception on the *Halal* culture in South Korea. The questions were designed in the interview covers three issues, which include the pre-travel behaviour, extensivity of information search, and travel decision. According to the interviews, most of the travellers spent their time conducting research, explicitly on *Halal* dietary matters before heading to South Korea. They also stated that it was quite hard finding places that serve *Halal* food. Therefore, we concluded that the *Halal* principle adoption in Korea influences the travel decision by most Muslim travellers.

Keywords: Exploratory, *halal*, Muslim, South Korea, tourist perception

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INTRODUCTION

Tourism has been identified as one of the factors of economic growth in recent years. According to the World Tourism Organization (WTO), it is forecasted that Asia and Pacific would become the second most important tourist destination in the world by 2020. South Korea being one of Asia's largest economy and strategically located between China, Russia and Japan, is deemed to be an attractive tourist destination.

South Korea has competitiveness advantages in a few important areas such as arts, historic places and heritage. Credit to its growth in a large part of the export-focused strategy, South Korea has enjoyed rapid growth. From the year 2012, the visitor arrivals keep increasing from 11,140,028 (end of 2012) up to 17,241,823 visitors by the end of 2016 (South Korea Tourism Organization, 2017). South Korea is a tourist-friendly country since it is easy for the local and international tourists to get information from the information centres that are strategically located in airports, hotels and subway stations. This country is a well-developed country since they are advanced in several industries compared to other developing countries, for example, their sophisticated public transports, several world-renowned universities, entertainment and medical industry especially in the plastic surgical field. South Korea is not new to most people in the world. The Hallyu phenomenon has effectively made travellers especially K-pop fans to go to South Korea. In other words, the popularity of K-pop and K-drama have made the capital of South Korea a desirable holiday destination (Chin, 2017).

Halal is defined as lawful and permitted. It is an Arabic word which comes from the Holy Quran. These laws are practiced by Muslims all around the world. *Halal* from dietary standpoint, is any food and beverages free from components that prohibited for Muslims to consume, otherwise, commonly adopted as "pork-free" and "alcohol-free". Whilst the contrary to this principle is known as Haram.

Halal can also mean meat that came from allowed animals are to be slaughtered before consuming them. The slaughtering procedure must fulfil a few requirements to make it valid. Growing demand for *Halal* phenomenon has dramatically increased in both Muslim and non-Muslim countries as the number of Muslims all around the world keep

increasing year by year. In simple words, all food consumed by Muslims should be prepared, processed, packaged, transported and stored in such a manner that it complies with according to Sharia principles.

Halal as a principle isn't only restricted with food and how they were processed but in a holistic perspective, cosmetics, logistics, finance, medicine, textile, marketing, travel and tourism are also categorized under *Halal* (Zulkifli, Rahman, Awang & Man, 2011). Hashim and Mat Hashim (2013) stated that *Halal* cosmetics not only includes the ingredients, production process and safety issue but must also include the manufacturing process, storage, packaging and delivery. Besides *Halal* cosmetics, *Halal* logistics can be defined as: "The Command & Control of goods flows in a value system in such a way that the *Halal* integrity is secured throughout the supply chain (Abd Rahim, Mohd Sirajuddin, Mohd Mansor & Zainal, 2018) Malaysia Institute of Transport (MITRANS) on 28th June 2012 at the *Halal* Logistics Conference 2012. According to Duman (2011), Islamic tourism can be defined as "the Muslims activities of travelling to and staying in places outside their usual environment for not more than one consecutive year".

Originally, 'tourist' and 'traveller' were interchangeable terms which describe a person who was touring. Recently, according to the Tourism, Tourists and Society book by Sharpley (2018), someone who is travelling/touring for an extended period is usually applied to the word 'Traveller'. The word tourist, on the other hand, is defined as a person who's travelling away from his or her habitual habitat or residence. While travelling, a tourist will consume the tourism product which benefits the economies of a country he or she is visiting (Wang & Pizam, 2011).

There were 1.6 billion Muslim in this world according to 'Muslim World and Its Tourism' in 2010 (Jafari & Scott, 2014). The numbers keep increasing and by the year 2070, a recent report from the Pew Research Centre predicted that there will be more Muslims than Christians around the globe.

The purpose of this research is to discover the perception of Muslim travellers towards *Halal* principle in South Korea. Since South Korea is not yet fully ready to endorse *Halal* in their market, it is important to know what travellers perceive of *Halal* in the context of South Korea. The community of Muslims in South Korea is slowly growing in numbers and there is a minor step up where there are several official websites that provide *Halal* information and even *Halal* food guides. These websites include the South Korea *Halal* website (<http://SouthKoreaHalal.org/>) and visitSeoul.net website (<http://english.visitseoul.net/map-guide-book>). However, the in-depth information on not just *Halal* food but *Halal* tourism, *Halal* financial and *Halal* cosmetics in Korea are still grey areas for Muslim travellers especially who visits from different countries.

Apart from that, South Korea is still lacking in *Halal* supplies especially restaurants that serve *Halal* food where food is essentials for Muslim travellers. Since South Korea is not a Muslim country, Muslim travellers often face this problem because *Halal* foods and restaurants are mostly situated in Itaewon and there is at least one *Halal* restaurant in other parts of South Korea which could be a problem for them.

The context of travel decision-making has been narrated differently by authors. One of it is doing information search for the particular region or destination, accommodation, length of stay, mode of transportation and to learn more about the particular destination in order to reduce the risk of uncertainties and enhance the quality of the trip (Murray, 1997). In this paper, we will identify if *Halal* really matters in the traveller's travel decision-making.

According to the official South Korea Tourism Organisation, there were about 750,000 Muslims travelled to South Korea in the year 2014. Certainly, the Muslim market is a good opportunity for South Korea to venture. Hence a study on the general perception of Muslims toward *Halal* industry in South Korea looking into their pre-behaviour, information on the availability of *Halal* supplies and its impact on travel decision to South Korea.

Research Questions

There are few questions that need to be answered for this research which includes:

1. Do travellers make research on the *Halal* market before travelling to South Korea?
2. How is the availability level of finding places that serve *Halal* food and beverages in South Korea?
3. Does *Halal* aspects influence the travellers' decision to travel to South Korea?

Significance of Study

In this era of industrialization and urbanization, local communities often faced the challenges of conserving their traditional cultural tourism resources. South Korea is one of the countries that are famous for its own culture and heritage. These days, Islamic tourism is becoming like mushrooms growing after the rain. Although the Muslim market

is not being catered effectively in South Korea, there are small associations taking baby steps to introduce Muslim and Islam to South Koreans. There is some research done previously by other researchers, but research specifically on perceptions of Muslim travellers towards *Halal* in South Korea is not yet to be found. This research can be the initial step towards future studies on the *Halal* industry in South Korea.

As the number of Muslims keep increasing globally, many countries are starting to market their Islamic tourism to fulfil the Muslim travellers' needs. Therefore, it is important to do this study to improve the level of awareness among the business owners and entrepreneurs in South Korea. They can take this as an advantage to venture into Muslim's market which is still a niche market in South Korea. Some research has emphasized on the importance for responsible development where the tourist engages with the local community and is respectful of the values of the host in their behaviour (Harrison & Husbands, 1996; Spenceley, 2008). This is mainly what Islamic tourism is trying to seek whereby the locals are aware of the Muslim behaviour and get to treat them according to their beliefs as long as they respect each other.

As there is a large population of Muslims across the globe, this leads to an increase in the number of Muslim tourists especially in South Korea. In this case, this study is important to know how the tourists evaluate *Halal* industry in South Korea. This is because Muslim tourists are quite demanding since they have to follow the *Sharia* rules.

This study is also significant to know what travellers expect *Halal* South Korea to become in the future by investigating their personal perceptions on this topic. Although South Korea is not one of the Islamic countries, this initiative can be done to improve the awareness and introduce Islam in-depth to South Koreans so that they are not going through any culture shock when seeing or meeting Muslim tourists or even South Koreans whom convert to Islam. Moreover, this research can also help tourism marketers in South Korea to demonstrate Muslim friendly environment of the country for potential Muslim travellers from around the globe.

MATERIALS & METHODS

For this study, unstructured qualitative responses were used since the interviews took quite some time to be done. The answers from the interview were coded and stored in an electronic data file. The process of coding involves the translation of data into symbolic form by using numbers as representation. As in the book of Research Method (Zikmund, Babin, Carr, & Griffin, 2013), coding is defined as numbers assigned to transfer data from questionnaire or interviews. It is also defined as rules for interpreting, classifying and recording data. There are two types of coding which are unstructured qualitative responses (long interviews) and structured qualitative responses.

A total of nine respondents selected via judgmental sampling were interviewed in this study. The structure of the interview was designed based on the research questions (Table 1).

RESULTS

They were 9 interviewees, 5 of them were males and the remaining were females. The age ranges from 19 up to 52 years old and all of them were Muslims since this thesis was specified on Muslim travellers. The age ranges were chosen to get various perspective from different generations. One of them was 19 and travelled to Korea with his parents, four of them were attending a student exchange program in Korea for a year. They were 2 parents who travelled to Korea together with their family and are very meticulous regarding *Halal* matter. The interviews were done in fair and ethical manner and no bias intended during the interviews.

This section was the second section during the interview. The heading was further divided into three sub-headings. These sub-headings were named as (1) preparing to travel, (2) information resources, and (3) importance of information research. Each sub-heading consists of several questions. The answers were coded according to the theme. This section of interview questions was asked to investigate how these travellers make preparation before they travel to South Korea.

According to the interview in the second section, interviewees were asked about pre-travel behaviour. Most of the interviewees made their own research before travelling to South Korea. Five of them said that they will do a little bit

Table 1. Interview Questions

Pre-travel behavior (RQ1)	Extensivity of information search (RQ2)	Travel decision (RQ3)
What are the things you do before travelling to South Korea?	Do you search for information regarding <i>Halal</i> when you travel to South Korea for business purposes?	Is it easy/hard for you to find restaurants that serve <i>Halal</i> meals?
How long do you take to prepare before travelling to South Korea?	How does your information search vary when you travel with different kind of people? (children, business partner, friends, family)	Do they provide proper <i>Halal</i> certification in their restaurants?
Do you make your own research/study before going to South Korea?	How long do you usually spend on information search before travelling?	How is the level of availability for <i>Halal</i> authentic South Korean meals in South Korea?
Do you make research when travelling in group(s) or solo travelling or both?	How can people's blog posts/reviews influence your perceptions toward <i>Halal</i> in South Korea?	How often do you travel?
How do you find your information? (Internet, flyers, WOM, etc)	Is it easy to identify whether the food is genuinely <i>Halal</i> or not?	How many times have you visited South Korea?
Are you usually the one who makes the research before travelling?	Do you think some of the street food sells in South Korea are safe to be consumed by Muslims?	How often do you travel to non-Muslim country?
Do you do a thorough research on <i>Halal</i> before travelling to South Korea?	How much money (in RM) do you spend (estimation) for <i>Halal</i> food while in South Korea for a day?	What is your common purpose in travelling?
Is the information on <i>Halal</i> (restaurants, mosques, cosmetics, etc) important to you? Why?	In your opinion, is there more local or foreign (Pakistan, Iran, Turkish, India, etc) <i>Halal</i> restaurant in South Korea?	Do you make your own travelling decision or other people will contribute as well? (when travelling in group)
Are there enough resources for you to do information search about <i>Halal</i> in South Korea?	In your opinion, is the amount of Muslim-friendly (restaurants, prayer hall, <i>Halal</i> meat, etc) in South Korea is sufficient for the local Muslims and tourists?	Is <i>Halal</i> matter concerns you the most when travelling to South Korea?
Which is the most source that influences your perceptions toward <i>Halal</i> in South Korea?	<i>Halal</i> cosmetics or skincare products are equally important to me.	Is there any other factor that influences your travel decision to South Korea?
How important is it to you to make such research before travelling to South Korea?	Checking often the ingredients first before buying the cosmetics or skincare and food products in South Korea.	Can you easily find places to pray in South Korea besides the central mosque in Itaewon?
Do you make any research for your revisit to South Korea?		Does your information search before travelling influences your decision-making process travel to South Korea?
Why do you think you sacrifice your time in making research before travelling? What motivates you?	Intention to buy/not buy products (i.e: makeup brush) if it is made (contaminated) with unlawful materials in Islam.	Does <i>Halal</i> situation in South Korea influence your decision to travel there? Do you think it is worth to travel to South Korea? (based on <i>Halal</i> in South Korea) I will be delighted to revisit South Korea again.

of shopping such as buying winter clothes and snacks from Malaysia (i.e. instant noodles). Other than that, two of them said that they will monitor currency from time to time before travelling to South Korea. Meanwhile, the other two interviewees will plan on what to bring and make some information search on the places they planned to visit. The travellers will do some research on the *Halal* information in South Korea in order to prepare themselves and so that they can plan their holiday smoothly. Therefore, it is not surprising that research on information has been one of the most examined subjects in consumer studies (Schmidt, 1996).

Besides that, most of them also mentioned that they will still do some research for their revisit to South Korea in the future. This is to make sure that they are up to date on the *Halal* situation in South Korea at that time. To answer the research question regarding the research made by travellers on the *Halal* market before traveling to South Korea, there are few use-cases in the previous study by Kotler in the year 1998. Kotler mentioned that information search was done by travellers before traveling and they might encourage to go for an active search in information including advertisement (Kotler, 1998).

Regarding information resources, the interviewees obtained their information through internet surfing. They said that the internet was the most reliable platform in finding sources since the information they get from the internet is limitless and easy to get. Besides the internet, the travellers often seek information and recommendation from friends and family that have experienced South Korea before them. They rely on this resource because they believe that the information gained from their close friends and relatives are trustable.

In addition to that, two interviewees mentioned that they obtained information on *Halal* in South Korea from reading other people's blog posts. They said that those bloggers often visit South Korea and they knew every nook and crook on finding the best places to dine in South Korea without having any doubt on *Halal* matters. According to them, there were enough resources for them to do the information search regarding *Halal* in South Korea. This is because of the initiatives done by the authorities like the South Korean Tourism Organisation (KTO). KTO provide *Halal* guidebooks on their website as well as at their building in South Korea.

Six of the nine interviewees claimed to have made a thorough research before going to South Korea so that they can save time once they were there. They also told that the information on *Halal* market is very important to them because they need to carefully monitor and be alert on what they consumed since South Korea is not a Muslim country. Thus, a non-Islamic country like South Korea might not know what it is like to be a Muslim and what can be eaten or not.

Most of them said that it is important for them to do the research to practice as a better Muslim and to ensure that they know *Halal* situation in South Korea enough so that they won't be lost in finding *Halal* places that serve *Halal* or even vegetarian or seafood meals. It is also important for them to do research beforehand due to the scarcity of *Halal* food in South Korea because there were not many places that really do serve *Halal* meals to Muslim travellers. According to the research done by Kim, Xu and Yoon (2017), there were only 14 certified *Halal* restaurants in South Korea.

In section 3, the questions asked were on (1) the travel information search purpose, (2) influence of information search as well as (3) *Halal* food in South Korea. Questions asked for this section was to find out how deep and how far do the travellers go to search for *Halal* information in South Korea.

Three interviewees will do information search on *Halal* aspects if they are to travel to South Korea for business purposes. This is because they still need to educate themselves with knowledge on *Halal* especially those who are traveling to South Korea for the first time. Also, four of them said that the information search varies in terms of accommodation, transportation and places to visit when they are travelling in different kind of people. For instance, they need to search for a bigger place to stay when they are travelling with family consist of parents and children. Besides that, they also need to consider larger transportation when travelling with family rather than a standard size when travelling with a partner.

The period for information done by the interviewees was between one to three months. However, there were four interviewees who did their information search for a few hours and a week respectively. Also, seven of them believe that blog posts are trustable since the bloggers have more experience travelling to South Korea compared to themselves. This also depends on how far the bloggers are sensitive to the *Halal* issue.

Apart from that, three of the interviewees answered that the restaurants that offer *Halal* meals are only concentrated in Seoul especially Itaewon. Meanwhile, it is hard for Muslim tourists or even local Muslims to find places that serve

Halal cuisine at any other place especially at the suburban. On the other hand, four of them said that yes, the amount of Muslim--friendly places in South Korea were enough for both local Muslims and tourists. The remaining two interviewees said that places that serve *Halal* food are not enough in South Korea. Based on research question 2, the availability places that serve *Halal* food and beverages are still lacking in numbers in South Korea.

Other than that, five interviewees will check the ingredients at the back of the packaging (for food and cosmetics) for assurance. They mentioned that when the labels are in Hangeul (South Korean language), they will seek advice and consult with the shopkeeper or the promoter. The remaining interviewees said that they still read the labels and packaging but for different purposes. They read the labels in order to make sure that the products sold would not harm them and they are keen to know about the benefits of the products.

According to six of the interviewees, it was hard for them to identify whether the food is genuinely *Halal* or not. This is because, in most products, there was no *Halal* logo on the packaging and labels. Besides that, since the labels are always in Hangeul instead of English, Muslim travellers from other countries often feel doubtful to buy such products because they cannot understand the labels. In terms of the cuisine, six of them said that there were more foreign *Halal* restaurants rather than authentic South Korean *Halal* restaurants. This is because according to their observation, they mentioned that there were a lot of *Halal* restaurants run by the Middle East migrants such as from Turkey, Iran, Pakistan, India, etc.

South Korea is famous for its street food. Thus, six of the interviewees couldn't miss out to try the street food in South Korea. They claimed that the street food in South Korea was safe to be consumed by Muslims. This is due to the variety of street food sold over there. Some of the street foods that they deem safe to be consumed including the fried seafood, rice snack, fish cake, and others that were not prepare or serve with unlawful ingredients in Islam.

Muslim tourists to enjoy most of the South Korean delicacy while travelling. At the same time, seven of them said that the price for *Halal* food over there in South Korea were pricy especially the local (authentic) *Halal* food. Referring to their background, the ones who said the price for *Halal* food was expensive are among the student exchange (four of them). The other two interviewees are parents who travelled with their children. So, they have their own income and didn't really mind the price for their daily food whilst travelling to South Korea.

The last section in the interview questions was to gain in-depth data on the travellers' travel decision. The sub-heading consists of two parts which are (1) availability of *Halal* related information, (2) certificates and food in South Korea as well as (3) travelling experiences.

Three of the interviewees answered that it depends on the location in finding restaurants that serve *Halal* meals in South Korea. This is because they mentioned that places that offer *Halal* food are limited and only available in tourist spots, especially in Seoul. Four of them said it was hard in finding restaurants that serve *Halal* meals and only two people answered it was easy for them to find *Halal* places to eat. According to all the interviewees, the premises in South Korea that serve *Halal* meals showcased their *Halal* certificates in their restaurants. This showed that the shop owner made some efforts in assuring their Muslim customers.

The next question asked was on the places to pray in South Korea besides the central mosque in Itaewon. Six of the interviewees said that there were no other places available for them to pray since the praying room was nowhere to be found in public places. However, three of them believe that although there was no other proper praying room in public places, they can always pray at the parks in South Korea. They also mentioned that most of the parks in South Korea were clean and suitable for them to just lay their praying mat or the picnic mat and pray peacefully.

Among the nine interviewees, six of them went to South Korea once and the other three went there twice or more. Besides that, eight of them travel to other non-Muslim countries every year. Therefore, they might have great experience in handling *Halal* issues whilst travelling. For travelling to South Korea, five of them went to South Korea for a family vacation and the other four went there to undergo student exchange.

Apart from that, *Halal* in South Korea has influenced the travellers' decision to travel to South Korea. This is because six of them rated 10 out of 10 that *Halal* situation in South Korea influenced them which means it was so important for them to keep updated with *Halal* environment and current *Halal* situation in South Korea. With no exception, three of them rated 8 out of 10 which can be considered quite important for them to be updated with *Halal* situation in South Korea. This may answer the research question 3 whereby *Halal* does influence the travellers' decision to travel to South Korea.

DISCUSSION

RQ1: Do travellers make research on the *Halal* market before travelling to South Korea?

Travellers have done plenty of research on *Halal* places to eat, where to buy *Halal* supplies and even prayer rooms or mosque in South Korea. Since South Korea now provides *Halal* guidebooks, travellers' research on *Halal* aspects becomes easier and they can gain a lot of information in that book. Apart from that, it is best and convenient to search for *Halal* information on the internet and these travellers always make sure they are up to date with the information online. The online resources on *Halal* information in South Korea are enough for them to get some good insights into what South Korea has to offer regarding *Halal* issues. Based on a research by Fodness and Murray (1997), the information available to and used by the tourist plays a critical role in determining consumers awareness, selection and choice of tourism and hospitality products.

Apart from the internet, travellers obtained information and recommendations from their friends. They believed their friends who had been to South Korea have a lot of experience in finding the Muslim-friendly activities or restaurants. Besides that, their friends mentioned to them on what to avoid. For instance, they told them not to restrict from trying street food and seafood in South Korea. This is because according to their experience, there are several street food stalls sell deep-fried seafood that does not use any unlawful ingredients in Islam.

RQ2: How is the availability level of finding places that serve *Halal* food and drinks in South Korea?

The results from the interview conducted found out that travellers find it hard to locate places that serve *Halal* food. According to them, restaurants that serve *Halal* food are only situated in big cities such as Seoul. With no exception, some of them mentioned that it was a struggle for them if they are not staying in Itaewon. This is because, in Itaewon, a minority of South Korean Muslim community lives there. Thus, a lot of *Halal* restaurants are located in Itaewon but not in any other places.

Besides that, in South Korea, there are a lot of seafood places that are Muslim-friendly. But, as mentioned earlier, the restaurants or places for seafood wholesaler usually located far from tourist-concentrated area. South Korea should consider providing *Halal* certification to more premises because when a Muslim travelled to a non-Muslim country, he/she might act differently, and *Halal* certification plays an important role when Muslim travellers are deciding to eat at certain places. Apart from that, based on the research done by Nadhifah, Eka and Tusita (2019) *Halal* Korean food is hard to find because most of the common ingredients used in Korean cooking is their paste. The paste sometimes may contain alcohol. Apart from that, rice wine or cooking wine is commonly used to marinate meat.

RQ3: Does *Halal* aspects influence the travellers' decision to travel to South Korea?

A research done by Alam and Sayuti (2011) said that according to the Theory of Planned Behaviour, there are 2 thoughts that influence the intention of *halal* food purchasing which include the attitude towards the target behaviour and subjective norms about engaging in the behaviour. In this case, travellers who involved in this research must have the same trait. Moreover, South Korea is not a Muslim country and South Koreans are not aware of the *Halal* issue which makes the travellers be cautious in what they consume while they are in South Korea.

Therefore, throughout the interview session conducted for this research, it can be concluded that yes, *Halal* aspects in South Korea does influence the travellers' decision to travel there. It can be supported by their answers which one of it was "If there's no *Halal* food in South Korea, I would consider a lot of times before travelling to there" and also "If there are no *Halal* supplies over there, it would be hard for me to enjoys the most out of my vacation". This shows that *Halal* aspects in South Korea influences a lot to Muslim travellers. In other words, the scarcity of *Halal* supplies in South Korea gave a huge impact on travellers' travel decision.

Luckily, South Korea is just like any other non-Muslim country which had been taking the initiative to cater to the demand for *Halal* supplies that keep on increasing. Due to this initiative, few of the travellers had commented on the effort done by the authorities over there in expanding the *Halal* market in South Korea. Because of these improvements also, Muslims are not afraid to travel to South Korea although it is not a Muslim country. However, despite their small changes, South Korea is still considered as a 'newborn' in the *Halal* market.

In conclusion, we can say that the *Halal* phenomenon in South Korea gives the perception to travellers to make their decision to travel to South Korea. Lacking in awareness on *Halal* issue among South Koreans can be overcome by doing more exhibition and give education on *Halal*-awareness in universities as well as public events in order to teach

the community as well as the business owners on the importance of *Halal* aspects in South Korea to the local Muslims and Muslim tourists specifically. Many exhibitions were held in Malaysia annually in order to educate people on the importance of *Halal* lifestyle not only amongst Muslims but in general perspective. Some of the exhibitions and conferences include Halal Fiesta Malaysia (HALFEST), Malaysia International Halal Showcase (MIHAS), Malaysia Halal Expo and Halal Food Festival. Other than that, YouTube has been an important platform for the travellers to make decision as it is very convenient and travel blog or travelogue have been a great help for these travellers.

CONCLUSION

Travellers made some research to ensure that they are not consuming anything unlawful in Islam since South Korea is a non-Muslim country and to feel at ease whilst travelling instead of getting lost without preparing themselves with some knowledge on *Halal* aspects in South Korea. However, they find it quite hard to find places that serve *Halal* food especially authentic South Korean *Halal* food. The aspect of *Halal* influences their travel decision since the concept *Halal* is a sensitive matter in Islam and as a Muslim, they are most concern about maintaining the *Halal* lifestyle when travelling to South Korea.

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Macroeconomics Determinations of Gold Price in United States

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ABSTRACT

Nowadays, gold prices have been volatile, and the wealth of gold investors depend on the movement of gold prices. The purpose of this study is to examine the relationship between gold prices, crude oil prices, inflation rate, real interest rate and stock prices in United States. This study uses monthly data covering the period ranging from January 1990 to August 2018. The Johansen and Juselius (JJ) Cointegration test and Vector Error Correction Model (VECM) are conducted in this study. The result shows that there is a long-run relationship among gold prices, crude oil prices, inflation rate, real interest rate and stock prices. The results show that inflation rate and crude oil prices are significance and positively related to gold prices, while stock prices and real interest rate are negatively affecting gold prices. There are three unidirectional Granger causality and one bidirectional Granger causality in the short run. Only inflation rate Granger cause gold price, which means that inflation rate directly affects the gold prices. This study allows community such as central bank, government, financial institution, economist, investor and policy makers in manipulating and controlling the movement of the gold prices so that they have a better decision making to diversify their risks.

Key Words: Crude Oil Prices, Gold Prices, Vector Error Correction Model (VECM), Granger Causality

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INTRODUCTION

According to Andrew (2018), gold is one of the oldest means of exchange and can be considered as one of the precious metal. In fact, gold is both a commodity and a currency because of its intrinsic value. The Classical Gold Standard was the first international monetary system developed. According to Sukri, Zain and Abidin (2015), since thousands of years ago, many people have been fascinated by gold. It is because gold is a light, generally accepted and durable metal. Based on Hashim, Ramlan, Razali and Nordin (2017), many years before, man y people declared that gold was a symbol of prosperity and also wealth. Before fiat money, gold was used as a currency and now it is used as an investment both in computer and jewelry. Based on Eric (2012), most of the businesses are likely to make the gold into jewelry to attract more consumers. Hence, the jewelry is made by consuming around 78% of gold and it is the main use of gold in different cultures.

Gold also helps to offset the big losses that suffer by investors such as the risk of asset depreciation or investment losses, and thus it is also known as a hedging tool. The investors will use gold as an asset to hedge against the highest risk when the economy is unstable or cannot be expected. As a result, gold has become a possible financial staple. Basically, investors invest in gold mainly to hedge against inflation and political turmoil in their investments because gold acts as a commodity which can reduce the portfolio risk. It means that when the rate of inflation increases, then the gold price will also rise. Gold is also classified as a financial asset, in addition regarded as a commodity. That means that gold is a safe storage as it is a store of wealth. Today, gold has attracted many of the investors to keep or invest in it as future assets investment. According to the study by Wang (2013), the future value of gold is more liquid compare to paper money or stock as gold is one of the hedging tools. On the other hand, in year 2018, there was a trade war between China and United States (US). According to Nick (2018), US want to raise 10% to 25%, which is \$200 billion of the tariffs on Chinese goods because Washington has increased its control over the increasingly fierce US-China trade war. In response to these 'rumors' China said that they would take appropriate measures. Basically, the investors will seek for the gold to reduce their risk (Nick, 2018). However, based on Figure 1, we can clearly see that the gold price decreased to USD122 per troy ounce from March 2018 to August 2018. It means that gold remain weak, pressed by a weak Chinese Yuan and a strong US dollar. The expectations of higher US interest rates continue with a third 0.25% increase in this year which has already reflected in September and the fourth in December. Thus, the relationship between gold prices and other assets prices assumes that the investors' predictions will towards the unforeseen circumstances. It is

imperative to know how gold prices react to the adjustments in rate of inflation, crude oil prices, stock prices and real interest rate.

Figure 1 demonstrates the fluctuations of gold prices in the end of the month from January 1990 to August 2018. It is shown clearly that the gold price has risen since January 1990 at the price of USD 415.1 per troy ounce. In year 2008, the price of the gold decreased due to the subprime mortgage crisis and the gold buyers who leveraged purchase the gold previously were forced to sell their holdings. Therefore, the gold prices seem to be positively correlated with the negative shocks in stock markets (Baur & McDermott, 2010). Besides, this trend has kept on growing until August 2011, when the gold price has recorded the highest at USD1813.50 because of the standard downgrade and poor rating of US Treasury Bond from AAA to AA+ (Hashim et al., 2017). As a result, the investors lost faith in the US paper money and then increased the demand of gold and eventually its price.

In the year 2015, due to the revitalization of US economy, the interest rate of US has increased. Thus, the gold prices fall and the investors are reluctant to invest in gold thus caused the demand for gold to decline. During the year 2016, the speculation in the energy market, the poor performance of Chinese stock market and also the decision of Britain I leaving the European Union were viewed as the factors causing the spike in the gold price (Dan, 2017). Hence, the gold price increases in early 2016 as many investors thought that gold is safe-haven against the bad economy. However, since September 2016, the gold price has fallen by more than USD200 per ounce as many of the underlying issues in financial markets have disappeared. In March 2018, the gold price started to drop from USD1323.85 to USD1202.45 in August 2018 due to the falling of US bond prices (Adrian, 2018).

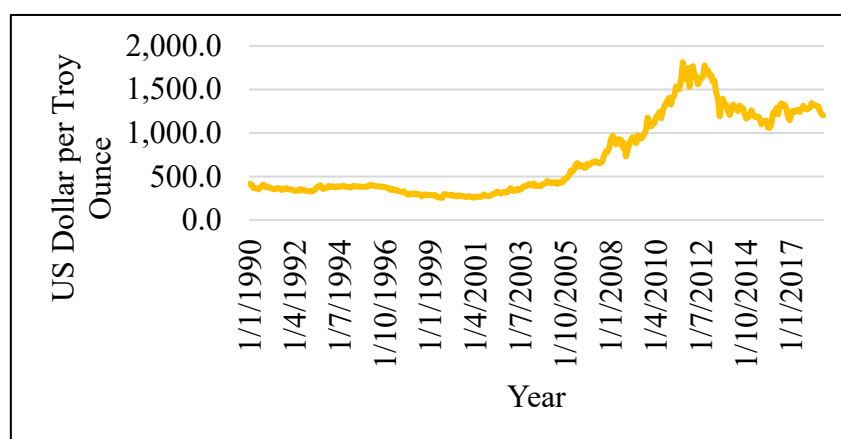


Figure 1: Historical Gold Price (End of period), Jan 1990 – Aug 2018. Source: World Gold Council (2018).

Figure 2 demonstrates the Brent spot prices (crude oil prices) in United States from January 1990 to August 2018. Crude oil is the main source in gold mining and it plays an essential role in the advancement of the world economy. According to GlobalSecurity (2018), the crude oil prices increase is due to the shortage of refineries in order to meet the growing demand for crude oil prices. In July 2008, crude oil price has recorded the highest at USD132.72 as Saudi Arabia failed to increase its production and demand. In the year 2009, after the subprime crisis broke out, crude oil prices recovered rapidly and fell back to USD68.61 per barrel in June 2009. The price continues to rise and hit a new peak in the year 2011, which mainly due to the growth in the emerging markets such as the Middle East and China (U.S Energy Information Administration, 2018). From June 2014 to January 2016, the crude oil prices exceeded its demand and then fell sharply to USD57.58 per barrel. Since then, the crude oil price has increased until recently in August 2018 as the members of the Organization of the Petroleum Exporting Countries (OPEC) decided to cut the production of crude oil (U.S Energy Information Administration, 2018).

Based on the inflation rate in Figure 3, it shows the fluctuations of inflation rate over time from January 1990 to August 2018 in the United States. The inflation rate in the US remains constant at less than 0.5% in most countries except for a few years. The highest inflation rate is 1.22% in September 2005 due to the recession in the US's economy. Under the economic effects of Hurricane Katrina, the price of oil, gasoline and other energy resources rise sharply (Charles, Darne & Kim, 2015). The lowest inflation rate is -1.92% in September 2008, just before the crash that led to deflation. During the year 2008, the financial institutions around the world collapsed. The demand for consumer products has fallen sharply in recent months, since the credit crisis erupted in mid-September 2008.

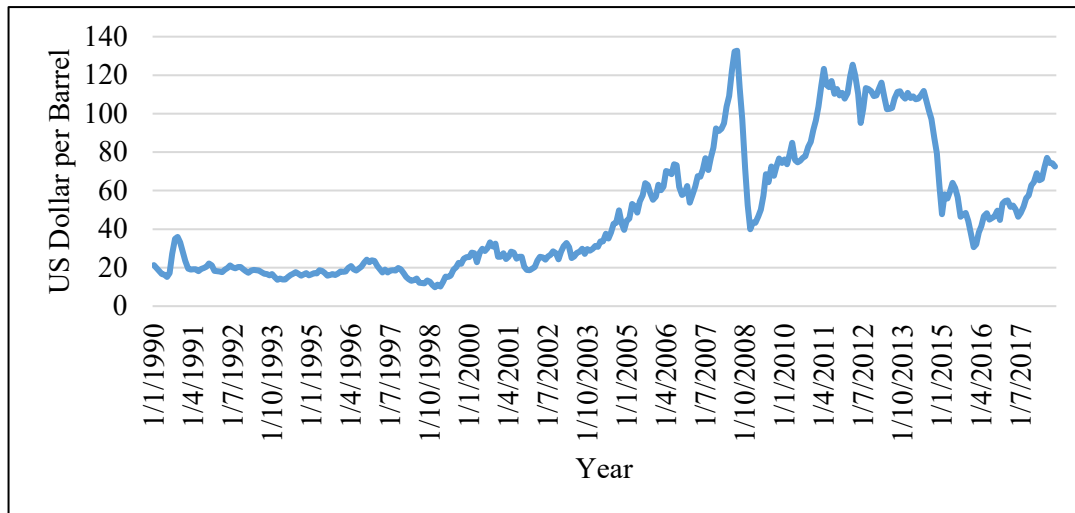


Figure 2: Crude Oil Prices (Brent spot prices), Jan 1990 – Aug 2018. Source: U.S Energy Information Administration (2018).

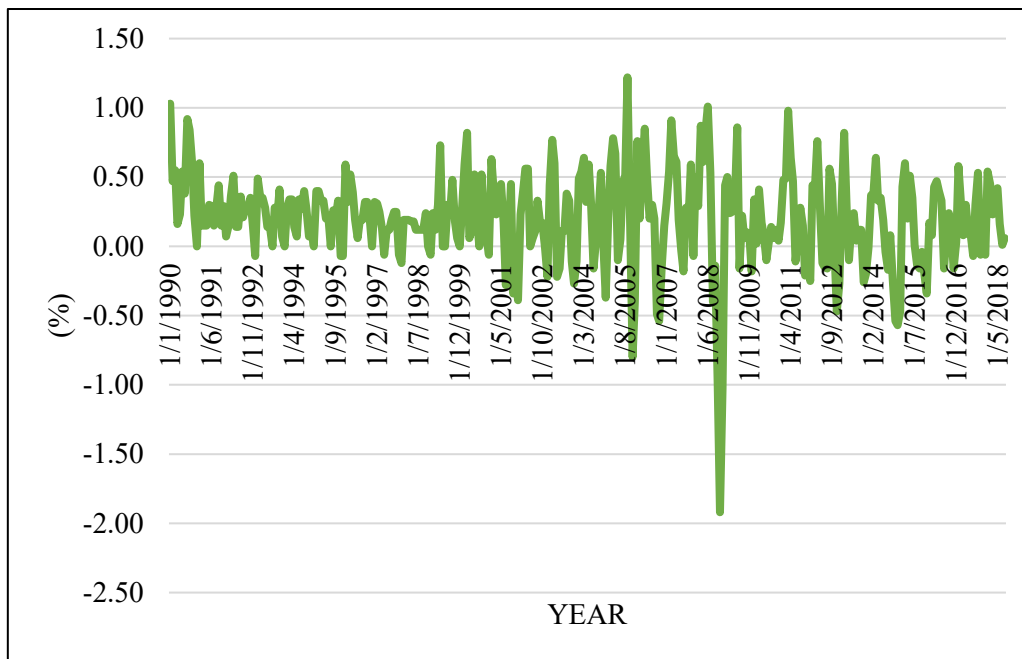


Figure 3. Inflation Rate in United States, Jan 1990 – Aug 2018. Source: StatBureau (2018).

S&P500 Adjusted Close Price (Stock Prices) in United States

Figure 4 demonstrates the volatility of stock prices (S&P 500) in the United States. The Standard & Poor's 500 (S&P 500) index which is a composite index of the US stock market, consists of the market capitalization of the 500 companies recorded on NASDAQ or the New York Stock Exchange (NYSE). It is a benchmark for the investors representing the overall performance of the US stocks and basically, the price of stock index shows an upward trend. From January 1990 to August 2018, the stock price has increased by 781.71% in the S&P 500 index. This shows that the US economy is growing rapidly. However, there is a drop between August 2000 to March 2003 by 44.11% due to Dot-Com Bubble and the tech stocks were getting a hard hit, corporate profits declined, and businesses cut spending. After that, the stocks start to recover. According to John (2018), the financial crisis in the year 2008 caused serious damage to the stock market. The stock price has fallen by 38.5% of its value at the height of the Great Recession.

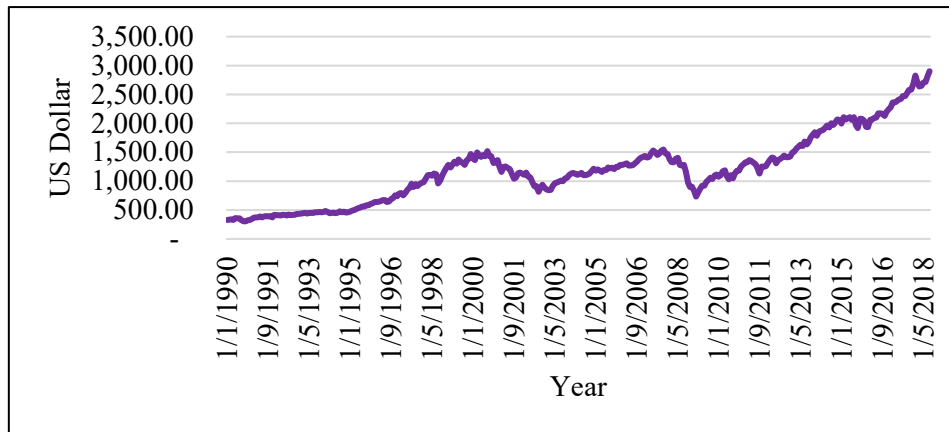


Figure 4. Standard & Poor's 500 Index, Jan 1990 – Aug 2018. Source: Yahoo Finance (2018).

Real Interest Rate in United States

Based on Figure 5 below, it shows the real interest rates (yields on 10-Year Treasury Constant Maturity Rate minus Consumer Price Index for All Urban Consumers) in the United States from January 1990 to August 2018. Overall, it can be noticed that the real interest rates are still stabilizing below 5% to maintain the economy health except for few years. On November and December 1994, the real interest rates are more than 5% due to the Fed raised rates to keep growth and inflation in a healthy range. However, due to financial crisis in late 2007, the Fed cuts the nominal rates again then followed by a sharp decrease in the real interest rates and a surge in the gold prices. The real interest rate has risen after the financial crisis as the Fed expanded its mortgage purchasing program and said it would buy USD750 billion in mortgage-backed securities. Since December 2011, the yield has been negative as the investors expected a high inflation in the life of the bond (Richard & Yang, 2013). When there is financial crisis in 2008, the Fed brought down its benchmark rate, which is the rate that is charged by the banks to the borrowers at almost zero in order to encourage lending and stimulate the economy. However, at a high inflation rate of -0.25%, the real interest rate turns negative. Since January 2016, it shows negative as European Central Bank (ECB) introduced negative interest policy and then cut the short-term and long-term interest rate on its deposit facility to below zero. After August 2016, the real interest rate increases again from -0.74% to 0.71% as the Fed increases the interest rate and causes dollar to appreciate against major currencies.

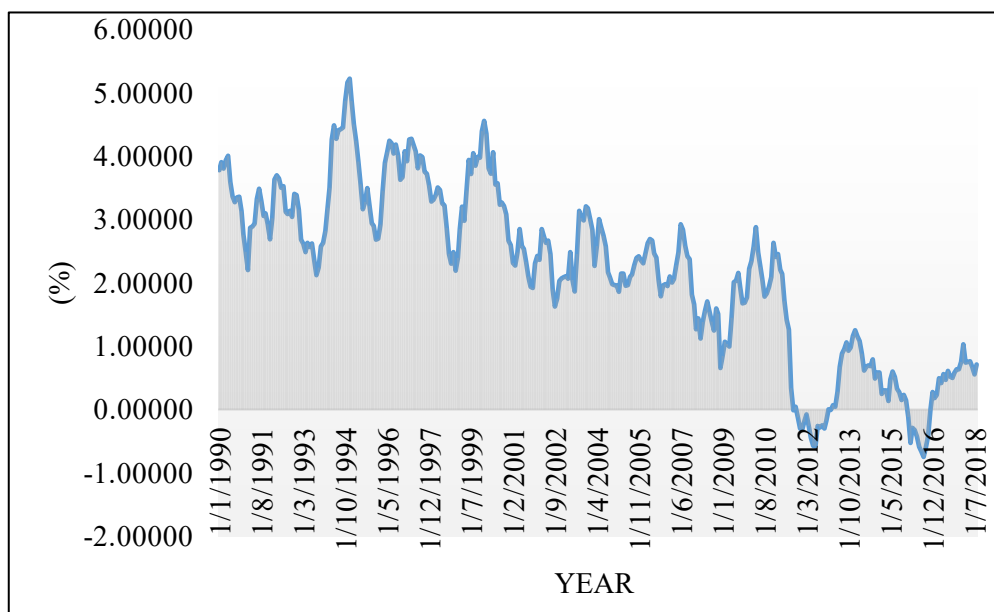


Figure 5. Real Interest Rate, Jan 1990 – Aug 2018. Source: Board of Governors of the Federal Reserve System (2018).

LITERATURE REVIEW

Most of the literatures show that there are certain relationship between gold prices, real interest rate, prices of crude oil, inflation rates and the stock prices. However, the nature of these relationships may vary from one and another due to different data used as proxy of certain variables and also different types of method, time periods and countries used.

Based on the prior studies, the relationship between gold price and inflation is complex. Some researchers support their findings because gold is used to hedge against inflation. For example, Seemuang and Romprsert (2013) and Hashim et al. (2017) found that gold price is statistically significant and positive correlated with inflation in their research. Since gold is a hedge against inflation, higher inflation in the economy will increase the demand for gold in the market. Moreover, Lampinen (2007) found that gold price and US inflation change has a statistically significant and positive short run relationship. He also proved that gold price has a long run relationship with US price level. On the contrary, Sukri et al. (2015) and Ibrahim (2014) found gold price is negatively correlated with inflation rate. On the other hand, Tully and Lucey (2006) and Blose (2010) pointed out that gold prices and inflation rate do not have significant relationship and that unexpected changes in inflation rate would only affect the risk-free rate and gold holding cost, rather than the spot price of gold. Hence, the interaction between gold price and inflation was not yet clear.

Most of the studies conclude that the crude oil will affect the gold prices. In recent years, gold and crude oil the biggest components of commodities, have moved beyond the traditional effects of supply and demand. Hashim et al. (2017) and Sukri et al. (2015) found that gold price is positively correlated with crude oil prices. Besides, Sari, Hammoudeh and Soytaş (2010) also pointed out that crude oil prices and gold prices has a significant positive elasticity in the short-run. Narayan, Narayan and Zheng (2010) showed that gold and crude oil prices had a bilateral relationship and can be interpreting by inflation channel. When oil prices rise, it can lead to inflation. Thus, higher oil prices mean higher gold prices. However, it was opposed by Zhang and Wei (2010) and Sari et al. (2010). They found that crude oil price has a positive but not bilateral relationship with gold price. Hence, there is an ambiguity about the relationship between Brent crude oil prices and gold prices.

There are only few of studies that observed the effect of financial market such as stock on the gold prices. Baur and McDermott (2010), they found that as volatility of stock return increased, gold acted as a safe haven to hedge against uncertainty only in all European markets and United States. The result is supported by Ghazali, Lean and Bahari (2013) who found that gold acts as a weak safe haven for stockholders in developing countries such as Malaysia during market downturn. Besides, Baur and Lucey (2010) concluded that gold price is negatively correlated with stock price and gold only acts as a hedge for stocks in the short-run. Narang and Singh (2012) also found that gold price have no relationship with stock price in the long-run. Most studies have concluded that there is no directional causality in the long run.

In addition, previous researches have summarized the relationship between gold price and real interest rates. According to the World Gold Council (2018), the price of gold responds to the interest rate of the United States through the investment channels, and global investment from all over the world accounts for more than 25% of gold demand. Seemuang and Romprsert (2013) and Zakaria, Shukur and Affandi (2015) concluded that the relationship of US interest rates and gold prices was inversed. Besides, Ghosh, Levin, Macmillan and Wright (2004) found that the variables such as real interest rate would interfere with the equilibrium price of gold and lead to the fluctuation of gold price. The short-term relationship of gold was more significant than the long-term relationship. Hashim et al. (2017) also supported this result, declaring that the most important factor that affect gold price is real interest rate.

METHODOLOGY

As our objective is to investigate the relationship between crude oil prices, inflation rate, stock prices, real interest rate and gold prices. Gold price is the dependent variable and prices of crude oil, real interest rate, stock prices and the inflation rate are the independent variables. Besides, the monthly data is used from January 1990 to August 2018 which consists of 344 observations for each variable. The empirical model employed to investigate the relationship between gold price, stock price, crude oil price, exchange rate and inflation rate can be expressed as follow:

The functional model is as follow:

$$GP = f(OIL, INF, SP500, INT)$$

To estimate the experiment model, the regression model is performed as follow:

$$LGP_t = \beta_0 + \beta_1 LOIL_t + \beta_2 LINF_t + \beta_3 LSP500_t + \beta_4 LINT_t + \varepsilon_t \quad (1)$$

where LGP_t = the natural logarithm price of gold in t^{th} month; $LOIL_t$ = the natural logarithm price of crude oil in t^{th} month; $LINF_t$ = the natural logarithm rate of inflation rate in t^{th} month; $LSP500_t$ = the natural logarithm price of S&P 500 index in t^{th} month; $LINT_t$ = the natural logarithm rate of real interest rate in t^{th} month; β_0 = the constant term; $\beta_1, \beta_2, \beta_3$ and β_4 = coefficient to measure the impact of crude oil prices, inflation rate, S&P 500 index and interest rate on the gold prices respectively; and ε_t = error term.

Unit Root Test

The empirical testing methods employed is the unit root test to examine the stationary of each variable. The Unit Root test in this study consists of Augmented Dickey-Fuller (ADF) test, Phillips-Perron test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. ADF tests use parameter autoregressive to approximate the ARMA structure of errors. Hence, higher order of autoregressive process can be applied in the ADF test as follows:

$$\Delta y_t = \delta_0 + \delta_1 t + \delta_2 Y_{t-1} + \alpha_1 \sum_{i=1}^k \delta_3 \Delta Y_{t-1} + \mu_t \quad (2)$$

where Δ symbol is the first difference, k is lag value, variable ΔY_{t-1} express as lagged first differences, μ is the adjustment of error, and Y represents the variable under study. The optimum lag length is selected according to Akaike Information Criterion (AIC).

For PP test, unit root tests might be bias if it did not account for structural breaks that explain for permanent changes in the pattern of time series. The equation of PP test can be written as below:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 \left(t - \frac{T}{2} \right) + \mu_t \quad (3)$$

where Y_t is the time series that represented as μ_t defined as the innovation term, t is represented as the number of observation, $\alpha_0, \alpha_1, \alpha_2$ are the conventional least-squares regression coefficients. Moreover, KPSS is unique whereby this approach testing the unit roots by reversing the null and alternative hypothesis which is different with ADF and PP unit roots and the test can be used to examine the properties of time series data.

The KPSS statistic is based on the residuals from the OLS regression of y_t on the exogenous variables x_t : $y_t = x_t \delta + \mu_t$. The LM statistic is defined as:

$$LM = \frac{\sum_t^t S(t)^2}{(T^2 f_0)} \quad (4)$$

where, f_0 is an estimator of the residual spectrum at frequency zero and where $S(t)$ is a cumulative residual function:

$$S(t) = \sum_{r=1}^t \hat{u}_r \quad (5)$$

Based on the residuals $\hat{u}_t = y_t - x_t \hat{\delta}(0)$. We note that the estimated use of δ by Generalized Least Square (GLS) detrending as it is based on regression including the original data rather than quasi-differenced data. To specify the KPSS test, the set of exogenous variables x_t and the method for estimating f_0 must be specify.

Johansen and Juselius (JJ) Cointegration Test

After identifying the stationary level of the variables, the Johansen Cointegration Test is conducted to examine the long run relationship between the variables. The system based on the cointegration procedure developed by Johansen and Juselius (1990) to tests the existence of long-run equilibrium. Let x_t be a vector of n time series, the Vector Auto Regression (VAR) can be written as shown below:

$$\Delta x_t = \pi x_{t-1} + \sum_{i=1}^{k-1} \pi_i \Delta x_{t-i} + \varepsilon_i \quad (6)$$

where x_t = the (5×1) vector of an $I(1)$ variable;

π and π_i = a (5×5) coefficient matrixes and a (5×1) constant vector;

ε_i = error term which is normally distributed at zero mean with covariance matrix of Ω ;

k = the lag length; and

Δ = the first difference operator.

Johansen procedure use two like-hood ratio to determine the number of cointegrating vectors which are the trace test and the maximal eigenvalue (λ -max) test.

Vector Error Correction Model (VECM) Granger Causality

After the detection of cointegration, the Vector Error Correction Model (VECM) Granger causality test will be employed to test the short-term relationship among the variables. Although cointegration implies the presence of granger causality, it does not necessarily determine the direction of causality between variables in the short term. The temporal granger causality can be captured by VECM from long-term cointegration vectors (Granger, 1986). Therefore, VECM is a special case of VAR that cointegrates the variables. The VECM granger causality test is to determine the short-run and long-term relationship between gold prices, inflation rate, crude oil prices, real interest rates and stock prices. The error correlation terms (ECTs) are used to avoid misspecification and omissions of constraints. The equation is as follows:

$$\Delta LGP_t = \alpha_1 + \sum_{i=1}^k \beta_{y,i} \Delta LGP_{t-i} + \sum_{i=0}^k \gamma_{x,i} \Delta LOIL_{t-i} + \sum_{i=0}^k \gamma_{x,i} \Delta LINF_{t-i} + \sum_{i=0}^k \gamma_{x,i} \Delta LSP500_{t-i} + \sum_{i=0}^k \gamma_{x,i} \Delta LINT_{t-i} + \varphi_y ECT_{y,t-1} + \varepsilon_{y,i} \quad (7)$$

where ECT_{t-1} is the error correction term for one period lagged

β is the parameter

φ_y is measuring the error correction mechanism to long-term equilibrium relationship between the variables.

EMPIRICAL FINDINGS

According to Table 1, for ADF and PP test, all of the variables (LGP, LOIL, LINF, LSP500 and LINT) are non-stationary at level, which means they have a unit root. It is because the p -value of all the variables are greater than 5% significance level, so the null hypothesis is not rejected. However, at first difference, since their p -value is smaller than 5% significance level, so the null hypothesis is rejected. It means that the variables are stationary after first difference. For KPSS, the same result is obtained since the null hypothesis of KPSS indicated that the variables are stationary, which is opposite to the null hypothesis of ADF and PP. Overall, the time series variables are non-stationary at level but become stationary after first difference, $I(1)$. The findings show that all the variables have the same order of integration allowing us to proceed with the Johansen cointegration analysis. The results reflected in the Table 1 shows the common integrational properties of all the series under the investigation and this allow us to proceed with the cointegration tests for the five-dimensional systems which consists of LGP, LOIL, LINF, LSP500 and LINT. Johansen cointegration test was applied in this study to test for the long run equilibrium between these variables.

Table 1. Unit Root Test Results.

Variables	ADF		PP		KPSS	
	Intercept	Trend and intercept	Intercept	Trend and intercept	Intercept	Trend and intercept
A: Level						
LGP	-0.263(0)	-1.859(0)	-0.202(1)	-1.859(0)	1.844(15)**	0.357(15)**
LOIL	-1.576(1)	-2.720(1)	-1.353(6)	-2.524(5)	1.789(15)**	0.221(15)**
LINF	-1.990(2)	-2.267(2)	-2.771(13)	-2.052(11)	2.253(15)**	0.406(15)**
LSP500	-2.087(4)	-0.416(4)	-1.588(31)	-3.157(0)	2.074(15)**	0.446(15)**
LINT	-2.193(1)	-1.998(1)	-2.457(9)	-2.297(9)	3.871(0)**	1.352(0)**
B: First Difference						
LGP	-20.613(0)**	-20.623(0)**	-20.624(1)**	-20.635(1)**	0.347(2)	0.145(40)
LOIL	-14.057(0)**	-14.036(0)**	-13.618(11)**	-13.593(11)**	0.060(7)	0.060(7)
LINF	-11.939(1)**	-12.106(1)**	-9.912(20)**	-9.943(23)**	0.380(2)	0.050(13)
LSP500	-12.586(3)**	-12.816(3)**	-37.131(46)**	-48.498(67)**	0.311(42)	0.101(50)
LINT	-13.888(0)**	-13.927(0)**	-14.241(6)**	-14.265(6)**	0.107(9)	0.061(9)

Notes: The ADF, PP and KPSS tests are based on the null hypothesis of unit roots (non-stationary). ** denotes statistically significant at 5% significance level. Lag length for ADF and maximum bandwidth for PP have been chosen based on Schwarz's Information Criteria (SIC) and Newey-West Bandwidth respectively. Figures in parentheses are the lag lengths.

Table 2 indicates the results of Johansen and Juselius Cointegration test. According to the Likelihood Ratio Trace test, the null hypothesis of no cointegrating vector ($r = 0$) has been rejected under 5% significance level. This indicate that the series has one cointegrating vector. Besides, the Maximum Eigenvalue test also shows one rejection of null hypothesis which are no cointegrating vector ($r = 0$) at 5% significance level. We noted that both of the trace and the maximum eigenvalue test do not lead to the same conclusion. The result of trace shows that there have two cointegrating vectors ($r = 2$) while maximum eigenvalue shows that there is only one cointegrating vector ($r = 1$). Since maximum eigenvalue is a more powerful test, hence it can be concluded that there is only one long run relationship exists between LGP, LOIL, LINF, LSP500 and LINT. The rejection of the null hypothesis of no cointegration implies that the five variables do not drift apart and share at least a common stochastic trend in the long-run. In short, there is only one cointegrating vector ($r = 1$).

Table 2. Results of Johansen and Juselius (JJ) Cointegration Test.

Null	Alternative	Trace		λ_{max}	
		Unadjusted	95% CV	Unadjusted	95% CV
$r = 0$	$r = 1$	84.9844**	69.8189	35.9330**	33.8769
$r \leq 1$	$r = 2$	49.0514**	47.8561	25.2929	27.5843
$r \leq 2$	$r = 3$	23.7585	29.7971	14.1408	21.1316
$r \leq 3$	$r = 4$	9.6177	15.4947	7.0284	14.2646
$r \leq 4$	$r = 5$	2.5893	3.8415	2.5893	3.8415

Table 3 indicates the long-run relationship between the parameters of interest. For normalizing the cointegrating vectors, the estimated sign for the parameter normalizing between LGP, LINF, LOIL, LINT and LSP500 is consistent with the prior expectation. The result shows that LGP, LINF, LOIL, LINT and LSP500 are statistically significant at 5% significance level as the t -statistic of LINF (1.9750), LOIL (4.8513), LINT (2.4812) and LSP500(3.9663) are greater than its critical value, which is 1.96. Based on the table above, LINF and LOIL have positive relationship with LGP. This indicates that 1% increase in LINF and LOIL will lead to 4.99% and 1.7% increase in LGP respectively. Besides, LINT and LSP500 have negative relationship with LGP, which indicate a1% increase in LINT and LSP500 will lead to 0.72% and 1.69% decrease in LGP respectively. The normalizing equation is shown below:

$$LGP_t = 15.3104 + 4.987LINF + 1.7007LOIL - 0.7197LINT - 1.6932LSP500$$

Table 3. Normalizing the Cointegrating Vectors.

Variables	LGP	LINF	LOIL	LINT	LSP500	C
Coefficient	-1.0000	4.9869	1.7007	-0.7197	-1.6932	15.3104
t -statistic	-	1.9750**	4.8513**	-2.4812**	-3.9663**	-

Notes: Trace refers to Likelihood Ratio Trace Test while Max refers to Maximum Eigenvalue Test. k represents the optimal number of lag and r represents the number of cointegration vector(s). The lag length chooses according to the Schwartz criterion (SC). ** denotes the rejection of null hypothesis at 5% significance level.

Based on Table 4, the results indicate that there are three unidirectional Granger causality, which are running from (i) LINF to LGP, (ii) LOIL to LINF and (iii) LSP500 to LINT in the short-run. Besides, there is one bidirectional Granger causality between LINF and LSP500. There is only one independent variable that granger caused the gold price, which is the inflation rate. It means that the inflation rate plays an important role in determining the gold prices. Figure: 6 indicates the causality relationship among the variables in diagram.

From Table 4, Error Correction Model (ECT) is applied on $\Delta LINF$ and $\Delta LSP500$ as both of the results fulfil all the condition of ECT. The t -statistic of LINF is 3.5569 while LSP500 is 3.5997 which are all greater than 1.96. Moreover, the coefficient of LINF (-0.0008) and LSP500 (-0.3375) are significantly negative and less than one. The coefficient of ECT indicates the speed of temporal adjustment to long-run equilibrium in the system which is denoted by the cointegration relationship. In this manner, the adjustment for LINF is about 0.08% monthly and for LSP500 is about 33.75% monthly, which will take 1250 months (104 years) and 3 months (0.24 year) to

adjust to the long-run equilibrium due to the short-run shock. This implies that LINF and LSP500 bear the brunt of short-run adjustment to bring about the long-run equilibrium in the system.

Table 4. Results of Vector Error Correction Model (VECM) based Granger Causality.

Dependent Variables	χ^2 - statistics (p-value)					ECT	
	Δ LGP	Δ LINF	Δ LOIL	Δ LINT	Δ LSP500	Coefficient	t-statistics
Δ LGP	-	14.578 (0.012)**	5.182 (0.394)	3.493 (0.624)	4.912 (0.427)	0.0044	1.2274
Δ LINF	4.895 (0.429)	-	26.227 (0.000)**	3.824 (0.575)	18.090 (0.003)**	-0.0008	-3.5569
Δ LOIL	2.219 (0.818)	8.145 (0.148)	-	3.800 (0.579)	5.0377 (0.411)	0.0068	-0.9633
Δ LINT	2.268 (0.811)	4.786 (0.443)	3.5311 (0.619)	-	16.071 (0.007)**	-0.0081	-1.3922
Δ LSP500	2.747 (0.739)	22.260 (0.001)**	9.9031 (0.078)	0.571 (0.989)	-	-0.3375	-3.5997

Notes: ** denotes the rejection of null hypothesis at 5% significance level while the number in () represents the p -value.

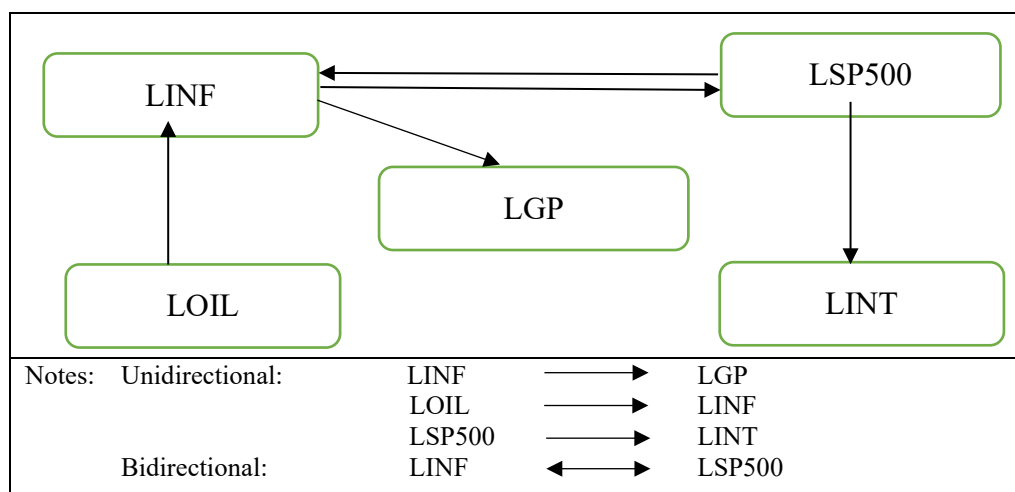


Figure 6. Summary of Short-Run Causality Linkages.

Diagnostic Test

There are three diagnostic tests used in this study, which are Jarque Bera Normality Test, Breusch-Godfrey (BG) Serial Correlation LM Test and White Heteroscedasticity. Based on Table 6, since p -value of Jarque-Bera Normality test (0.1783) is greater than level of significance (0.05), so we do not reject the null hypothesis. Thus, we can conclude that the error term is normally distributed. From the model, since p -value of BG test (0.8404) is greater than the level of significant (0.05), the null hypothesis will not be rejected. It can be concluded that there is no serial autocorrelation in the residual. Hence, the error term does not exhibit a serial correlation problem. Based on Table 5, since p -value of white test (0.3056) is greater than level of significant (0.05), the null hypothesis will not be rejected. Hence, it can be concluded that there has no heteroscedasticity problem in the model.

Table 5. Diagnostic Tests for the Underlying VECM Models.

Diagnostic tests	Probability	Significant	Conclusion
Jarque-Bera Normality Test	118.2177 (0.1783)	Statistically insignificant	Do not reject Ho, Normality distributed
Breusch-Godfrey (BG) Serial Correlation LM Test	18.0461 (0.8404)	Statistically insignificant	Do not reject Ho, No autocorrelation problem
White Heteroscedasticity	3069.072 (0.3056)	Statistically insignificant	Do not reject Ho, No heteroscedasticity problem

DISCUSSION

The primary purpose of this research is to examine the relationship between gold prices (LGP) and its determinants such as crude oil prices (LOIL), real interest rate (LINT), stock prices (LSP500) and inflation rate (LINF) in the United States from January 1990 to August 2018. First, this study starts with the Unit Root test and the empirical result of ADF, PP unit root test shows that all of the variables are non-stationary at level and stationary after first difference. For KPSS, the same result is obtained since the null hypothesis of KPSS is the variable is stationary, which is opposite to the null hypothesis of ADF and PP. Hence, it can conclude that all the time series variables are integrated at $I(1)$. All of the variables are statistically significance at 5% significance level. Overall, the time series variable is non-stationary at level but become stationary after 1st difference, $I(1)$, which proved that integration exist among all of the selected variables from the United States.

After that, we proceed to Johansen and Juselius (JJ) Cointegration test that test the long-run equilibrium between the dependent and independent variables. The results for both trace and maximum eigenvalue test are different. For trace test, there are two cointegration vectors ($r = 2$) while maximum eigenvalue test shows that there is only one cointegrating vector ($r = 1$). Since maximum eigenvalue is more robust, hence it can be concluded that there is only one long-run relationship between LGP, LOIL, LINF, LSP500 and LINT. In short, there is only one cointegrating vector ($r = 1$). This is consistent with the past studies. Levin and Wright (2006) proved that gold price had a long run correlation with the price level in United States. Zhang and Wei (2010) also showed that there exists a long run relationship between gold prices and oil prices. The spot and future markets of gold and oil up to maturity of 10 months were cointegrated (Narayan et al., 2010). Ghosh et al. (2004) also found that there is a long-run relationship between real interest rate and gold price. However, some of the previous studies found that there is no long-run relationship between the variables. Narang and Singh (2012) concluded that there is no relationship between stock returns and gold prices such as Sensex return in the long-run period. This may due to the different proxies or methodologies used in the estimations

Next, the results of the normalizing equation shows that the estimated sign for the parameter normalizing between LGP, LINF, LOIL, LINT and LSP500 is consistent with prior researches. LINF is positively correlated with LGP, which means that gold is proved to be an inflation hedge. Seemuang and Romprsert (2013) and Hashim et al. (2017) support this result as gold is used as a hedging tools against inflation. When inflation rate increases, the demand for gold will increase and lead to the improvement in price level of gold. Thus, the investors might be anxious and shift to gold in order to hedge against their risk. Moreover, LOIL and LGP have significance and positive relationship, which is approved by Hashim et al. (2017) and Sukri et al. (2015). It shows that when the price of crude oil rises, the price of gold will also increases as the crude oil is the main resource used in gold mining activity. Increment in the price of crude oil will also lead to either recession or inflation occurs and eventually caused a higher gold prices as demand increases. Narayan et al. (2010) showed that gold and crude oil prices can be interpreting by inflation channel. Hence, LOIL and LINF are positively related to LGP. Furthermore, LSP500 and LGP are negatively related as when the stock prices increase, the gold price will decrease as gold are deem as a more stable hedging tools and haven for stocks. This result is same as the previous studies by Baur and McDermott (2010) as they found that as the stock prices increased, gold acted as a safe haven to hedge against uncertainty mainly in the European and United States markets. The investors face a trade-off between financial securities and commodities since money is limited. In addition, the gold price is negatively correlated to real interest rate, which means that high interest rate will stimulate people to save and slow down their borrowing trends. Thus, the investors will cash out of their gold investments and flee money to capital markets in search of a higher returns. When the demand for gold decreases, the price of gold are expected to also decline. This finding is same as the previous studies made by Seemuang and Romprsert (2013) and Zakaria et al. (2015) who concluded that there is an inverse relationship between the interest rates and the gold prices in the US market.

According to the result, there are three unidirectional Granger causality, which are running from (i) LINF to LGP, (ii) LOIL to LINF and (iii) LSP500 to LINT in the short-run period. Besides, there is one bi-directional Granger causality exists between LINF and LSP500. Only one independent variable does Granger caused gold price, which is the inflation rate. It indicates that the inflation rate plays a vital role in the model and eventually affect the gold prices directly. Lampinen (2007) found that gold price and US inflation change has a statistically significant and positive short-run relationship, which is the same with our final finding. LSP500 is the most endogenous then followed by LOIL, LGP, LINF and LINT. Overall, about the model require an estimated of more than 100 years to settle down and return to the equilibrium by forecasting using the impulse response function.

CONCLUSION

In a nutshell, this research has achieved the general objective of finding the relationship among gold price, inflation rate, crude oil price, stock price and real interest rate during the periods of January 1990 to August 2018. All of the variables have long-run as well as short-run equilibrium relationship with the gold price in the United States. Furthermore, there are some limitations and recommendations have been discussed in order for the future researchers to make improvement and provide more contributions in future study. The findings in this study will be useful as it allow stakeholder such as the central bank, government, financial institution, economist, investors and policy makers in manipulating and controlling the movement of the gold prices. Thus, the economic players will clearly understand on how the macroeconomic variables can affect the gold prices especially as gold are viewed as an important tool to hedge against risk such as inflation and at the same time assist the community especially investors to diversify their risks.

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To Explore Customer Consciousness towards Brand Loyalty between Malaysian and International Students

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ABSTRACT

In the age of modern competitive market force, where traditional marketing system is not enough to capture the loyalty from customers, and the increasing consciousness toward the brand making the marketer more concern to survive and the competition are becoming more difficult. So, customers are more conscious about their choice and giving more priority on the right product with right features, conditions, images and quality at the right price. The aim of this study is to explore customer consciousness toward brand loyalty between Malaysian and International Students. Quantitative research method is being used to evaluate the outcome of the research where total survey respondents were 197 (140 Malaysian and 57 International students) and the scope of the research is limited to the respondent of University Malaysia Sarawak, Kota Samarahan. The result of regression linear and Pearson Correlation showed that except price-consciousness, brand-consciousness, quality-consciousness and social-consciousness have positive significant relationship toward brand loyalty.

Keywords: Price-consciousness, brand-consciousness, quality-consciousness, social-consciousness, brand loyalty.

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INTRODUCTION

Research Background

Brand loyalty is one of the desired objectives of every marketing professionals which deliver benefits in the form of tangible and intangible (Parida & Sahney, 2017). In this age of globalization, where competition is very high, maximizing profits and retaining market shares are very difficult for marketers as they are struggling for it. Recently, the development of marketing environment is shifting gradually and becoming very multifaceted and more competitive (Gillani, 2013). Moreover, the empowerment of customer and increasing competition forcing marketing professionals to find out creative modes and methods to gain the advantage of competition and get consumer attention (Rajumesh, 2014). Consequently, the necessity of looking for a new way to gain and maintain loyalty by building customer believes and gives a personal identity to brand loyalty is essential for businesses. Customer of modern are getting more conscious about the products they are using because of the level of their consciousness is increasing with the rapid change of lifestyle. The attitude towards a particular brand is now not only depending on the necessity and the utility of that products, but also it reveals a customer's personality and their social status. On the other hand, Campbell (1991) mentioned that, sometimes customers might not act as a consequence of conscious choice but as the consequence of unconsciousness habits as well as emotions. Consequently, one might perceive that customer having problem of behaving consciously might experience a same problem of consciousness about brand loyalty as well (Akin, 2012).

Malaysia as a multiracial country, where culture has a great power to control the market, it is very tough for marketers to gain the loyalty of the young generations just by providing the same kinds of product. Because, every culture has different core values, beliefs and norms. Culture is influencing customer to be more conscious about their perception to the products. Besides, Malaysia has a huge number of international students and workers who are coming from different region like South Asia, Middle East, Europe and they might have different perception because of their different culture. It can be said that, these large number of foreign people also have an effective impact towards the Malaysian marketplace. These dynamic scenarios make companies more concern about marketing their products to the target markets where customers are conscious about brand, price, quality and social value of the products. Based on the examination, the intention of this current study is to establish and test a model of a better understanding of the relationship of customer consciousness toward brand loyalty between Malaysian students and international students.

Research Objectives

The general objective of this research was to explore the relationships of customer consciousness towards brand loyalty between Malaysian and international students of Universiti Malaysia Sarawak. And the specific objectives were:

1. To analyze a relationship between price-consciousness and brand loyalty.
2. To analyze a relationship between brand-consciousness and brand loyalty.
3. To analyze a relationship between quality-consciousness and brand loyalty.
4. To analyze a relationship between social-consciousness and brand loyalty.

Conceptual Framework

Understanding the significance of consumer behaviour in buying specific products and services is very important. However, it can be explained by a consumer behavioural adoption theory, Theory of Reasoned Action (TRA). This theory was developed for the purpose of explaining the consumer's purchasing behaviour (Fishbein & Ajzen, 1975). Moreover, this theory describes the numbers of antecedent variable of buying behaviour such as the consciousness toward the behaviour, the subjective norm and the behavioural intention where intention acts as a moderator. The conceptual framework is developed to identify the relationship between the customer conscious and brand loyalty between Malaysian and International students. The dependent variables are- price-consciousness, brand-consciousness, quality-consciousness and social-consciousness. On the other hand, the dependent variable used in this framework is the brand loyalty. Figure 1 shows the conceptual framework.

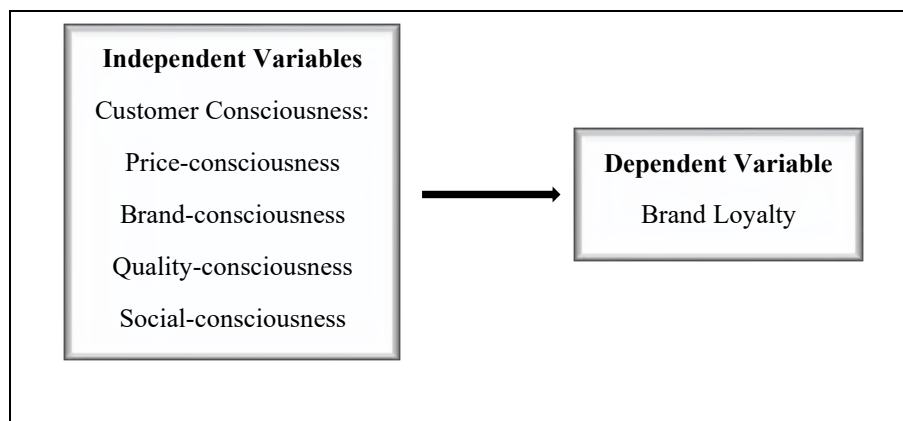


Figure 1. Proposed Conceptual Framework. Source: Adopted with modification from Akin, (2012).

Research Hypothesis

Lichtenstein, Ridgway and Netemeyer (1993) described the price-consciousness as the scale of measurement used to measure the customer decision towards price in the negative way. In different way, “customer who has price consciousness is not willing to pay a higher price for a product or he only centers on searching for low price products” (Lee, 2008). The purchasing intention of customers for a product or service is reflected by their willingness to pay. Customers’ perception of high price, low price or mutual usually influence his/her purchasing behavior and loyalty (Ahmad & Vays, 2011; Suki, 2013). As a result, product with higher price- other things remain constant- led to lower purchasing possibility by the customer. The unwillingness commonly represents the customers’ sensitivity about pricing. This price sensitivity has been converted as the perception of price consciousness in literature. Based on above research, it is considered as the first hypothesis to be examine in this study.

H1: Customer’s price-consciousness will have a significant relationship towards brand loyalty.

Customers who give more consideration to brand names and interested in buying the renowned branded products are called brand-conscious customer (Yaşın, 2009). Therefore, the consciousness of a brand can be explained as “an intellectual direction to choose brand-name, services and products that are renowned and extremely promoted” (Sprotles & Kendall, 1986). Besides, brand conscious people will appreciate updated information about latest trends and fashions involved in brand media as well as the celebrities (Keum, Devanathan, Deshpande, Nelson & Shah, 2004). Therefore, customer who has high brand-consciousness, consider brand as the sign of image,

identity as well as their status, to represent their personality (Lee, 2008). High conscious customers believe that their prestige and personal status are symbolized by brands, as the result they prefer to buy recognized, branded and expensive products (Liao & Wang, 2009). On the other hand, brand conscious consumers consider brand as a symbol of quality (Eastman & Eastman, 2011). Besides, it should be also emphasized that trust level is the other important point of attention for customers that a brand delivers to them. Based on above research, it is considered as the second hypothesis to be examine in this study.

H2: Customer's brand-consciousness will have a significant relationship towards brand loyalty.

“Consumers who always tend to discover the products of high quality and make their decision of preference over quality, without comprising from quality for price” are defined as quality-consciousness (Ailawadi, Neslin & Gedenk, 2001). Customers' justification on overall quality or advantage of the products or services can be defined as a perceived quality (Zeithaml, 1988). Rowely (1998) defines perceive quality in the service sector as a type of attitude but different from the satisfaction, happens as perception of performance from their expectations. Gurbuz (2008) mentioned perceived quality as the main dimension of brand loyalty. High satisfaction of a brand or product indicates the high quality of the brand or product and low satisfaction of a brand or product indicates low quality of product or brand. Customers who have experience on specific brand or branded product usually behave positively towards the brand thus increase the quality-consciousness of that brand or branded products. Based on above research, it is considered as the third hypothesis to be examine in this study.

H3: Customer's quality-consciousness will have a significant relationship towards brand loyalty.

According to Eastman, Goldsmith, & Flynn, 1999) social-consciousness is “the process of motivation to improve customer's social standing through exposed consumption of consumer products that deliberate or symbolize status for both customers and their surrounding”. To maintain the social status, customers want to develop their status so their decisions in purchasing is highly dependent on the product attributes. When customers get satisfied by getting their necessity to achieve a specific lifestyle, they tend to develop a repeat purchasing behaviour towards the same brand. Moreover, a personal attachments formed when customer's desired lifestyles reflected by the consumption of the brands (Onkvisit & Shaw, 1987). In recent times, consumers share their reviews and opinions on social media and their friends and families can get information about the products which makes them more conscious to behave positive towards brand (Mangold & Foulds, 2009; Stileman, 2009). Based on above research, it is considered as the third hypothesis to be examine in this study.

H4: Customer's social-consciousness will have a significant relationship towards brand loyalty.

METHODOLOGY

Research Design

Quantitative method was used in this research to get all the required information by conducting survey with the respondents. Because, it is possible to conduct the research for locating and obtaining correct data about customer consciousness and its relationship with brand loyalty. Therefore, a list of questions is use to collect data from the respective respondents who joined this study by using quantitative method.

Population and Sample

In this research, the targeted population are the students of Universiti Malaysia Sarawak (UNIMAS), located in Kota Samarahan, Sarawak, Malaysia. UNIMAS has 17,628 people including postgraduates, undergraduates, pre-university, local and international students and staffs. Questionnaire method was used to gather all the information for analyzing the relationship of customer-consciousness towards brand loyalty between Malaysian and International students. However, only 200 respondents were targeted to conduct this research from the population of UNIMAS and non-probability sampling technique was used and applied.

Data Collection Method

As this study is conducted based on quantitative data collection, questionnaires about the relationship of customer-consciousness towards brand loyalty between Malaysian and International students, especially in UNIMAS. Moreover, the existing information available for Malaysian and international students was gathered from different websites and all related researches and theories are reviewed carefully to come up with a primary framework. A set of a close-end questionnaire had been used as the research instrument for this study. A structured questionnaire is subsequently developed in English languages only with the inclusion of both Malaysian and international student respondents. In this study, majority of the items in the questionnaire are from a pre-existing questionnaires with a little modification applied towards the items in the questionnaire. Likert Scales is used to measure the degree of

importance in Section B & C of the questionnaire. The responses were weighted from 1 to 5 with higher values indicating the greater agreement (Kamri & Radam, 2013). The level of importance is based on the following score:

1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree.

The data that which has been collected will be analyzed based on the descriptive statistics analysis. Descriptive analysis enables this study to use percentage analysis in response to each variable distributed and enable us to understand more about the results. On the other hand, SPSS is the most widely used software program for the analysis of a survey data as it offers a wide range of data analysis products from data collection, analysis and modelling to the report presentation. Thus, SPSS v23.0 was chosen for this study to analyse all the data collected from the survey.

Statistical Analysis

In the first place, reliability test is important to ensure validity and reliability of instruments used in the research in order to obtain good results from the analysis. Reliability test refers to the degree to which a data collection method or methods will yield a consistent finding, One of the most common tests used to measure reliability of the research using survey questionnaire is the Cronbach Alpha test. Based on this test, a reliable study should have Cronbach's alpha score exceed 0.7. Besides, Pearson's Correlation analysis will be used to test the hypotheses and confirm the conjectured relationships among the specified variables.

RESULTS

Reliability Test

Results of the Cronbach Alpha test on the dataset are presented in Table 1. All the variables price-consciousness, brand-consciousness, quality-consciousness, social-consciousness and brand loyalty are reliable for this study as reported by the Cronbach Alpha's values greater than 0.7.

Table 1. Cronbach's Alpha Values for the study variables (N= 197)

Scale	Cronbach's Alpha	N of Items
Price-Consciousness	.834	4
Brand- Consciousness	.848	4
Quality- Consciousness	.795	4
Social- Consciousness	.875	4
Brand Loyalty	.793	5

Hypothesis Testing

In this study, Pearson's Correlation analysis is used to find out the specific hypothesis of the selected variables. A hypothesis can be defined as a logically conjectured relationship between two or more variable expressed in the form of a testable statement (Sekaran, 2000). By testing the hypotheses and confirming the conjectured relationships, it is expected that the solution can be found to correct the problem encounter.

In Table 2, four very useful indicators of the data were summarized. One is Pearson Correlation also known as R-value. This value indicates the strength of the relationship between the variables. Another important indicator is the significance value, also known as P-value. To indicate a significant relationship, P-value has to be 0.05 or less. Moreover, t-value and B-value also indicate the indirect relationship between any two variables. However, according to Table 2, the R-value for price-consciousness, brand-consciousness, quality-consciousness and social-consciousness are -0.050, 0.587, 0.491 and 0.627 respectively. Meanwhile, the P-values are respectively 0.487, 0.000, 0.000 and 0.000. Based on this result, it can be said that the brand-consciousness, quality-consciousness and social-consciousness have a positive significant relationship toward brand loyalty except for the price-consciousness. The t-value and B-value also further supported the result. Therefore, only hypothesis 1 is rejected and rest of the hypothesis are accepted.

Table 2. Summary of linear regression analysis of independent variables

Model	R	R ²	Std. Er.	F	Unstandardized Coefficients		t	sig
					B	Std. Er.		
					Price-consciousness (1)	-.050		
Brand-consciousness (2)	.587**	.345	.59765	102.6	.564	.056	10.131	.000
Quality-consciousness (3)	.491**	.241	.64333	61.864	.628	.080	7.865	.000
Social-consciousness (4)	.627**	.393	.57521	126.30	.562	.050	11.238	.000

Dependent Variable: Brand loyalty

** . Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Price-consciousness and Brand Loyalty

“Customer who has price consciousness is not willing to pay a higher price for a product or he only centers on searching for low price products” (Lee, 2008). Study shows that, customer’s price-conscious have a negative relationship toward brand loyalty (Kumar & Rajan, 2009). Customers’ perception of high price, low price or mutual influence his/her purchasing behavior and loyalty (Ahmad & Vays, 2011; Suki, 2013). As a result, product with high price, other things obtain still same, possibility of purchasing a product by a customer is low. Moreover, based on the result from the Pearson Correlation test and regression analysis estimated, the relationship of price-consciousness and brand loyalty in nearly zero ($R = -0.050$) and there is no significant level between these two variables ($p = .487$). That is why the first hypothesis is rejected.

Brand-consciousness and Brand Loyalty

Liao and Wang (2009) stated that the high consciousness customers believe that their prestige and personal status are symbolized by brands, so they prefer to buy a recognized branded and expensive product. Because, brand conscious consumers consider brand as a symbol of quality (Eastman & Eastman, 2011). Customer who has high brand-consciousness, consider brand as the sign of image, identity as well as their status, to represent their personality (Lee, 2008). Previous study proved that brand name has positive relationship toward brand loyalty, (Wong & Sidek, 2008). Furthermore, based on the result from the Pearson Correlation and regression analysis, the brand-consciousness and brand loyalty have a significant positive relationship ($R = 0.587$) and there is a significant level between these two variables ($p = .000$). That is why the second hypothesis is accepted.

Quality-consciousness and Brand loyalty

Products’ or services’ performance is highly affected by the expectation of the consumer (Churchill & Brown., 1982) and performance of the brand depends on the attributes of the product that the buyer expects. “These features can be in the form of hardware, software, style or another functionality” (Churchill & Brown, 1982). Previous study proved that customer satisfaction perceived brand quality and experience has positive and significant relationship toward brand loyalty (Forsido, 2012). Furthermore, based on the result from the Pearson Correlation test and regression analysis, the quality-consciousness and brand loyalty have a significant positive relationship ($R = 0.491$) and there is a significant level between these two variables ($p = .000$). That is why the third hypothesis is accepted.

Social-consciousness and Brand Loyalty

Brands provide important meanings to identify the customer’s identity and interact with other customers (Sirgy, 1982). Brand symbolism has a positive relationship with brand loyalty. Another study showed that, the brand community has a positive relationship with brand loyalty (Bennett, Härtel & McColl-Kennedy, 2005). Furthermore, based on the result from the Pearson Correlation test and simple regression analysis, social-consciousness and brand loyalty have a significant positive relationship ($R = 0.627$) and there is a significant level between these two variables ($p = .000$). That is why the fourth hypothesis is accepted.

Recommendations for Future Research

In future, the research can be conducted by determining a wider range of customer consciousness that may have relationship with a brand loyalty. One suggestion will be to study more deeply into all the characteristics of customer consciousness like health-consciousness, environment-consciousness, and safety-consciousness. For further research, the survey should be carried out on a bigger sample which would be more presentable. Moreover, some additional questions as well as statements regarding the demographic profile and characteristics of consciousness can be included in the survey questions. Unfortunately, in this research, the education level of the respondents is not included in the questionnaire. It is a very important factor for research to understand the education level as it can also be an indicator for consciousness. Education has effects on customer's consciousness. So, it should be included in survey question. For further research, more international student should be included from different institution as international respondents have a huge of impact on outcome of the survey.

CONCLUSION

The purpose of the study was to compare the customer consciousness toward brand loyalty between Malaysian and international students. The research question "What is the relationship between the customer consciousness and brand loyalty?" and "What are the relationships between the price-consciousness, brand-consciousness, quality-consciousness, and social-consciousness with the brand loyalty?" has been developed to answer it where a proposed conceptual framework had been led in this study. After the result evaluated from the survey of the research sample, it is found that, the price-consciousness does not have any significant relationship toward brand loyalty. However, the rest of the independent variables which are brand-consciousness, quality-consciousness and social-consciousness have a positive significant relationship with the brand loyalty.

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Identifying Factors on Agent's Sales: A Case Study in an Apparel Manufacturing Company

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ABSTRACT

Agents are the most important marketing tools for company to become a successful in business. Agents not only operate as a channel to customers, but they also play an important role in providing customers with a variety of services before and after the sales. The main purpose of this study is to identify the factor influencing agent's sales at an Apparel Manufacturing company. There are three categories of agents at the company namely, Trial agent, Basic agent and Premium agent. Based on the sales records in May 2018, the sales of product obtained by Trial Agent is lower than Basic and Premium Agents in this company. Therefore, this study aims to determine difference mean on record sales by agent among three categories of agents. This study also investigates the relationship between sales records by agents and years of experienced in business. Data was collected using questionnaire from 46 active agents at the company. Data was analyzed using One-way Analysis of Variance (ANOVA), Pearson correlation coefficient and Multiple Linear Regression. Result showed that there is a statistically significant difference in the mean sales records among the three of agent's categories. Furthermore, there is a strong positive correlation between sales records by agent and years of experienced in business. Meanwhile, factors of knowledge and skills in business are most contributed to the agent's sales. This study can help the company to create a strategic business plan and conducting several workshop trainings for agents to increase their knowledge and skills in business.

Keywords: ANOVA, marketing, multiple linear regression, Pearson correlation

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INTRODUCTION

The success of any sales and marketing organization ultimately depends on the success of individual salesperson. Their performance directly affects the firm's performance, not just in the short run, but in the long run as well. For each company, their agents are the most important marketing tools to become more successful in business. Agents not only a channel to customers, but also performs other functions for company such as providing customers with a variety of services before and after the sales. Therefore, this study focuses on three categories of agents namely Trial agent (person who is new started in business), Basic agent (upgraded agent originally from Trial agent) and Premium agent (usually have many experienced in business and also have their own shop) in an Apparel Manufacturing Company.

Based on the sales in May 2018, the record shows that the monthly average sales of product obtained by Trial agent is lower (RM498.50) than Basic (RM603.74) and Premium agents (RM1080.38). Trial agent consists of person who is newly started in business. Therefore, they do not have much experience in managing sales in business. Experience in business is an important criterion for every agent to develop strategic plans to increase their sales. Hence, this study aims to investigate the relationship between agent's sales and years of experience in business. All businesses have access to an extensive pool of knowledge whether they understand the customers' needs and the business environment or the skills and experience. Typically, different people have different ideas about what it takes to earn sales in business. Kusumawardhany & Trisnawati (2019) believes that good prior knowledge and business idea alertness has a positive effect on the entrepreneurial opportunity, while Ukko, Nasiri, Saunila & Rantala (2019) emphasise the importance of skills or strategy. Therefore, it is important to identify which factors that affect sales records by agents in order to help company in investigating the trends of business sales and profits.

This study specifically addresses the effects of five factors influence agent's sales at the company which are knowledge, skills, stay focused and determined, consistent, channel of advertising and strategy in business. The factor of knowledge refers to agent's knowledge about business marketing and advertising of product.

According to Peyton (2017), the most marketing important skills are selling, storytelling and understand of customer and product. Selling skills have been found as one of the causes that contribute to the performance of sales agents (Basir, Ahmad & Kitchen, 2010). Sales skills refer to the abilities of agent such as interpersonal skills, technical skills, selling skills. Marketing skills also refers to the knowledge of the agent on the customer's needs, competitive information and the best of marketing strategy. Therefore, sales skills by agents play an important role on the performance of their sales.

According to Nieto-Rodriguez (2016), those companies that manage to stay focused and determined is the key to succeed and remain in business. Stay focused on one brand of product can lead to agent increase the sales. Besides that, consistently promote the product and follow up the customer also can also increase the sales of product. Hee & Yen (2018) and Malhotra, Malhotra, Mariotz & Poteau (2018) explained that advertising channel is a medium used by the company or its agent to advertise their products and inform their customers about promotion carried out. The number of advertising channels can enhance total of product sales by the company or agents. For example, television, radio and print ads now used in connection with advertising-based technology like Instagram, Facebook, email, websites, blogs, Lazada and others. Much as there are various factors that determine the successful operation of the sales and distribution channels of newspaper organizations, the reach and popularity of a newspaper to a large extent depends on its distribution network.

The main purpose of this study is to identify the most factor (knowledge, skills, stay focused and determined, consistent, channel of advertising and strategy) influencing on sales records by agent at the company. This study also aims to analyse the differences of sales records among three of agent's categories (Trial Agent, Basic Agent and Premium Agent) and to investigate the relationship between agent's sales and years of experienced in the business.

DATA

A survey based on questionnaire among 46 active agents of the company. The survey questionnaire was divided into two sections. Section A included a set of questions on the agent's experiences in business. Section B included a set of questions on the factor influencing sales records by agent of the company. All items in both sections were rated on a 5-point interval scale (from strongly disagree = 1, to strongly agree = 5).

METHOD

In this study, a questionnaire was used to collect the primary data. Before distributing questionnaire to the active agents, a pilot study was conducted to test the reliability of data. SPSS software was used to generate Cronbach's alpha to test the ability for accurate analysis while Shapiro-Wilk test was used to test normality of data. In this study, Pearson correlation was used to identify the relationship between sales records by agents and years of experienced in business. After that, one-way ANOVA test was used to determine any difference mean of sales records between three of agent's categories (Trial, Basic and Premium). Finally, Multiple Linear Regression analysis was applied to identify the most independent factors related to the dependent variable (agent's sale).

One-Way Anova Test

Analysis of Variance (ANOVA) is a statistical method used to determine difference mean on record sales by agent between three of categories (Trial, Basic and Premium). The null and alternative hypotheses of one-way ANOVA can be expressed as:

$H_0: \mu_1 = \mu_2 = \mu_3 = \dots = \mu_k$ ("all k population means are equal")

$H_1: \text{At least one } \mu_i \text{ different}$ ("at least one of the k population means is not equal to the others")

where, μ_i is the population mean of the i^{th} group ($i = 1, 2, k$).

The test statistics is $F = \frac{MSR}{MSE}$, (1)

where, MSR= the regression mean square and MSE = the mean square error.

If $p\text{-value} < \text{significant level}$, so reject H_0 . Therefore, it can be concluded that there is a difference in the mean for the different treatment groups.

Pearson Correlation

Pearson's correlation coefficient is the test statistics that measures the statistical relationship, or association, between two continuous variables. Basically, a Pearson correlation attempts to draw a line of best fit through the data of two variables, and the Pearson correlation coefficient, r , indicates how far away all these data points are to this line of best fit. The Pearson correlation coefficient, r , can take a range of values from -1 to +1. A value of 0 indicates that there is no association between the two variables. A value greater than 0 indicates a positive association; that is, as the value of one variable increases, so does the value of the other variable. A value less than 0 indicates a negative association; that is, as the value of one variable increases, the value of the other variable decreases.

Multiple Linear Regression (MLR)

Multiple linear regression model can be used to infer causal relationships between the independent and dependent variables. The null and alternative hypotheses of MLR can be expressed as:

$$\begin{aligned}
 H_0 &: \beta_i = 0 \text{ (independent variables do not significant)} \\
 H_1 &: \beta_i \neq 0 \text{ (independent variables do significant)} \\
 \text{The test statistics is } T_0 &= \frac{\hat{B}_j}{\sqrt{\hat{\sigma}^2 c_{jj}}} = \frac{\hat{B}_j}{se(\hat{B}_{jj})} \quad (2)
 \end{aligned}$$

If, p -value $< . \alpha = 0.05$, reject H_0 , and it can be concluded that there is relationship between dependent variables (y) and independent variables (x_i).

DATA ANALYSIS AND FINDINGS

The result of Cronbach's Alpha from reliability test showed that data acceptable reliable since the value was 0.959 which exceed 0.5 as depicted in Table 1. Result of normality test in Table 2 showed that all factors are significant and fulfil the requirement of the parametric method.

Table 1. Reliability test.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.958	.958	20

Table 2. Tests of normality.

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Knowledge	.103	46	.200*	.962	46	.141
Skill	.096	46	.200*	.964	46	.167
Focus	.119	46	.104	.971	46	.298
Consistent	.102	46	.200*	.952	46	.055
Channel	.129	46	.052	.952	46	.054
Strategy	.100	46	.200*	.952	46	.054

* This is a lower bound of the true significance.

^a Lilliefors Significance Correction

Bar chart in Figure 1 depicted three categories (Trial, Basic and Premium) where a total of 14 agents from Trial agent, 19 agents from Basic agent and 13 of agents from Premium agent. From boxplot in Figure 2, Premium agents obtained the highest maximum sales (RM1321) per month as compared to the maximum sales by Trial

agents (RM953) and Basic agents (RM1101). The minimum sales obtained by Basic agents (RM112) show the lowest sales than minimum sales obtained by Trial agents (RM210) and Premium agents (RM798).

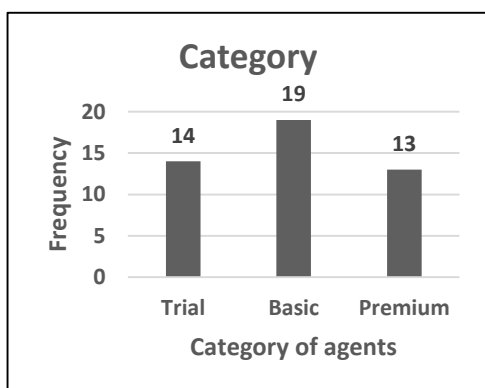


Figure 1. Number of agents for Trial Agent, Basic Agent and Premium Agent.

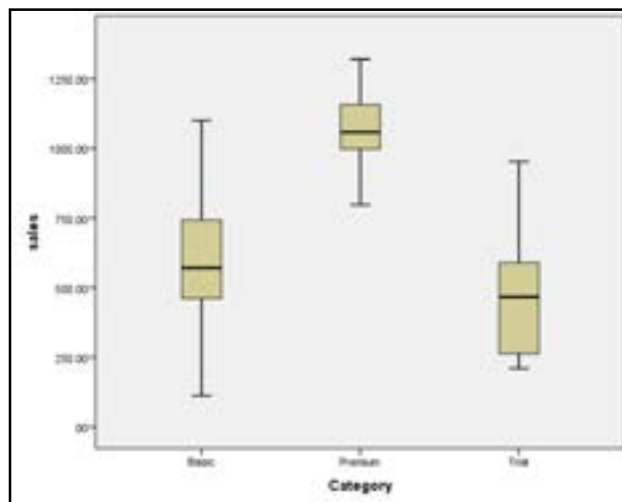


Figure 2. Boxplot of monthly agent's sales (RM)

After that, one-way ANOVA test was applied to determine the difference mean on factor influencing agent's sales between 3 of agent's categories (Trial, Basic and Premium). It can be seen that the significance value is 0.000 which is below 0.05 (Table 3). Therefore, it can be concluded that there is a statistically significant difference in the mean sales records among the three of agent's categories (Trial, Basic and Premium).

Table 3. ANOVA test for difference means of Trial Agent, Basic Agent and Premium Agent

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2785623.264	2	1392811.632	24.669	.000
Within Groups	2427802.475	43	56460.523		
Total	5213425.739	45			

A Tukey post hoc test in Table 4 revealed that the mean sales records by agents in Mei 2018 was statistically significantly lower in Trial agent (RM 498.50) and Basic agent (RM 603.74) compared to the Premium agent (RM 1080.38). However, there was no statistically significant difference between the Trial and Basic agent's group.

Table 4. Multiple comparisons between Trial Agent, Basic Agent and Premium Agent

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Trial	Basic	-131.87970	83.69290	.267	-335.0392	71.2798
	Premium	-608.52747*	91.52055	.000	-830.6881	-386.3668
Basic	Trial	131.87970	83.69290	.267	-71.2798	335.0392
	Premium	-476.64777*	85.52616	.000	-684.2574	-269.0382
Premium	Trial	608.52747*	91.52055	.000	386.3668	830.6881
	Basic	476.64777*	85.52616	.000	269.0382	684.2574

* The mean difference is significant at the 0.05 level.

Pearson’s correlation was used to determine whether there is an association between agent’s sales and years of experienced in business. A Pearson’s correlation attempts to draw a line of best fit through the data of two variables, and the Pearson correlation coefficient, r , indicates how far away all these data points are from this line of best fit. Based on Table 5, there was a strong positive association between sales records by agent and years of experienced in business with $r = 0.694$, $p = 0.001$.

Table 5. Pearson correlations

		Sales	Business
Sales	Pearson Correlation	1	.694**
	Sig. (2-tailed)		.000
	N	46	46
Business	Pearson Correlation	.694**	1
	Sig. (2-tailed)	.000	
	N	46	46

** Correlation is significant at the 0.01 level (2-tailed).

Finally, multiple linear regression model was applied to determine the relationship between sales records and five factors influencing agent’s sales records. From Table 6, only two factors (knowledge and skills) are statistically significant. Therefore, it can be concluded that knowledge and skills in business are the major contributor to agent’s sales at the company. Meanwhile, the factor of stayed focus and determined, consistent, channel of advertising and strategy in business did not statistically significant affect the agent’s sales. From this result, company can do alternative program or strategy to increase knowledge and skills by all agent at company.

Table 6. Coefficients for multiple linear regression

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-499.002	168.770		-2.957	.005		
Knowledge	187.199	65.863	.512	2.842	.007	.279	3.590
Skill	114.524	55.232	.306	2.074	.045	.414	2.415
Focus	56.400	46.502	.140	1.213	.232	.676	1.479
Consistent	12.345	66.648	.030	.185	.854	.356	2.812
Channel	-46.577	29.287	-.207	-1.590	.120	.532	1.880
Strategy	27.132	53.872	.083	.504	.617	.334	2.994

CONCLUSION

From the results in this study, there are positive association between the agent’s sales and years of experienced in business. This signifies that as the years of experienced in business increases, the prices of agent’s sales increase and vice versa. Result also showed that there is a difference in the means of agent’s sales between three of agent’s categories (Trial, Basic and Premium). Besides that, this study suggested that knowledge and skills are key factors on the agent’s sales. Meanwhile, other factors such as focus, consistent, channel of advertising and strategy do not significantly affect the agent’s sales. Therefore, to improve sale’s performances, company and agents can focus on matter that could affect these two factors (knowledge and skills).

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Oral Health Knowledge and Practices and Its Association with the Demographic Characteristics among Longhouse Community in Julau, Sarawak

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ABSTRACT

Oral health gained attention worldwide as it exerted unfavourable and undesired influences on an individual's daily lives and wellbeing, especially among the rural population. In order to increase the understanding on the oral health among the rural community, this study aimed to determine the oral health knowledge and practice and its association with sociodemographic characteristics among the longhouse residents in Julau, Sarawak. In this cross-sectional study, a total of 105 residents were recruited from five longhouses, namely Rumah Panjang Mengga, Rumah Panjang Ikeh, Rumah Panjang Michael, Rumah Panjang Budit, and Rumah Panjang Manju. Information related to sociodemographic characteristics, as well as oral health knowledge and practice was gathered through face-to-face interview by using a structured questionnaire. Spearman rho correlation test, Mann-Whitney U-test, and Kruskal-Wallis H-test were applied during data analysis. Median (interquartile) age of the children and adults was 10.0 (5.0) and 50.0 (22.0) years old, respectively. Findings revealed that oral health knowledge and practices among participants, both children and adults were inadequate as a high proportion of the participants were unable to provide answers for oral health related questions (functions of fluoride and correlation between gum disease with heart disease) and several oral health practices (regular oral check-up, change of toothbrush, and consumption of sweetened food) were also not being engaged in the daily life among the children and adult participants. A significant correlation was found between age and knowledge score among adult participants ($r_s = -0.389$, $p < 0.001$). Besides, significant higher oral health knowledge score were found among adult participants with higher education level ($H = 27.466$; $p < 0.001$) and significant higher in oral health practice score was found among unemployed adult participants when compared to self-employed and employed workers for government and private ($H = 9.631$, $p = 0.008$). In conclusion, younger and educated participants are more knowledgeable regarding oral health. Engagement of oral health practices were related to occupation of the adult participants. Provision of health education and education aid for longhouse community should be continued taking into consideration age, level of education level, and even occupation in order to improve their oral health knowledge and practice.

Keywords: Knowledge, longhouse community, oral health, practice, sociodemographic characteristics

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INTRODUCTION

World Health Organization (WHO, 2020) defined oral health as '*a state of being free from chronic mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking and psychosocial wellbeing*'. Oral health gained attention worldwide as it exerted unfavourable and undesired influences on an individual's daily lives and wellbeing especially among the rural population (Baiju, Peter, Varghese, & Sivaram, 2017; Sahar, Lau, Wan Puteh, Amara, & Abdul Razak, 2019). First, impaired oral health was associated with obstructive sleep apnea (Schroeder & Gurenlian, 2019) and poor sleep quality (Setia et al., 2019). Second, it was also linked with psychological discomfort, such as feeling discomfort due to food stuck in teeth or feeling uncomfortable with their appearance. Third, it was related with functional limitation that

encompass aspects such as having difficulties in chewing food, and having bad breath caused by dental problems (Saub & Locker, 2006). Fourth, it increased the tendency for medical conditions that included heart disease, stroke, diabetes, pneumonia, and other respiratory diseases (Yap, 2017).

Despite the known negative effects, the prevalence of oral health-related diseases keeps increasing worldwide especially in the low- and middle income countries (WHO, 2020). According to the Global Burden of Diseases, Injuries, and Risk Factors Study 2016 (GBD 2016), approximately 3.6 billion people worldwide were affected by the oral diseases, with caries of the permanent teeth being the most prevalent of all cases reported. At the same time, 2.4 billion people suffered from caries of permanent teeth, and 486 million children suffered from caries of primary teeth (GBD Disease and Injury Incidence and Prevalence Collaborators, 2017). In Malaysia, the findings from the National Health and Morbidity Survey 2015 (NHMS 2015) presented that 5.2% of the Malaysian population had oral-health related problems, with the highest prevalence reported in Sabah/Labuan (Institute of Public Health [IPH], 2015). Other independent studies, similarly, showed a high prevalence of oral health problems among adults and children. For instances, a study by Kaur, Maykanathan, and Lyn (2015) showed that dental caries was 44.6% among the urban school children (aged seven to eleven years) in Kuala Lumpur, Malaysia. Meanwhile, another study conducted among the adult population at Kampung Kerinchi and Pantai Dalam in Kuala Lumpur showed that caries prevalence was 70.5% among the adult respondents (Jaafar et al., 2014). However, the prevalence of oral health for the current target group, that was rural population of Sarawak was not available.

One of the most common contributing factors for oral diseases was demographic and socioeconomic factors such as birth order, household size (Oyedele, Fadeju, Adeyemo, Nzomiwu, & Ladeji, 2018), sex, geographical region, and ethnicity (Simangwa, Åström, Johansson, Minja, & Johansson, 2018). Besides that, many behavioural factors such as diet, nutrition, oral hygiene, tobacco, and alcohol can play an essential role in the prevention of dental caries (Cheah et al., 2010). Excessive amounts and frequent consumption of sugars are also one of the major causes of dental caries, and the risk of caries would be higher if population exposure to fluoride is inadequate (Gati & Vieira, 2011). In addition, in the World Oral Health Report, tobacco use has been estimated to cause over 90% of cancers in the oral cavity and is associated with an aggravated periodontal breakdown, the poorer standard of oral hygiene as well as premature tooth loss (WHO, 2003). Such evidence needed to be made available as the identified contributing factors were important for health care practitioners during planning future interventions in promoting oral health among the general population.

Level of urbanization in Sarawak was reported at only 53.8% (Department of Statistics, 2015). This indicated that large proportion of the Sarawak population were residing at the rural area. Therefore, rural population was given priority in the present study. The target population was Dayaks, who composed of more than 40% of the population in Sarawak (Minority Rights Group International, 2018). The ethnic group has their own unique culture and belief that are totally different from the general population and the difference was believed to have influences on the health behaviours (Waterworth, Pescud, Beaham, Dimmock, & Rosenberg, 2015). Under such circumstance, despite the information pertaining to negative influences and contributing factors of the oral health mentioned above is available in the literature, further exploration into the oral health issues among the Dayaks is still needed. Applicability of the findings on Dayaks remains doubt as the studies in the literature were conducted among the general population that were from distinguishable backgrounds.

This study was also conducted in line with the third Sustainable Development Goal, that is to promote healthy life and wellbeing for all (United Nations Department of Public Information, 2020). With the availability of the information, appropriate oral health practice can be instilled by having appropriate health education (Ab Murat & Watt, 2006). In order to create such health education, it is vital to assess the knowledge, attitude and practices of a community (Bala, Gupta, Ara, & Sahni, 2018). To the best of our knowledge, there are not many studies regarding oral health among longhouse communities. Thus, this study aims to assess the oral health knowledge and practices among the longhouse community and its association with sociodemographic characteristics. This data would provide valuable information on the oral health knowledge and practices among longhouse community which could aid in the the planning of oral health promotion programs.

METHODOLOGY

This cross-sectional study was conducted to collect information pertaining to oral health knowledge and practice among residents of the five longhouses in Julau, Sarawak. Julau is a district that is in Sarikei Division. It covers an area of 1,703.39 square kilometres. Majority of the ethnic groups are Iban, Chinese, and Malay. Most of the locals are involving in the agriculture sector, such as pepper, rubber, paddy, and fruits (The official website of Sarikei Divisional Administration, 2020). All the residents who met the inclusion criteria were recruited in this study. Firstly, a visit was made by the researchers to the longhouses in order to determine the suitability of the

longhouses as study location. The *Tuai Rumah* (Heads of the longhouses) was briefed regarding the purpose of the study and all the research activities that would be conducted. Negotiation was carried out with the *Tuai Rumah* seeking for their permission. Aside from that, permission to conduct research activities at the longhouses was also sought from the Sarikei Resident's Office and Julau District Office. Five longhouses that were selected through purposive sampling were Rumah Panjang Mengga, Rumah Panjang Ikeh, Rumah Panjang Michael, Rumah Panjang Budit, and Rumah Panjang Manju. Participants were 105 longhouse residents. Both male and female participants more than seven years old and above were eligible to participate. Participants should be permanent residents of the longhouses, who were currently staying in the longhouses for more than six months. Residents who were reported to be bedridden and to have mental problems were excluded from this study.

Sample Size

The sample size that has been calculated is 95 based on expected population of 125 residents at Rumah Panjang Mengga and Rumah Panjang Ikeh. The number of sample size is calculated by using Raosoft software sample size calculator (online). The confident level is set at 95% and the margin of error is at 5%. The sample size n and margin of error E are given by:

$$n = \frac{N^2}{(N-1)E^2 + x}$$
$$X = Z(c/100)^2 r (100-r)$$
$$E = \text{Sqrt} \left[\frac{(N-n)x}{n(N-1)} \right]$$

where N is the population size, r is the fraction of responses that you are interested in, and $Z(c/100)$ is the critical value for the confidence level c .

Procedures

Data collection was conducted in October and November 2019. Before data collection, all the participants were briefed regarding the purpose of the study and the planned research activities. Written informed consents were obtained from the participants that agreed to involve. For participants that were less than 18 years old, written informed consents of the parents and caretakers were sought. Information on sociodemographic characteristics, as well as oral health knowledge and practices, was gathered through face-to-face interviews, with aid from a questionnaire.

Instrument

For data collection, a structured questionnaire was used. For better understanding and to ensure a smooth interview, the questionnaire was translated into Iban and Malay languages. In addition, the questionnaire was divided into three sections, namely section A, B, and C. Section A was related to information about respondent sociodemographic characteristics, such as name, age, sex, race, religion, marital status, educational background, occupation, and associated disease. Section B was on the assessment of oral health knowledge. The instrument has 16 items and the response options based on a dichotomous scale (yes or no). Items of the questionnaire adopted from several sources (Al-Zarea, 2013; Al-Omiri, Wahadni, & Saeed., 2005; Al-Subait, Alousaimi, Geeverghese, Ali, Metwally, 2016; Philipp & Niknamdeh 2017; Chen, Huang, Huang & Wu, 2011; Lang, Woolfolks, & Faja, 1989). One score would given to a correct answer. A total score was calculated by summing the scores of the 16 items. A higher score indicates higher oral health knowledge. Internal consistency of the instrument was found to be good, with a Kuder Richardson's coefficient of 0.715.

The instrument in Section C was to assess oral health practice among the participants. It was adopted from Carneiro, Kabulwa, Makyao, Mrosso, and Choum (2011), Rad, Shahravan, and Haghdoost (2016), Albashtawy and Khamaiseh (2013), and Alhaj and Jawfi (2018). The instrument consists of nine items. Response for each item was different in accordance to the intention of the question. For instance, the responses could be in the form of frequency (example: do not brush teeth, once, twice, or more than twice), methods applied (mouth wash, dental floss, tooth pick, or none) as well as "yes" or "no". The responses provided were categorized into "appropriate" and "inappropriate" based on the guidelines from the Ministry of Health. A score was assigned to every "appropriate" response. A summative score was calculated by summing the all the nine scores. A higher score indicates better oral health practices among the participants.

Content Quality Control

Pretest and pilot test were conducted at another Rumah Panjang Sebastian, Sibul on October 2019. The pretest that involved nine Iban participants showed no presence of any unclear wordings that might lead to confusion. On the other hand, the pilot test that involved 30 Iban participants showed that data collection was practical and manageable.

Statistical Analysis

Data cleaning was done to minimize outliers and statistical analysis was performed using the IBM SPSS statistics

version 22.0 (IBM Corp., Armonk, NY, USA). Separate analysis was performed on children and adults. The descriptive data for continuous variables were presented in median and interquartile range meanwhile, categorical data were presented in count and percentage. Spearman rho correlation test was used to examine the associations between numerical sociodemographic variables with oral health knowledge and practice. Mann-Whitney U-test and Kruskal-Wallis H-test were applied to compare oral health knowledge and practice scores among participants with different sociodemographic status (categorical variables). Significant level was set at a p-value less than 0.05.

RESULTS

Details regarding sociodemographic characteristics are shown in Table 1. A total of 105 respondents were recruited. Among them, 26.7% were children while another 83.3% were adults. For children, median age was 10.0 (5.0) years old. More females (64.3%) than males (35.7%) were recruited. All the children were still studying: primary education (64.3%), secondary education (32.1%), and pre-U / university (3.6%). On the other hand, for adult participants, median age was 50.0 (22.0) years old. Majority of them (58.4%) was from 35 to 60 years old. One third of them (69.4%) were females. Almost all of them were married (93.5%). Regarding education level, almost equal number of the participants were reported to have “no formal” (31.2%), “primary” (29.9%), and “secondary” (37.7%) education. More than half of the participants were unemployed (51.9%) and it was followed by self-employed (42.9%).

Table 1. Sociodemographic characteristics of participants in Julau (n=105).

Characteristics	n (%)	Median (Interquartile)
CHILDREN (7 to 17 years)		
Age group (years)		
7 to 12	18 (64.3)	
13 to 18	10 (35.7)	
Gender		
Male	17 (60.7)	10.0 (5.0)
Female	11 (39.3)	
Educational background		
Primary education	18 (64.3)	
Secondary education	9 (32.1)	
PreU/University	1 (3.6)	
ADULTS (18 and above)		
Age group (years)		
< 35	13 (16.9)	
35 to 60	45 (58.4)	
> 60	19 (24.7)	
Gender		
Male	27 (35.1)	
Female	50 (64.9)	
Marital status		
Single	5 (6.5)	
Married	72 (93.5)	50.0 (22.0)
Educational background		
No formal education	24 (31.2)	
Primary education	23 (29.9)	
Secondary education	29 (37.7)	
University	1 (1.3)	
Occupation		
Government	1 (1.3)	
Private	3 (3.9)	
Self-employed	33 (42.9)	
Unemployed	40 (51.9)	

Distribution of children and adult participants regarding oral health knowledge and practices according to the response is shown in Table 2. For children, the median (interquartile range) for knowledge is 8.0 (3.0).

Among the 16 items, only three items managed to be answered by a high percentage the participants (75.0% to 85.7%) while another five items could be answered by a moderate-high proportion of the participants (50.0% to 64.3%). Lastly, eight items were answered correctly by less than 50% of the participants (7.1% to 46.4%). The eight items included “is there any relation between gum disease and smoking”, “is there any relation between gum disease and diabetes”, “oral health affects general health”, “have you heard about fluoride”, “fluoride can strengthen your teeth”, “toothbrushes can be used for as long as they are not bent, deformed or worn out”, “is there any relation between gum disease and heart disease” and “fluoride can whiten your teeth”. The median for practice score was 7.0 (2.0). Out of nine practices, six of them were practised by a high percentage of the participants (71.4% to 96.4%), another two were engaged by a moderate proportion of the participants (67.9%). Lastly, the least practice (32.1%) were the item “when will you change your toothbrush”.

For adult participants, the median (interquartile range) for knowledge is 9.0 (4.0). Among the 16 items, only five items managed to be answered by a high percentage the participants (70.1% to 85.7%) while another four items could be answered by a moderate-high proportion of the participants (57.1% to 62.3%). Lastly, seven items were answered correctly by less than 50% of the participants (45.5% to 10.4%). The seven items included “toothbrushes can be used for as long as they are not bent, deformed or worn out”, “is there any relation between gum disease and diabetes”, “have you heard about fluoride”, “children’s caries does not require treatment because they will be replaced by permanent teeth”, “fluoride can strengthen the teeth”, “fluoride can whiten the teeth”, and “is there any relation between gum disease and heart disease”. The median for practice was 6.0 (3.0). Out of nine practices, five of them practised by a high percentage of the participants (70.1% to 97.7%), another three were engaged by a moderate proportion of the participants (56.3% to 62.1%). Lastly, the least practice (37.9%) were the item “I checked my oral health with the dentist within the past six months”.

Sociodemographic characteristics with oral health knowledge and practices

Table 3 shows the associations between the sociodemographic characteristics with oral health knowledge and practice scores. For children, age did not have significant associations with knowledge and practice score. At the same time, there were no significant differences in the oral health knowledge and practice scores with gender and education levels. For adult participants, a significant and negative correlation was found between knowledge score and age of the adult participants. Besides that, significant differences were found in oral health knowledge score with different levels of educational background ($H = 27.466; p < 0.001$) and practice score with occupations ($H = 9.631, p = 0.008$) among adult participants. There were no significant differences in the oral health knowledge and practice score with gender and marital status.

Table 2. Distribution of oral health knowledge and practices according to responses.

Assessment on oral health knowledge		True
CHILDREN (n = 28)		
1.	Does eating sweets can cause tooth decay?	24 (85.7)
2.	Do we get rid of bad breath by using mouthwash?	22 (78.6)
3.	Does cleaning the teeth can prevent tooth decay?	21 (75.0)
4.	Does drinking sweets can cause tooth decay?	18 (64.3)
5.	Dental visit every 6 months.	18 (64.3)
6.	Gum bleeding is a primary sign of poor oral health.	15 (53.6)
7.	Children’s caries does not require treatment because they will be replaced by permanent teeth.	15 (53.6)
8.	If I rinse my mouth after I eat, I don’t need to brush my teeth.	14 (50.0)
9.	Is there any relation between gum disease and smoking?	13 (46.4)
10.	Is there any relation between gum disease and diabetes?	12 (42.9)
11.	Oral health affects general health.	10 (35.7)
12.	Have you heard about fluoride?	9 (32.1)
13.	Fluoride can strengthen your teeth.	6 (21.4)
14.	Toothbrushes can be used for as long as they are not bent, deformed or worn out.	5 (17.9)
15.	Is there any relation between gum disease and heart disease?	3 (10.7)
16.	Fluoride can whiten your teeth.	2 (7.1)
Median (Interquartile)		8.0 (3.0)

Table 2. Cont...

ADULTS		
1.	Does cleaning the teeth can prevent tooth decay?	66 (85.7)
2.	Does eating sweets can cause tooth decay?	65 (84.4)
3.	Do we get rid of bad breath by using mouthwash?	65 (84.4)
4.	Does drinking sweets can cause tooth decay?	65 (84.4)
5.	Dental visit every 6 months.	54 (70.1)
6.	Gum bleeding is a primary sign of poor oral health.	48 (62.3)
7.	Oral health affects general health.	45 (58.4)
8.	If I rinse my mouth after I eat, I don't need to brush my teeth.	44 (57.1)
9.	Is there any relation between gum disease and smoking?	44 (57.1)
10.	Toothbrushes can be used for as long as they are not bent, deformed or worn out.	35 (45.5)
11.	Is there any relation between gum disease and diabetes?	27 (35.1)
12.	Have you heard about fluoride?	27 (35.1)
13.	Children's caries does not require treatment because they will be replaced by permanent teeth.	26 (33.8)
14.	Fluoride can strengthen your teeth.	22 (28.6)
15.	Fluoride can whiten your teeth.	9 (11.7)
16.	Is there any relation between gum disease and heart disease?	8 (10.4)
Median (Interquartile)		9.0 (4.0)
Assessment on oral health practices		
CHILDREN		Appropriate
1.	Do you use any of these oral hygiene methods in addition to tooth brushing?	27 (96.4)
2.	Did you use toothpaste to clean your teeth?	26 (92.9)
3.	I wash or rinse mouth or brush my teeth.	26 (92.9)
4.	Rinse your mouth after each meal?	24 (85.7)
5.	I consume sugary food.	20 (71.4)
6.	How much do you clean your teeth per day?	20 (71.4)
7.	I checked my oral health with dentist within the past 6 months.	19 (67.9)
8.	I consume sweet/ soft drinks.	19 (67.9)
9.	When will you change your toothbrush?	9 (32.1)
Median (Interquartile)		7.0 (2.0)
ADULTS		
1.	Do you use any of these oral hygiene methods in addition to tooth brushing?	85 (97.7)
2.	Did you use toothpaste to clean your teeth?	82 (94.3)
3.	I wash or rinse mouth or brush my teeth.	77 (88.5)
4.	How much do you clean your teeth per day?	62 (71.3)
5.	I consume sugary food.	61 (70.1)
	When will you change your toothbrush?	54 (62.1)
6.	Rinse your mouth after each meal?	51 (58.6)
7.	I consume sweet/ soft drinks.	49 (56.3)
8.	I checked my oral health with dentist within the past 6 months.	33 (37.9)
Median (Interquartile)		6.0 (3.0)

Table 3. Distribution of mean score of oral health knowledge

Sociodemographic Characteristics	Knowledge		Practices	
	Median (Interquartile)	<i>H/U/r_s</i>	Median (Interquartile)	<i>H/U/r_s</i>
CHILDREN				
Age (years)		0.114 ^a		0.050 ^a
Gender		73.500 ^b		81.500 ^b
Male	8.0 (4.0)		7.0 (2.8)	
Female	8.0 (2.0)		7.0 (2.0)	
Educational background		57.500 ^b		79.000 ^b
Primary school	7.0 (4.0)		7.0 (2.0)	
Secondary school/Pre-U/ University	8.0 (6.0)		7.0 (3.0)	
ADULTS				
Age (years)		-0.389 ^d		-0.175
Gender		566.500 ^b		541.500 ^b
Male	9.5 (2.8)		8.0 (4.3)	
Female	7.0 (2.0)		6.0 (2.3)	
Marital status		175.500 ^b		169.000 ^b
Single	7.5 (5.0)		5.5 (4.5)	
Married	9.0 (4.8)		6.0 (3.0)	
Educational background		27.366 ^{c,d}		1.813 ^c
No formal education	6.0 (4.0)		5.5 (3.8)	
Primary education	9.0 (3.0)		7.0 (2.0)	
Secondary education/ University	10.0 (3.0)		7.0 (2.0)	
Occupation		5.786 ^c		9.361 ^{c,d}
Employed (Government/ Private)	7.5 (4.0)		5.0 (5.5)	
Self-employed	8.0 (5.5)		6.0 (2.0)	
Un-employed	9.0 (3.0)		7.0 (2.0)	

^a Correlation coefficient for the Pearson's product moment correlation test

^b U-value

^c H-value

^d Significant at $p < 0.05$

DISCUSSION

Several social issues were found worthy of being given priority among the participants. In this study, about one-fifth of the participants did not receive any formal education, especially among the elderly. Lack of educational opportunity among the group could be due to the scarcity of education facilities in Julau during the old time. Similar to their counterparts in Peninsular Malaysia, low education access was due to lack of parental involvement, poverty, transportation problems or involvement in self-employed activities at home (Sharifah et al., 2011). At the same time, a high proportion of the participants were self-employed and unemployed. High involvement in self-employed activities was in line with their counterparts in the Peninsular Malaysia as engagement in agricultural activities was a form of traditional socioeconomic activity among the indigenous population (Gan et al., 2020). High percentage of unemployment, on the other hand, could be attributed to involvement of the elderly in the current study. Due to the age factor, the elderly participants could no longer withstand the workload in the plantation sector. As such, majority of this particular age group chose to run small-scale agricultural activities that could provide them with food sources in return.

Overall, oral health knowledge among longhouse participants was not in a satisfactory manner. The findings were consistent with a study in Cameron Highland that involved 11 to 12 years old Orang Asli children, in which only 6.2% of the participants reported having good oral health knowledge (Samosir, Yusof, Mohamed, & Shoaib, 2018). General health knowledge among indigenous people in Malaysia that included knowledge related to child health and nutrition (Ng et al., 2005), antenatal care (Rosliza & Muhamad, 2011), and soil-transmitted helminth infection (Nasr, Al-Mekhlafi, Ahmed, Roslan, & Bulgiba, 2013) was low. Possession of knowledge is essential as it leads to a change in the awareness and thus directs individual to adopt a healthier lifestyle (Al-Darwish, 2016). Similarly, the participants scored low in certain oral health practices. For example, regular check-up to a dental clinic every six months could not be achieved due to low physical access towards the health services (Akbar, Pasinringi, & Awang, 2019), which were usually available at the larger city nearby such as Sarikei, Bintangor, or Sibu. Regular changing of a toothbrush was not performed by most of the participants could be restricted by the low socioeconomic status (Younus & Qureshi, 2016). Lastly, high consumption of sweets/sugary drinks among participants could be attributed to high affordability even under limited financial status. Cheaper low quality food was always found to be loaded with high amount of added sugar (Thompson et al., 2010).

A significant and negative association was reported between age and oral health knowledge among adult participant only. The findings were found consistent with Abu-Gharbieh, Saddik, El-Faramawi, Hamidi, and Basheti (2019), in which age was reported to be significantly associated with oral health knowledge score among adults in the United Arab Emirates. In addition, Patino (2015) also showed that older age was found to have a significant lower oral health knowledge score among Hispanic adults in Iowa. Younger adults were found to have better oral health knowledge could be attributed to higher exposure of oral health information online as searching online for oral health information was related to higher tendency of having better knowledge than those did not search online (Yuen, Azuero, & London, 2011). However, a contradictory findings were reported by Geethapriya, Asokan, and Kandaswamy (2017), who presented that older children of older age in India had higher oral health knowledge, but this protective factor did not influence the oral hygiene practices of children in general.

The findings showed that a significant difference was found in the oral health knowledge score between adult participants with different educational levels. Participants with formal education are more knowledgeable regarding oral health compared to participants with lower formal education level. Importance of personal education level on oral health knowledge was consistent with Movahhed, Dehghani, Karbasi, Khaki, and Dorri (2014) and Márquez-Arrico, Almerich-Silla, and Montiel-Company (2019). The significant findings could be attributed to the success of oral health care services that were provided by the Ministry of Health in promoting oral health among students in public primary and secondary schools (Ministry of Health, 2020). The services covered promotive, preventive, and curative activities (Oral Health Division, 2005). Furthermore, a significant difference was reported in the oral health practice score of the adult participants with different occupations, in which unemployed adults scored higher when compared to self-employment and employment in government / private. The findings were inconsistent with a study that conducted in the United Arab Emirates, as the employed participants had a higher mean oral health behaviour scores than their unemployed counterparts (Abu-Gharbieh et al., 2019).

Lastly, no significant differences were found in the oral health knowledge and practice score of the adult and children participants with different gender and marital status. This is in agreement with Cheah et al. (2010), in which no significant difference of the knowledge score between gender of the secondary school students in Kuching, Sarawak. Moreover, Rasouli-Ghahroudi et al. (2016) also revealed that no significant associations were

found between oral health practices with age and marital status among patients with heart disease. The possible explanation of the insignificant interaction between sociodemographic characteristics of the participants and oral health practices are still unclear and more exploration into a similar topic is warranted.

Limitation

This current study, however, was subjected to certain limitations. The use of cross-sectional study design indicated that the temporal relationships between the sociodemographic characteristics with oral health knowledge and practice are unclear. Therefore, the causal inferences between sociodemographic characteristics with oral health knowledge and practices cannot be drawn. In this case, it is recommended that longitudinal study design should be applied in future research. Secondly, the representativeness of the respondents might be influenced due to the use of purposive sampling during selection of longhouses. Thirdly, the data collection was based on interview using survey instrument, which might introduce recall bias. Fourthly, the suitability of the items of knowledge in the instruments that be used among children raised doubt. Certain items such as relationship between oral health with gum bleeding, heart disease, and diabete were considered as “too hard” for children. Similar to the practice instrument, where using of toothpaste, changing of toothpaste, and dental visits were depended on their parents. Fifthly, translation that was conducted without referring to a guideline might introduce errors and influence the accuracy of the findings. Lastly, absence of oral health expert during content validation was also identified as a limitation of the the present study. As such, the findings of this study should be interpreted with cautious.

CONCLUSION

Several issues among longhouse community such as low education level and high unemployment require more attention. The findings also provide proof that oral health knowledge and practice among the longhouse community are not in a satisfactory manner. Age and education level are the factors that have significant associations with oral health knowledge among adult participants. Occupation was found to play a role in influencing the oral health practices among adult participants. The identified factors should be incorporated into the scheme of any future oral health intervention in order to increase its effectiveness. Due to little understanding towards oral health issues among indigenouse people, especially in Sarawak, more exploration into the related topics are highly recommended.

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