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October 01, 2020

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ENVIRONMENTAL AWARENESS AND BEHAVIOR OF PEOPLE IN TURKEY'S MEDITERRANEAN

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Abstract: The environment is a biological, physical, social, economic and cultural environment in which living and lifeless beings live, maintain and interact (Cepel, 1995). Therefore, the environment is vital for all living creatures. It should be noted that the sooner the environmental hazards are recognized and the sooner solution can be reached, the more secure and healthy the future social life will be.

In this study it was investigated, how the people living in Turkey's Mediterranean region think about the environment, how they usually behave to their environment, and their awareness. This study was conducted by face to face questionnaire survey method with 370 randomly selected people. 201 of them were female, 169 of them were male and the average age was 36.

71 % of them have high school and lower education level. It was determined that 70,7% of the individuals used an energy saving tools and 64.3% of these do not run the washing machine before it is filled to save water. 52.4 % of the participants do not believe that changing their way of the life would solve the environmental problems. 33.2 % of individuals emphasized that environmental problems affect their health. While 50.5% of the individuals stated that they would welcome the increase in the water bill to be taken against water pollution, 49.5% did not respond positively, even if it prevents water pollution.

Key Words: Turkey's Mediterranean, Environment, Economy, Behavior

Introduction

Human and nature have interacted with each other throughout history. In the beginning while nature directs humans, in the later ages human has started to direct the nature. The rapid, distorted and unhealthy development of cities, as well as the problems of urban identity created by urbanization causes the loss of historical, cultural, and natural values and all this make it impossible to sustain these values (Keleş, 2007: 45-46, Mengi, 2007: 47-49). It is also the person who harms the environment and protects and develops it and humans can do many things to protect and keep available resources as they continue to advance in science and technology. Respect for the environment should be perceived as a result of human respect for himself and his humanity. Hence environmental awareness should be institutionalized within the framework of culture as it is an expression of the sense of solidarity and responsibility towards future generations (Keleş, 1987:87).

Although it is very new to deal with the impact of human activities on the natural environment, the problem of the environment is increasingly being of interest to international and national organizations (Meadows ve ark., 1990; Beck, 1990). In order to prevent environmental pollution, each country should participate in environmental protection policies.

Efforts to prevent pollution, national and international efforts to protect resources aims to human beiing as well as the rational use of resources and natural life aims to not lose balance.

The protection of degraded and polluted resources will be ensured through awareness and the awareness and understanding will be provided only through research and education (Asmaz, 1995).

In light of the growing environmental problems, the need to tackle these problems is becoming a great importance. Therefore "The solution of environmental problem" is only possible when people become sensitive to these problems.

In other words people's knowledge and awareness needs to be increased to focus more on environmental protection. It can be said that people can contribute to the protection of the environment through their environmentally friendliness behaviors and environmental awareness. Environmental awareness is to be aware of the importance of urban and environmental resources. In other words, environmental awareness means to being able to evaluate the effect of the bad use of natural sources to environment to itself and to future generations, and to have knowledge about it.

Mankind should avoid actions that can be considered a crime against the city, stone, nature, and the cultural accumulation of society (Keleş, 2005:16), and be aware of its responsibility towards nature and other living things.

In summary, environmental awareness means that the individual should respect both himself/herself and nature without forgetting the past, present and future. (Türküm, 1998:172).

In this study it was investigated, how the people living in Turkey's Mediterranean region think about the environment, how they usually behave to their environment, and their awareness.

Material and Method

The main material of the study consists of data obtained from face-to-face surveys with randomly selected individuals who living in Turkey's Mediterranean region in Izmir, Manisa and Aydin provinces, in urban areas.
In this study was investigated, how the people living in Turkey's Mediterranean region, think about environment, how they usually behave to their environment and their awareness.

This study was conducted by face to face questionnaire survey method with 370 randomly selected people. For the data obtained from the study, a database was created in the appropriate package program and data entry was provided. Afterwards, various analyzes such as frequency tables, percentage calculations, average, and standard deviation were performed.

Research Findings

Socio-Economic Factors

The data showing the socio-economic and socio-cultural characteristics of the individuals participating in this research study are given in Table 1.

In this study, 169 of the individuals were male and 201 were female and the average age was 36.08. Beside this, 71 % of the individuals participating in this research have high school and lower education level. According to the data obtained, 71% of the individuals who participated in this study has high school or less education level.

The distribution of the number of family members of the individuals is divided into 6 groups and is shown in Table 1.

While 31 of the participants (8,4%) were living alone, 86 participants (23,2%) has 2, 93 participants (25,1%) has 3, 101 participants (27,3%) has 4, 32 participants (8,6%) has 5 and 27 participants (6,5%) has 6 or more family members. The average number of family members living in the household is 3.27, this value is a close value to the average (3.4) of Turkey (TUİK, 2017). When the monthly income of the participants was examined, 143 (38,6%) of them stated that they were low, 222 (60%) of them were middle and only 5 (1,4%) of them were high incomes (Table 1).

Table 1. Socio-Economic Characteristics of Individuals

Features	n	%
Gender		
Female	201	54,3
Male	169	45,7
Total	370	100,0
Age Groups		
18-24	90	24,3
25-34	106	28,6
35-44	78	21,1
45 and above	96	25,9
Total	370	100,0
Education level		
Literate	3	0,8
Primary school	76	20,5
Middle School	9	6,8
High school	164	44,3
University and above	107	29
Total	370	100,0
Number of Family Individuals		
1	31	8,4
2	86	23,2
3	93	25,1
4	101	27,3
5	32	8,6
6 and above	27	6,5
Total	370	100,0
Level of Income		
Low	143	38,6
Middle	222	60
High	5	1,4
Total	370	100,0

Energy-Saving

In order to understand the attitudes of the participants about energy saving, they were asked whether they use energy saving bulbs and low consumption devices. It was determined that 63.5% of individuals use energy saving bulbs and 70,7% of the inviduals used an energy saving tools that would save energy in order not to harm the environment.

In addition, when 370 people are asked if you are running your washing machine before it is full to save water, 64.3% of them stated that they do not run the washing machine before it is filled to save water. While 50.5% of the individuals stated that they would welcome the increase in the water bill to be taken against water pollution, 49.5% did not respond positively, even if it prevents water pollution.

Individuals Perceptions on Environmental Issues

In this study, to reveal the attitudes about the environmental issue of the individuals living in the Turkey´s Mediterranean region and their thoughts about the environment some questions such as impact of environmental problems on health, the compatibility of food and products for health and environment, about believing that environmental problems will be solved without changing the way of life etc. were asked and the findings obtained are given in Table 2. While 33.2% of the participants stated that environmental problems affect their health very much, 6.8% stated that they did not. The average is 2.01 and the standard deviation is 0.900. When the health of food and products were asked to the individuals, 4 (1,1%) of them stated they are very suitable, 24 (6,5%) stated suitable, 65 (17,6%) stated middle, 140 (37,8%) stated tolerable and 137 (37%) participants stated they are not suitable. The average is 4.03 and the standard deviation is 0.951.

On the other hand, to the question 'the suitability of food and products to the environment' 28 (7,6%) participants stated they are very suitable and appropriate 140 (37,8%) participants stated tolerable and 137 (37%) participants stated they are not suitable. The average is 4.04 and the standard deviation is 0.899. Whereas 52,4 % of the participants do not believe changing their way of the life would solve the environmental problems. On the other hand, when we asked how much they agree with the sentence 'if we continue like now, we are going to environmental disaster', 78 of participants (21.1%) completely agreed, 126 participants (34.1%) agreed, 98 participants (26.5%) partially agreed , 41 participants disagreed (11.1%) and 27 (7.3%) of the respondents strongly disagreed. The average is 2.49 and the standard deviation is 1.155 (Table 2).

Table 2. Perspectives of Interviewed Individuals on Environmental Issues

	n	%
Impact of environmental problems on Health (average) 2,01 (0,900)[a]	**n**	**%**
Very effective	123	33,2
Effective	146	39,5
Low Effective	76	20,5
ineffective	25	6,8
Total	370	100,0
The health of food and products (average) 4,03 (0,951)[a]	**n**	**%**
Very suitable	4	1,1
Suitable	24	6,5
Middle	65	17,6
Tolerable	140	37,8
Not Suitable	137	37
Total	370	100,0
The suitability of food and products to the environment (average) 4,04 (0,899)[a]	**n**	**%**
Very suitable	3	0,8
Suitable	18	4,9
Middle	71	19,2
Tolerable	149	40,3
Not Suitable	129	34,9
Total	370	100,0
If we continue like now, we are going to environmental disaster (average) 2,49 (1,155)[a]	**n**	**%**
Totally agree	78	21,1
Greatly agree	126	34,1
Partially agree	98	26,5
Disagree	41	11,1
Strongly disagreed	27	7,3
Total	370	100,0
Changing the way of the life would solve the environmental problems (average) 3,37 (1,295)[a]	**n**	**%**
Totally agree	34	9,2
Greatly agree	67	18,1
Partially agree	93	25,1
Disagree	79	21,4
Strongly disagreed	97	26,2
Total	370	100,0

[a] Standard deviations are given in parentheses.

Conclusions and Recommendations

As the number of human species in the world increases their needs have also increased. The main human damages to nature are; advanced technology productions, destroying places where previously used as agricultural areas, polluting the areas they live in and consume natural resources (Türküm, 1998). This caused deterioration in the harmony of the natural environment.

Mankind has used unlimited the opportunities offered by nature during the struggle for existence in the universe (Şimşek, 2004). Again, people will be able to find solutions to various environmental problems caused by humans.

In recent years, people have become more sensitive to both the environment and the products they consume. People have begun to pay attention to the use of electricity, water consumption, energy-saving bulbs, low-consumption tools and to the use of environmentally and health-friendly products. They have started to contribute to the solution of the problems by using the complaint lines in consumer arbitration committees and municipalities.

In addition, in order to increase environmental awareness and environmental awareness, it is recommended to include applied environmental education in the curriculum of the Ministry of National Education. Other individuals in the society should be made aware. If necessary, perception of environmental sensitivity should be created by using mass media.

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EVALUATION OF THE GENDER DIFFERENCES AND REPRODUCTIVE PHYSIOLOGY OF CATFISH (ANCISTRUS CIRRHOSUS)

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Abstract: Ancistrus cirrhosis is a catfish which used for removing algae from aquariums. It is known that it's the largest genus in the Ancistrus family and is represented by 64 species. It feeds by herbal supplement and can tolerate a wide range of water condition. In general, all kinds of algae containing foods and also vegetables such as peas, carrots, spirulina are included in their diet.

The male fishes are larger than female fishes. Although female fishes have tentacles in the upper of the head, this structure is not available in females. The inside of the slot is cleaned by male fishes for reproduction. The male fish that cleans the area attracts the female to the breeding zone with their behavior. The female fishes adhere the eggs to clusters with adhesive properties. After pouring the eggs, the male fish looks at the eggs for 7 to 10 days. During this period, the male does not leave the nest even if the fish is to be fed.

In our study, it's aimed to observe the sex differences and reproductive physiology of Ancistrus cirrhosis fishes. 7 male and 7 female fishes were studied and took their pictures and recorded the videos during the behavioral process. All this process were also staged graphically. As a result, these fishes are being important in aquarium sector with its gender differences and nutrition.

Key words: Ancistrus cirrhosis, catfish, aquarium

Introduction

The Ancistrus is firstly specified by Kner at 1854 (Bifi et al., 2009). However, 59 various types were observed by the times and have been involved in the aquarium since the early 1900s. (Regan 1904; Isbrücker 1980). These fishes show the typical features of the Loricariidae family (Sabaj et al 1999). Ancistrus species are found in the high Andean rivers and white, clear and black waters. As a general rule, species from white and clear waters have colors ranging from light gray to medium brown and are usually either dark or light. However, almost all species encountered in territorial waters exhibit a dark brown color to black with a pattern of small to medium-sized white to yellow dots. Ancistrus can also swallow atmospheric air to help them breathe in environments with low oxygen content.

Ancistrus cirrhosus (Catfish) is a type of small stingray which also a great tank cleaner (Regan 1904). They have become a preffered fish due to their smaller structure, and a good algae eater than other pleco species. They can live and reproduce in a wide pH range in tanks with different water characteristics. Also they are more active at night like other types and live in a harmony with many peaceful fish species. Herbal feeds are important for these fishes. They can eat vegetable protein such as spirulina, boiled spinach, boiled carrot or cucumber. Their gender distinction is quite difficult since they're in small offspirng. There are thorny extensions at front and the trunks are both of wide and long in males. On the other hand, in the females, the thorny appendages can not be seen or very small. Also, their bodies and structures are thinner than male ones. The males are polygamy which means mating with more than one female in the same tank and make offspring. Then, the male cleans the region and attracts the female to the breeding area with courtship behavior, and also they look at the eggs and protects them. They protect the eggs for 7 to 10 days (Sabaj et al., 1999).

There is not much interest in breeding fishes which are not famous in domestic market. On the other hand, the production of this type of fish is a difficult, laboraius and demanding job. However, they are most popular in aquarium trade. Nico et al (2018) observed that "Aquarium release; bristlenosed catfish (along with many other species of the armored catfish family Loricariidae) are highly popular in the aquarium trade." Besides that, in Turkey, the amount of these fishes produces by domestic producers can not meet the demand sufficiently. In this study, it's aimed to observe the sex differences and reproductive physiology of Ancistrus cirrhosis (Catfish) to clarify and detect the importance of this genus.

Material and Methods

Animals and Experiment: The research was carried out in the Tekirdag Namik Kemal University, Faculty of Veterinary Medicine, Fisheries and Diseases Laboratory. In the trial, 7 male and 7 female fishes were studied. The animals were housed under standard laboratory conditions (average 27.06 ± 0.49 C; $59.27\pm13.58\%$ humidity). Also the salinity (312.61 ± 17.89) and TDS (dissolved solids; 500.89 ± 29.17) were in normal range (Table 1). 12 hours light and 12 hours dark photoperiod was applied in aquariums with a height of 80 * 35 * 45 cm. One side open and the other side closed test were used for reproduction (Figure 1).

Table 1. Water quality parameters.

Water Quality Parameters	Mean ± SD
Salinity (g/kg)	312.61 ± 17.98
TDS (mg/l)	500.89 ± 29.17
Aquarium temperature (°C)	27.66 ± 0.49
Environmental temperature (°C)	28.27 ± 0.35
Humidity (%)	59.27 ± 13.58
pH	8.08 ± 0.10
Oxygen concentration (mg/l)	9.00 ± 1.41
Conductivity (μs)	620.39 ± 37.16

The daily pH, salinity, TDS, conductivity and aquarium temperature were measured by the Extech Instrument. Environmental temperature and humidity was measured by Thermo Hygro and oxygen concentration was detected by commercial JBL kits. A pipe filter was used for filter system. During trial, it siphoned the waste accumulated in the aquariums every two days and exchanged water with the same temperature as the aquarium.

Figure 1. Reproduction cube

Fishes fed a standart diet. Some morphological parameters such as weight and height, were measured in all ages. Gender discrimination was separated according to the extensions formed by looking at the head structure of the adult fish (Figure 2). Also, their photos were taken and videos were recorded during all ages and behavioral process.

Statistical analysis: Statistical analyses performed with SPSS (Version 20.0). All the values were grouped and calculated as means ± standard deviation. One-way ANOVA was applied to all parameters to examine the

difference between groups. Differences were considered significant at p<0.05. Tukey's test (Dowdy & Wearden, 1981) evaluated if the difference between groups was provided to be significant (p<0.05). On the other hand, in non-homogenous groups, differences between means were analyzed by Kruskal Wallis and following Mann Whitney U test between groups one by one (Dawson and Trapp 2001). Also, The correlation analysis were identified by Pearson Correlation method.

Result and Discussion

The height and weight of all fishes were figured in Grapic 1. Also, some female reproductive parameters (larvae and egg counts) are shown in Table 2. The mean live weights of female and male fishes were 9.46±0.63 and 8.90±0.79, and the height of males and females were 8.77±0.27 and 9.70±0.43, respectively. The larvae and egg counts were 49.00 ± 16.63 and 53.00 ± 16.91, respectively. There were no statistical differences between either groups or parameters (p>0.05). However, there positively and statistically corelations were observed, especially among female weight, larvae and egg counts. There are positive and statistical correlations between weights and egg counts (r^2:0,977 p:0,001) which means that if weight being higher egg counts are more than normal. The positive and statistical correlation was found in weights and larvae counts (r^2:0,958 p:0,001), and egg and larvae counts (r^2:0,994 p<0,001). It means that if weight being higher larvae counts are more than normal. Also, if have more egg, it means that larvae counts are getting more than normal.
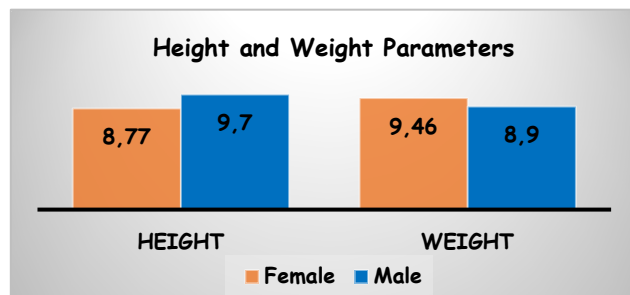
Grapic 1. The height and weight parameters of males and females

Table 2. The female reproductive parameters.

Female	Minimum	Maximum	Mean ± SD
Height (cm)	7.80	10.00	8.77 ± 0.72
Weight (g)	6.02	11.35	9.46 ± 1.67
Egg counts (piece)	21.00	74.00	53.00 ± 16.91
Larvae counts (piece)	19.00	72.00	49.00 ± 16.63
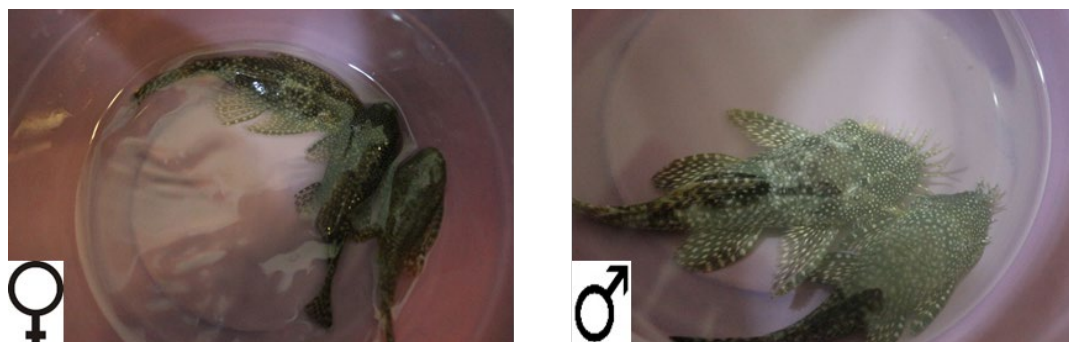
Figure 2. Male and Female Catfish (Ancistrus cirrhosus)

Male and female were fed three times a day with two Spirulina tablets. Reproduction began within a week in all separated fishes. It was observed that adopting and swimming around the cube of the male fish are the breeding behaviors. On the other hand, the female one came close to the cube after egg maturating, and also laying eggs

was reported. After laying eggs, female left the cube and the male fish cared the eggs for about 7 to 10 days with ventilation by his fings.
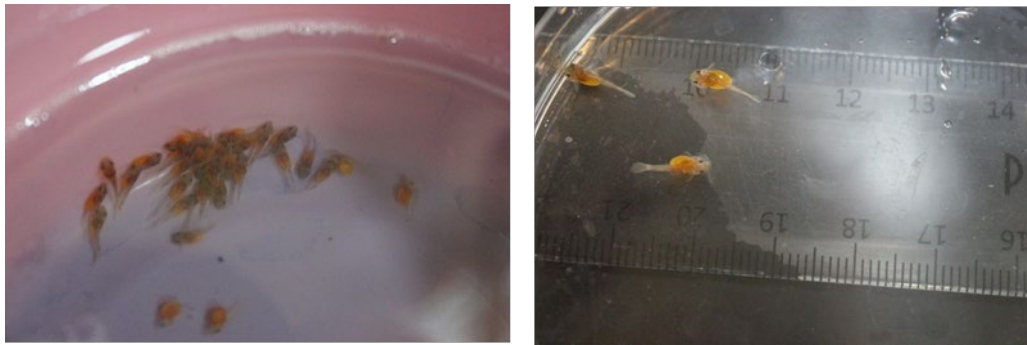
Figure 3. Puppies with egg sacs and 1 cm puppies of Catfish (Ancistrus cirrhosus)

At the end of the 7 or 10 days, the puppies, 1 cm height, left from cube and started to feed after the egg sacs consumption period were detected (Figure 3).

Figure 4. One month puppies of Catfish (Ancistrus cirrhosus)

After eggs consumption period, it was determined that the puppies growth rapidly with either 2 or 3 cm height after approximately 1 month (Figure 4).

There is limited study about this species of fish for nutrition and reproductivity. Researchers reported that the tentacules of catfish like as an olfactory organ which for detecting the odors (Burgess 1989; Sabaj et al., 1999). Also, this organ can be used to attach the eggs. Sabaj et al (1999) hypothesised that the snout tentacles are related to reproductivity. The male protects the eggs and cavity-nest which has a preference for females. Also they indicated that eggs and juveniles are guarded by males after hatching.

Conclusion

The aquarium industry has become an important sector in the world and has been a source of livelihood for thousands of people, especially in countries where fish are collected from nature. According to United Nations Commodity Trade Statistics Database in 2016 the ornamental fish industry included 128 countries in the collection, breeding, import and export of ornamental fish, with a total value of $333 million. The number of fish traded is estimated to be approximately 1.11 billion (EU Statistics 2017; Raja et al., 2019). In Turkey, these fishes are import from other countries, and belong this, it's being more expensive. The nutrition and growth of these fishes are approximately difficult and requires experience. Identifiying the problems encountered in the production of this species, suggesting solutions and introduction biotic and abiotic factors are important for professional procuders. Therefore, it's being more important to support the demand for this species with production.

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LINEAR REGRESSION ON INTERNET BANKING ADOPTION DATASET USING WEKA

Nidhi Nigam Verma, Dr. Deepika Pathak

Abstract: Data Mining or knowledge discovery in the database (KDD) is an excellent process to find out valuable information from a large collection of data. Data mining has successfully been used in different fields such as Medical, marketing, banking, business, weather forecasting, etc. For the banking industry, data mining, its importance, and its techniques are vital because it helps to extract useful information from a large amount of historical data which enable to make useful decisions. Data Mining is very useful for banking sector for better acquiring and targeting new customers and helps to analyze customers and their transaction behaviors. In the recent era, a new technology that has achieved considerable attention, especially among banks, is Internet banking. Its large scope of applications, its advantages brings an immoderate change in a common human's life. Linear Regression is one of the most commonly used and applied data mining techniques. Linear regression is really a very fast and simple regression algorithm and can give the best performance if the output variable of your data is a linear grouping of your inputs. In this paper the linear regression is applied on internet banking adoption dataset in order to compute the weights or coefficients of linear expression, and provides the predicted class value. The analysis here is done with the help of WEKA tool for data mining.

Keywords: Linear Regression, Data mining, WEKA, Internet Banking Adoption

I.   INTRODUCTION

Data Mining is one of the most commonly used techniques nowadays to retrieve useful information from large datasets. The techniques which are used for data mining includes Association rule mining, Classification algorithm, Clustering, Sequential Patterns, Linear Regression and Decision Trees. Classification requires a nominal class value but regression requires a numeric class value. Linear regression is basically a typical statistical method, which computes the weights or coefficients of linear expression, and provides the predicted class value, which is basically the sum of each and every attribute values multiplied by their weight. Linear regression works by estimating line coefficients or hyperplane which best fits the loaded training data. Linear regression is really a very fast and simple regression algorithm and can give the best performance if the output variable of your data is a linear grouping of your inputs. Internet banking has now days become a vital part of the banking system in India. Major benefit of internet banking, a customer can complete multiple banking transactions in the comfort of his home. The advantage of adopting internet banking provides competitive advantages to banks over other competitors. One of the most popular techniques of data mining used by banking industry is Linear Regression. The main aim of this paper is to apply Regression algorithm on internet banking adoption dataset with the help of WEKA tool for data mining.

II.   METHODOLOGY

Banking customers having accounts in different bank branches located in various cities of Madhya Pradesh was the target population for this research study. In this study specifically survey method is used where the data is collected by means of a questionnaire to determine the opinion of a target population of Madhya Pradesh [22].

A.   Primary Data for the Research

Primary data for this has been collected using a self structured questionnaire designed purposely for this study. Appropriate secondary sources have as well been relied upon for designing a suitable comprehensive questionnaire to gain deeper insights in this field. Questionnaire also includes questions regarding the satisfaction level of the customers using internet banking on identified factors. For this study data is collected using Google forms and through emailing of the questionnaires to users. Data for the research has been collected from 502 customers which includes both users

and non-users of Internet banking. The collected data should to be analyzed by using the appropriate analytical tool or technique in order to understand the various factors and reasons behind Internet banking adoption. For this research study, WEKA tool, a data mining tool, is being used.

B.   WEKA tool for Data Mining

"WEKA" stands for Waikato Environment for Knowledge Analysis. Basically WEKA is named subsequent to a flightless bird of New Zealand. It is a set of various machine learning algorithms that can easily be applied on any data set directly or can be called from your Java code. WEKA basically contains various tools for data mining and data pre-processing which are clustering, classification, association rules, regression and visualization [23].It is freely available and an open source software for data mining and its applications under GNU general public license, which is developed by the university of Waikato in New Zealand.

C.   Sampling Procedure

 A sampling, defines the population from which our research sample is drawn. As there is hardly enough money or time to collect information from everyone in overall population, the goal becomes choosing a representative sample, sometimes called as a subset of that population. Area for this research is Madhya Pradesh, India. Madhya Pradesh is situated at the center part of India, so known as the heart of India. For this research sample which is considered are from major cities of Madhya Pradesh. Research Questionnaire was sent to them online, their opinions and concerns are collected in order to measure the adoption rate of internet banking in Madhya Pradesh.

III. EXPERIMENTAL WORK

Primary Data Collection

For this study data is collected using Google forms and through emailing of the questionnaires to users. Only 502 responses were totally complete and found eligible for our analysis. So for this study, a sample of 502 responses was considered.
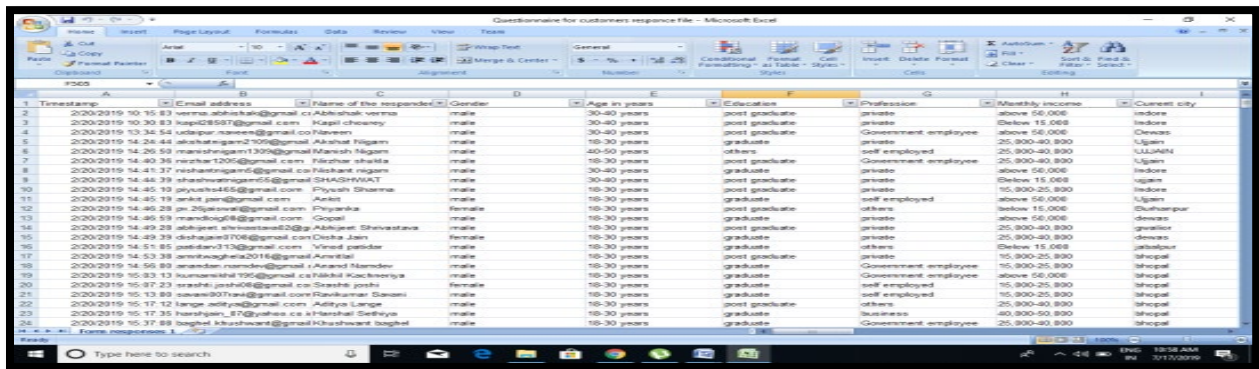
Fig 1: questionnaire for customer's response file containing 502 responses

Analysis of dataset using WEKA

Fig2: Weka first screen while startup

c. Loading Dataset into WEKA Explorer

For this study we are having a dataset on internet banking adoption, which we have collected online through a well structured questionnaire using Google forms. We have received 502 responses which we are going to consider here for the purpose of analysis using WEKA [24]. Here we import our data file which is CSV format and loading it is converted in ARFF file format with the help of save button in WEKA explorer.
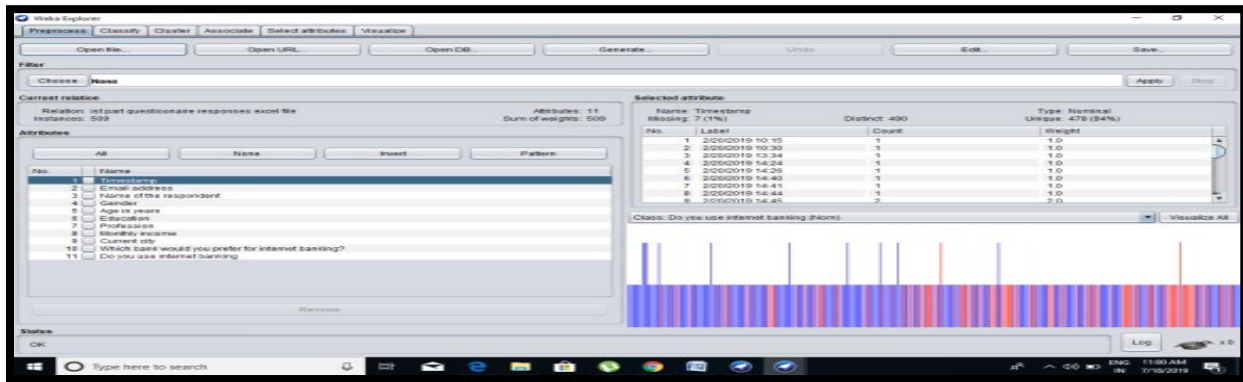
Fig3: Internet Banking Dataset in WEKA Explorer

d. Linear Regression on internet banking dataset

For applying linear regression on our data set it is necessary to first convert our data from nominal to binary form since regression will not work on nominal data set. So we can easily do that by choosing filtering in the preprocess tab and then click on nominal to binary in explorer window.
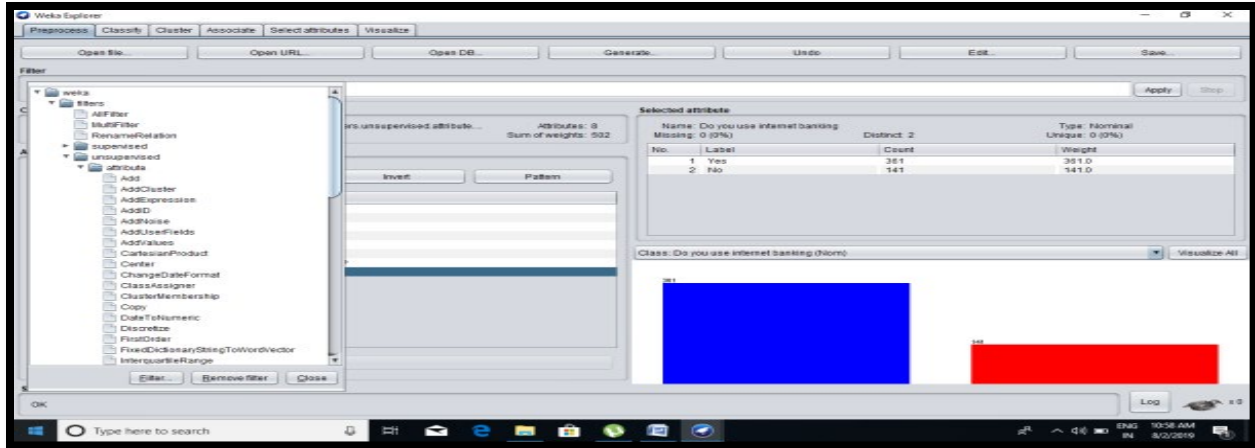
Fig 4: Preprocess to convert data set from nominal to binary using filter

e. Result of Linear regression for internet banking adoption data set
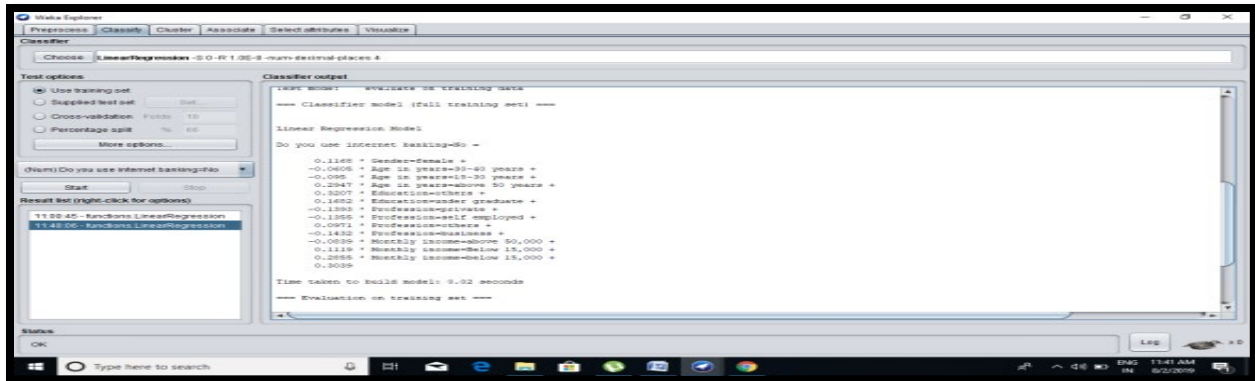
Fig 5: Result of Linear regression for internet banking adoption data set

For a given data set or set of attributes, the linear regression prepares a model, in the form of an equation that is used to calculate the predicted class value. Data mining is not just about providing a single number as an output; it's basically to identify rules and patterns. It's not only used to output an absolute number, but fairly to create a model that makes you discover rules and patterns, output prediction, and brings you to conclusions backed by the data.

Analysis by Linear regression is basically used to predict the value of one variable which is based on the value of some another variable in a dataset. The value of a variable which you want to predict is known as the dependent variable and the variable which is used to predict the value of other variables of the dataset is referred to as the independent variable.

=== Run information ===
Scheme: weka.classifiers.functions.LinearRegression -S 0 -R 1.0E-8 -num-decimal-places 4
Relation: ist part questioonaire responses excel file-weka.filters.unsupervised.attribute.Remove-R1-3,9-10-weka.filters.unsupervised.attribute.NominalToBinary-Rfirst-last

Instances: 502	Attributes: 21

Gender=female
Age in years=30-40 years
Age in years=18-30 years
Age in years=40-50 years
Age in years=above 50 years
Education=post graduate
Education=graduate
Education=others
Education=under graduate
Profession=private
Profession=Government employee
Profession=self employed
Profession=others
Profession=business
Monthly income=above 50,000
Monthly income=Below 15,000
Monthly income=25,000-40,000
Monthly income=15,000-25,000
Monthly income=below 15,000
Monthly income=40,000-50,000
Do you use internet banking=No

Test mode: evaluate on training data

=== Classifier model (full training set) ===

Linear Regression Model

Do you use internet banking=No =

   0.1168 * Gender=female +
-0.0605 * Age in years=30-40 years +
-0.095 * Age in years=18-30 years +
  0.2947 * Age in years=above 50 years +
  0.3207 * Education=others +
  0.1682 * Education=under graduate +
-0.1393 * Profession=private +
-0.1355 * Profession=self employed +
  0.0971 * Profession=others +
-0.1432 * Profession=business +
-0.0839 * Monthly income=above 50,000 +
  0.1119 * Monthly income=Below 15,000 +
  0.2855 * Monthly income=below 15,000 +
  0.3039

Time taken to build model: 0.02 seconds

Table 1: Linear Regression Model

The output of Linear regression model is regression line which is in the form of $y = m*x + b$, where y is the dependent variable which is dependent on the value of variable x, m is a slope or gradient which shows how steep the line is and b is a constant. One equation for each output variable. All the equations are composed of the addition of a series, which is composed of an attribute, multiplies a factor that can be either positive or negative. The regression process

basically determines the factors, which are based on the data set. The linear regression model for our dataset represents 'Do you use internet banking=no' is the dependent variable, whose values depend on the values of various attributes in the dataset like gender, age in years, education, profession, and monthly income. Here 0.3039 is a constant value and time taken to build the model is 0.02 seconds.

III.   CONCLUSION

Here in this paper we discussed the results of applying Linear Regression algorithm for data mining on internet banking adoption dataset. Through this paper we have shown how Linear Regression model is useful for predication and can helps to sort out problems regarding internet banking adoption in Madhya Pradesh. Regression is a most popular technique of data mining which is used to predict a range of numeric values called continuous values as well, for given a specific dataset. The output of Linear regression model is regression line which is in the form of y= m*x + b, which clearly shows the relationship between the dependent and independent variables in a dataset. These results will be useful for bank managers and other banking authorities, in order to enhance the internet banking adoption rate in the future.

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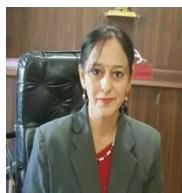
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SENSORY MAPPING FOR COMMON SPECIAL ESTERS IN CREAM PRODUCTS

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Abstract: Emollients are essential ingredients in all types of personal care products and cruial especially for skin care category. The basic building blocks of most emollients are long chain hydrocarbons, often combined with alcohols and acids in the form of esters. Esters have been increasingly used in cosmetic formulations over the past few years in a wide variety of applications for their sensorial and emollient properties. The majority of esters are either derived synthetically from petroleum or from natural triglycerides. The raw materials which are commonly used in FMCG like cyclomethicone, natural silicone, mineral oil, jojoba oil, lanolin oil, antimicrobial efficiany agent and preservative have their alternatives in the form of emollients which are special esters products. In this paper, common special emollients which have an ester form will be evaluated in terms of their end user sensory feelings as well as general informations about their production details.

Keywords: ester, emollient, sensory feeling, natural derivatives

INTRODUCTION

Esters are one of the most widely used types of chemical compound in the world today for cosmetics and the personal care industry because of their versatile chemistry. The majority of esters are either derived synthetically from petroleum or from natural triglycerides (Transparency Market Research, 2020).

The basic synthesis of esters are shown in Figure 1. It is a condensation product of carboxylic acid and alcohol heated in the presence of a mineral acid catalyst to form an ester and water.

$$RCOOH + R^1OH \xrightleftharpoons{H^\oplus} RCOOR^1 + H_2O$$
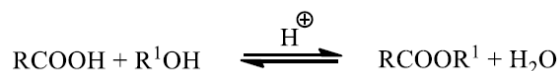
Fig. 1: Synthesis of esters (Esterleşme reaksiyonu, 2020)

Due to the variability of crude oil prices, Petroleum-derived esters are become more expensive so that their usage decrease day by day. Besides this, trends in cosmetics goes to green, organic, natural, natural derived and sustainable formulations. That situation lead to the need of natural alternatives of petroleum-derivatives in personal care, which could be met by increased use of naturally derived esters (Transparency Market Research, 2020).
The raw materials which are commonly used in FMCG like cyclomethicone, natural silicone, mineral oil, jojoba oil, lanolin oil, antimicrobial efficiany agent and preservative have their alternatives in the form of emollients which are special esters products as shown in **Table 1.**

Table 1: Special esters and their properties & replacements

Special Esters	Properties
Coco-Caprylate/Caprate	Alternative to Cyclomethicone, Natural Silicone and Mineral Oil
Oleyl Erucate	Alternative to Jojoba Oil (cost effective)
Decyl Oleate	Similar Sensory Mapping to MCT
Bis-Diglyceryl Polyacyladipate-1	Alternative to Lanolin Oil
Propylene Glycol Dicaprylate / Dicaprate	Alternative to Low Molecular Weight Silicone Oil
Glyceryl Caprylate	Antimicrobial efficacy against microorganisms & the most widely used natural preservative booster in the world

Coco-Caprylate/Caprate

Coco-Caprylate/Caprate is primarily used in cosmetics as an emollient and emulsifier for formulations. It is an ester of coconut fatty alcohol, capric acid and caprylic acid. Straight, unbranced wax ester made of C12 – C18 vegetable fatty alcohol and a defined blend of fractionated fatty C8/C10 acids of vegetable origin. It leaves a non-greasy, soft after touch on the skin. It is a successful sensory alternative to cyclomethicone, natural silicone and mineral oil and provides such kinds of claims like vegan, 100% natural vegetable source to the final products (IOI Oleochemical, 2019).

Oleyl Erucate

Oleyl erucate is a natural based highly pure cosmetic oil with properties similar to natural jojoba oil. It is produced by enzymatic catalysis.

Oleyl erucate is a wax ester of vegetable fatty alcohol and fatty acids. It is manufactured by esterification of vegetable C16/C18 and C18 unsaturated fatty alcohol and C16-C22 unsaturated fatty acid from Palm and Rapaseed. It is used as cost effective alternative of natural jojoba oil and provides such kinds of claims like vegan, palm based, 100% natural, 100% vegetable renewable source to the final products. (IOI Oleochemical, 2019).

Decyl Oleate

Decyl oleate is a wax ester made of straight chained decyl alcohol and oleic acid. It is used in variety of cosmetics and personal care products, including make up, and skin and hair products. The sensory performance is often compared to popular MCT oil. It is palm based, obtained from 100% vegetable renewable source. As antioxidants, mixed vegetable tocopherols and citric acid esters (Glyceryl Citrate/Lactate/Linoleate/Oleate) are used in the process (IOI Oleochemical, 2019).

Bis-Diglyceryl Polyacyladipate-1

It is a partial ester of natural diglycerin with medium chain fatty acids, isostearic acid, 12-hydroxystearic acid and adipic acid. It is promoted as vegan alternative to lanolin oil or without the potential skin irritation problems of lanolin. It provides high water absorption capacity, conditioning and film forming effect, stable against air oxidation and is produced with 85% vegetable renewable source that is palm based (IOI Oleochemical, 2019).

Propylene Glycol Dicaprylate/Dicaprate

Propylene Glycol Dicaprylate/Dicaprate is a mixture of the propylene glycol diesters of caprylic and capric acids (Wenninger and McEwen 1997). Propylene Glycol Dicaprylate/Dicaprate is also defined as the propylene glycol diester of short chain, predominantly naturally derived C8-Cl0 fatty acids (Nikitakis and McEwen 1990). It is soluble in alcohol containing up to 20% water and its viscosity is usually low (Stepan Company 1996).

Propylene Glycol Dicaprylate/Dicaprate has been defined as the propylene glycol diester of saturated vegetable acids (C8-ClO chain length) that contains 65 to 80% caprylic acid and 15 to 30% capric acid (Mahjour et al. 1993).

Propylene Glycol Dicaprylate/Dicaprate is produced via the combination of Propylene Glycol with capric and caprylic acids. The mixture is heated to temperatures high enough to cause esterification. Water of reaction is removed to drive the reaction to completion and to obtain the low hydroxyl specification. The product is then fully refined and deodorized (Stepan Company 1996).

It is promoted as excellent dispersing and dissolving properties for pigments and sunscreens. It is light emollient for many formulations such as sun care and BB creams, high polarity with high % vegetable source palm based product.

Glyceryl Caprylate

Glyceryl Caprylate is obtained by esterification of glycerol and caprylic acid. It is promoted as palm based, 100% natural and vegetable renewable source which exhibits excellent antimicrobial efficacy against microorganisms, voluable support for anti-acne poducts. It is the most widely used natural preservative booster in the world. 88% min. content of monocaprylate used for alternative preservation, refatting and wetting (Thiemann et. al, 2017)

Sensorial properties of ester emollients

The performance of emollients in the form of esters can have a significant effect on the final personal care product formulation depending on the chemical structure of the ester and the base formula of the final product as well. It seems difficut in the beginning to select the best ester for a particular formulation. However, formulators who understand how the structure of an ester affects its characteristics can select the optimum ester for their application quickly and reliably. The most important parameters given in the literature are as follows:

1. London dispersion forces

The attraction between molecules due to instantaneous areas of charge as a result of localised electron movement is called London dispersion forces. These forces are weaker than hydrogen bonds or covalent bonds. As molecules start to get bigger, the degree of interaction increases and the sum of the forces starts to become significant. This effect causes the increase in boiling points of esters as their molecular weights increase and so does the boiling point consequently. This is because of the increased attraction between molecules as a result of London dispersion forces. This increase of intermolecular attraction is also felt in the sensory properties of the material. As the attraction between the molecules increases, more force has to be applied in order for the layers of molecules to slide against each other, leading to lower spreadability and a heavier feel (Alander, 2012).

2. The effect of branching

For higher molecular weight, London dispersion interaction increase and heavy skinfeel occures for linear molecule but vise versa for branched ones. Branched molecules are less 'stack' in layers. Branching reduces the amount of interaction between the molecules and results in a lower boiling point and a lighter skin-feel.

3. The effect of unsaturation

In a saturated compound, each bond has 360° free rotation, allowing the material to be extremely flexible and conform to the most energetically favourable state so that high London dispersion interactions occur. Double bonds do not have this free rotation and fix the molecule in a certain conformation. This makes them less flexible and leads to a reduction in the strength of London dispersion forces and provides a lighter skinfeel. (Williams et. al, 2012).
Cis and trans conformations also have an impact on sensorial parameter. The cis conformation disrupts the structure far more and results in a lower melting point and therefore provides a lighter skin-feel (Williams 2012, Wu 2014).

4. Polyol derived esters

A polyol molecule has a multiple alcohol functional groups. Esters derived from polyols are inherently more branched than ones derived from mono alcohols, and so even though they can be quite large molecules, they feel quite light on the skin. The complex structures of polyols give a unique skin-feel (Barel et. al, 2009)

5. Hydrogen bonding and hydroxyl groups

Hydroxyl groups are common functional group in ester compounds and are easily identifiable from the INCI name, such as Ethylhexyl Hydroxystearate. These groups tend to make the material feel heavier and more moisturising (Iwata et. al, 2013).

Although the data in the literature provide significant information about sensory performance, panel tests are more common in FMCG, where the opinion of the end user is taken. In this study, the common emollients in ester form were used. For this purpose, a basic cream base was used and the amount of ester kept same in order to get comparable results. The results of the sensory map obtained were compared.

MATERIALS AND METHODS

In this study, 6 special ester given in Table 1 used to make cream samples. Basic cream formulation was used given in Table 2 for each esters.

Table 2: Basic cream formula

Phase A	Water Phase
Ethylhexylglycerin	0,25 %
Phenoxyethanol	0,65 %
Methylpropanediol	2 %
Carbomer	0,35 %
Water	up to 100
Phase B	**Oil Phase**
Stearic Acid	2 %
Cetyl Alcohol	1 %
Sodium polyacrylate	0,2 %
Potassium Cetyl Phopsphate	0,21 %
Ester	**5 %**

6 esters were evaluated with 5% usage ratio in cream base. In order to see a significant emollient effect in the cream formula, 5% usage ratio was selected. Sensory test was performed with 7 people and applied on forearm area in a conditioned laboratory. All the sensory evaluation results were noted after 15 minutes of the application time for each sample of creams. The parameters of dry time, softness, stickiness, velvetiness, dryness, shining were marked by the panellists and evaluation scores were noted between 1 to 10.

The following list explains how to perform sensory criteria:

Dry time: The time that emollients appears on skin that indicates absorption of emollients into skin. If the dry time is long, it means bad absorption, so the longer dry time gets lower mark.

Softness: The first feeling of the emollient on skin that shows the quality of sensory feeling of raw material. Best performance:10 points

Stickiness: It is an undesired feature for a cosmetic product to have. Non-sticky performance was marked with 10 points.

Dryness: It is an indication of moisturization on skin. Therefore, dry skin is marked with lower point. For the least dryness: 1 point, maximum dryness: 10 point.

Shining: 1 point is marked as less shining and 10 point is marked as more shining.

Velvetiness: The first velvety feeling of the emollient on skin that shows the quality of sensory feeling of raw material. Best performance:10 points

RESULTS AND DISCUSSION

By using the same cream base formula, 6 esters were successfuly evaluated for sensory mapping and spider graph introduced in Figure 2. Sensory test was performed with 7 people for applied on forearm area in a conditioned laboratory. 252 sensorial evaluation conducted in total, summarized in Table 3. The parameters of dry time, softness, stickiness, velvetiness, dryness, shining were marked by the panellists and evaluation scores were noted between 1 to 10.

Table 3: Summary of trial list

Sensorial Evaluation Criteria	5% emollient in cream	252 Sensorial Evaluation in Total for 7 Panellists
Dry Time		
Softness		
Stickiness	6 EMOLLIENTS APPLIED	
Velvetiness		
Dryness		
Shining		

Fig. 2: Sensory mapping spider graph of common special esters

All the esters have similer stickiness performance. The best velvetiness, softness and dryness performance obtained with propylene glycol dicaprylate/dicaprate which is an alternative to low molecular weight silicone oil. Decyl oleate and oleyl erucate has similar shining, dryness, softness and stickiness performances. Oleyl erucate is cost effective alternative of jojoba oil and decyl oleate is alternative to middle chain triglycerides which has a high cost either. The worst performance belongs to glyceryl caprylate with poor dry time performance.

CONCLUSION

Esters provide a drier feel than traditional oils, reducing the greasy feel of formulations. With natural cosmetics becoming more important, having functional natural alternatives instead of synthetic ingredients becomes crucial. Esters can provide formulators with effective and natural replacements for potentially unwanted materials such as mineral oils and silicones. In the future, the selection of an emollient mixture for a formulation consider parameters such as purity, biodegradability, and sustainability, leading to the development of new processes and types of emollients.

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THE ADOPTION OF INTERNET-ONLY BANK IN TERMS OF BENEFITS AND DIFFERENTIATED SERVICES

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Abstract: The purpose of this study is to analyze the adoption of internet-only bank in Korea in terms of benefits (functional, social, experiential, economic benefits) and differentiated services (customization and service diversity). Data was collected using an online and offline survey of 117 internet-only bank users and analyzed the data using structural equation model (SEM). The results of empirical analysis using SmartPLS show that functional benefits, experiential benefits, and customization are significantly related to the user's satisfaction, but economic benefits, social benefit, and service variety are not. This study has the significance in that it examines the user's attitude toward internet-only bank in terms of benefits and differentiated services while other studies analyzed banking services focusing on the attributes of banking channel itself.

Keywords: Internet-only Bank, Benefits, Differentiated services

Introduction

With the advent of internet banking, a large part of the services that are offered by banks can be provided online as well and many banks are closing offline branches and concentrating on improving online channels (Jun, 2017). Even more banks that use internet as the only channel of banking services has come to exist, which called 'internet-only bank'. Internet-only bank do not have any physical infrastructure resulting in costs savings. Instead, they invest in high end computer infrastructure that allows them to serve their customers in better and faster ways (Kim and Kim, 2018). Internet-only bank is a kind of self-service bank targeting small-scaled retail finance. Internet-only bank is providing services only through the internet and limited call center services are provided without face-to-face channel. As a mean to encourage development of fintech internet-only bank has emerged in Korea (Park, 2017). Two internet-only banks in Korea, KaKao Bank and K-Bank have started their operation in 2007. As of August 2017, 3.07 million accounts were opened in Kakao Bank and 490,000 accounts in K-Bank. When it comes to the amount of deposits and loans, Kakao Bank has 1,409 billion Won as deposits and 1,958 billion Won as loans while K-Bank has only 800 billion Won as deposits and 650 billion Won as loans (Park, 2017). The introduction of internet-only banks in Korea has decreased the market price of financial products and banking services resulting in causing healthy competition in banking industry.

Internet-only bank creates customer value by providing time optimization, immediate and customized information, fun and instant connectivity, great convenience and interactivity (Park, 2017). That is, customer use internet-only bank due to the various benefits compared with internet banking and mobile banking which are provided by traditional banks. Benefits are the personal values consumers attach to the product or service attributes and they are often linked to fairly basic motivations of purchasing (Keller, 2007). While prior banking-related studies have focused on the attributes of banking channel itself, this study intends to examine the adoption of internet-only bank in terms of benefits (functional, social, experiential, economic benefits) and differentiated services (customization and service diversity) as well.

Theoretical background

Several studies analyzed banking services and associated factors that influence consumers' adoption of it using a specific adoption theory or an extension of it, such as TAM (Technology Acceptance Model), IDT (Innovation Diffusion Theory), and UTAUT (Unified Theory of Acceptance and Use of Technology) (Aijaz and Heikki, 2015). They usually focused only on the attributes of banking channel and neglected the customer's subjective perception of benefits which banking services provide (Jun, 2017). However, it is necessary to investigate the relationship between the attitude and the usage in terms of user's subjective value, which are user's benefits, because customer has a tendency to use any service to get desirable benefits rather than to get attributes.

Benefits are the desirable consequences consumers seek when they buying and using products or services. Consumers don't buy and use products or services to get attributes; rather they think about products or services in terms of desirable and undesirable consequences - benefits (Peter and Olson, 1987). Benefits have been adopted by some studies on smart phone and mobile applications (Jun, 2017; Keller, 2007; Kwon, 2015; Noh and Hwangbo, 2016; Woo et al., 2013; Yim et al., 2016). Benefits can be distinguished into several categories according to the underlying motivations to which they relate (Keller, 2007; Peter and Olson, 1987). In this study benefits are categorized into 4; functional benefit, experiential benefit, social benefit, and economic benefit by adapting Jun's study (Jun, 2017; Jun, 2019).

Service variety and customization are also important factors of consumer's attitude. Broad range of products and services is one of significant predictor of consumer's motivations (Jun, 2018) and customized services are significantly related to the consumer's attitude and satisfaction (Jun, 2016).

Table 1: Affecting factors of internet-only bank

Factor	Construct	References
Functional benefit	Intrinsic advantages of product or service consumption and usually correspond to the product related attributes	Jun (2017), Yim et al. (2016), Kwon (2015), Noh and Hwangbo (2016)
Experiential benefit	Extrinsic advantages of product or service consumption such as social approval and personal expression	
Social benefit	Benefits relate to what it feels like to use the product or service such as sensory pleasure	
Economic benefit	Cheaper price and cost compared with other channels	
Service variety	Broad range of services	
Customization	Customized services	

Research model and empirical analysis

Research model and hypotheses

The primary purpose of this paper is to investigate the affecting factors of attitude, and usage of internet-only bank as Figure 1.
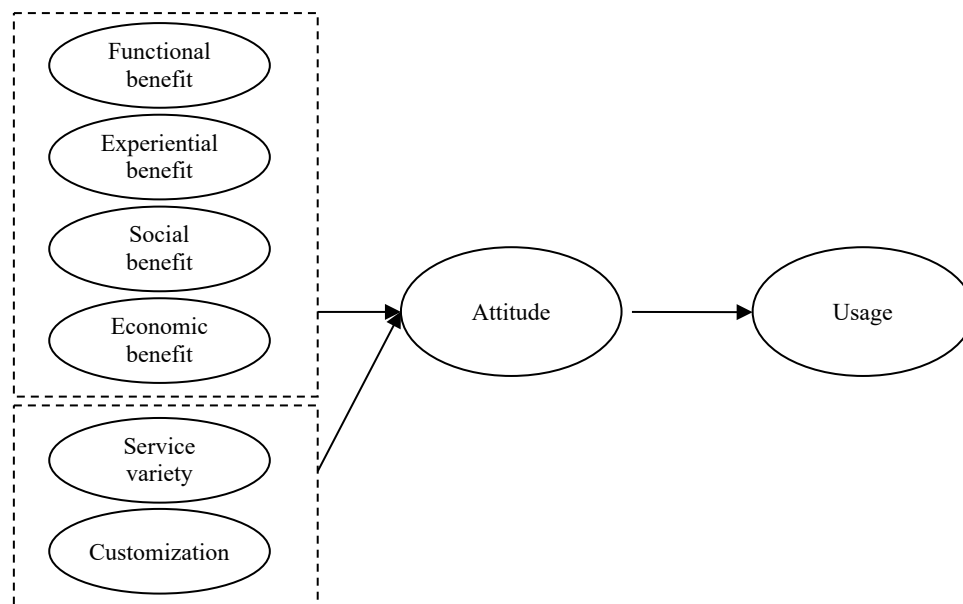
Figure 1. Research model

Based on prior studies which are mentioned in theoretical background benefits (functional, social, experiential, economic benefits) and differentiated services (customization and service diversity) are identified as affecting factors and following hypotheses are established as Table 2.

Table 2: Hypotheses

Hypotheses	Content
H1	Functional benefits will have a positive effect on attitude toward internet-only bank.
H2	Experiential benefits will have a positive effect on attitude toward internet-only bank.
H3	Social benefits will have a positive effect on attitude toward internet-only bank.
H4	Economic benefits will have a positive effect on attitude toward internet-only bank.
H5	Service variety will have a positive effect on attitude toward internet-only bank.
H6	Customization will have a positive effect on attitude toward internet-only bank.
H7	Attitude toward internet-only bank will have appositive effect on intention to re-use.

Empirical analysis

A questionnaire was used to collect data for this study targeting the internet-only bank users in Korea. The instruments measuring the constructs were adapted from the extant literature. The items were measured on a 5-point Likert scale using from 1 ('strongly disagree') to 5 ('strongly agree').

117 responses were used as a basis for the findings of this study. 76% of respondents use internet-only bank more than 1 time in a week. 0ver 70% of respondents use balance check service and transfer service regularly and frequently.

SEM (Structural Equation Model) was used for empirical test using SmartPLS. PLS is an extremely powerful multivariate analysis technique that is ideal for testing structural models with latent variables. This is a convenient and powerful statistical technique considered appropriate for many research situations (Henseler et al., 2009), suitable for studying complex models with numerous constructs (Chin, 1998).

The measurement model was assessed for construct reliability, indicator reliability, convergence validity, and discriminant validity. Table 3, 4 lists the average variance extracted (AVE), composite reliability (CR), factor loadings, and variable correlations. As shown in the table, the measurement model results indicate that the model has acceptable construct reliability (Straub, 1989), indicator reliability (Churchhill, 1979), convergence validity (Chin, 1998; Fornell & Lacker, 1981), and discriminant validity (Fornell & Lacker, 1981), ensuring that the constructs are statistically distinct and can be used to test the structural model.

Table 3: Confirmatory factor analysis

Construct	Factor loadings	Composite Reliability	AVE
Functional benefit	0.831	0.894	0.629
	0.815		
	0.798		
	0.857		
	0.648		
Experiential benefit	0.913	0.954	0.874
	0.951		
	0.939		
Social benefit	0.642	0.816	0.602
	0.734		
	0.924		
Economic benefit	0.776	0.812	0.685
	0.876		
Service variety	0.728	0.878	0.707
	0.911		
	0.872		
Customization	0.875	0.929	0.813
	0.909		
	0.919		
Attitude	0.842	0.909	0.771
	0.937		
	0.852		
Usage	0.978	0.978	0.956
	0.977		

Table 4: Discriminate validity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Functional benefit(1)	**(0.629)**							
Experiential benefit(2)	0.492	**(0.874)**						
Social Benefit(3)	0.274	0.353	**(0.602)**					
Economic benefit(4)	0.523	0.295	0.240	**(0.685)**				
Service variety(5)	0.210	0.384	0.227	0.213	**(0.707)**			
Customization(6)	0.435	0.421	0.293	0.420	0.319	**(0.813)**		
Attitude(7)	0.641	0.561	0.373	0.463	0.245	0.580	**(0.771)**	
Usage(8)	0.508	0.392	0.076	0.320	0.232	0.445	0.513	**(0.956)**

The analysis of hypotheses and constructs' relationships were based on the examination of standardized paths using the bootstrap resampling method (Chin, 1998; Henseler et al., 2009). The results are summarized in Table 5. Functional benefit (β = 0.343, t-value = 3.841), experiential benefit (β = 0.229, t-value = 2.475), and customization (β = 0.284, t-value = 3.0788) were found to be significantly related to consumer's attitude, but social benefit (β = 0.107, t-value = 1.405), economic benefit (β = 0.082, t-value = 0.899), and service variety (β = -0.047, t-value = 0.565) were not. Consumer's attitude also has positive effect on usage (β = 0.513, t-value = 6.649). According to the values given in Table 4, hypotheses 1, 2, 6, 7 are supported but hypotheses 3, 4, 5 are not supported

Table 5: Results of hypotheses testing

	Path	Estimate	t-value	Result
H1	Functional benefit $\rightarrow$ Attitude	0.343	3.841	Accept
H2	Experiential benefit $\rightarrow$ Attitude	0.229	2.475	Accept
H3	Social benefit $\rightarrow$ Attitude	0.107	1.405	Reject
H4	Economic benefit $\rightarrow$ Attitude	0.082	0.899	Reject
H5	Service variety $\rightarrow$ Attitude	-0.047	0.565	Reject
H6	Customization $\rightarrow$ Attitude	0.284	3.078	Accept
H7	Attitude $\rightarrow$ Usage	0.513	6.649	Accept

Conclusion

Internet-only bank means a bank that utilizes internet as the primary sales channel instead of establishing offline branches for face-to-face respond as the traditional bank does. In 2017, two internet-only banks in Korea, Kakao Bank and K-Bank have started their operation.

The launch of internet-only banks has brought many changes. As the existing commercial banks and internet-only banks have started the infinite competition, the maintenance of relationships with customers or the creation of new customers is important (Kim and Kim, 2018). For this, it is meaningful to understand the consumer's attitude toward of internet-only bank. Therefore, this study examined the effecting factors of internet-only bank in terms of benefits and differentiated services.

The results of empirical analysis show that functional benefit, experiential benefit, and customization are significantly related to the consumer's attitude, but social benefit, economic benefit, and service diversity are not. First of all, functional benefit such as quickness, easiness, trust, and effectiveness of internet-only bank was found to be the most important factor for consumers to use internet-only bank. It implicates that consumers appreciate internet-only bank as easier and convenient banking channel with trust. As internet-only bank which use smart phone becomes routine service in daily life, social benefit and economic benefit are not important factors for consumers any more. Instead, personalized and customized services play a great role in consumer's attitude toward internet-only bank. Customized services which make fun and useful to consumers affect the consumer's banking behavior positively. That's why experiential benefit and customization were found to be related to the consumer's attitude. Therefore, banking service provider should consider that banking service be much easier and quickly with trust and fun to consumers and provide more useful customized services with consumers.

This paper has the originality in that it examines the affecting factors of internet-only bank in terms of benefits and differentiated services while prior studies have focused on the attributes of banking channels. Further study should consider the difference among service types and device which use internet-only bank.

Acknowledgements

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THE EFFECT OF DIFFERENT HUMECTANTS ADDITION TO COLOGNES ON SKIN MOISTURE AND MICROORGANISM COUNT

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Abstract: The scented cosmetic products such as colognes are composed of basically ethanol, water and fragrance. The use of colognes is favorable because of the fragrance. However, the need of them has been increased to the global health issues and the purpose of using colognes has differed because of its alcohol content. Frequent use of colognes leads to irritation, dryness and redness on skin. Therefore, the addition of the humectants into the cologne formulations may help to decrease the skin problems. In the study, two humectants, glycerin and mono propylene glycol (MPG) were formulated in cologne. It was concluded that the skin moisture was increased by glycerin addition much better than MPG, but the microorganism count after mono propylene addition was lower than glycerin.

Keywords: Cologne, mono propylene glycol, glycerin, skin moisture, bacterial count

Introduction

The fragrance products consist of a fragrance compound dissolved in ethyl alcohol. Perfume in this form is said to have first appeared in Hungary in the 14th century. It was known as the Hungarian Water and was used by the Queen of Hungary to stay young (Mitsui, 1998).

Today, many cosmetics contain fragrance ingredients. Fragrance products are classified as perfume, eau de parfum, eau de cologne, fragrance powder, solid perfume and perfumed soap according to the perfume ratio they contain. In Table 1, fragrance product groups are given according to different concentration ranges (Wannaruemon et. al, 2013).

Table 1. Types of fragrance products (Mitsui, 1998)

PRODUCT	FRAGRANCE DOSAGE
Perfume	15-30%
Eau de Parfum	7-15%
Eau de Toilette	5-10%
Eau de Cologne	2-5%
Solid Perfume	5-10%
Fragrant Perfume	1-2%
Perfumed Soap	1.5-4%

Since the need for alcohol-containing products is increasing all over the world, cologne is one of the most prominent cosmetic products. Cologne is a product that contains a small amount of perfume but consists of high volumes of alcohol and water. The approximate alcohol content varies between 70-80%. The products are generally used as a refreshing body spray. Colognes have low permanence on the skin, but they are highly preferred due to their low price and pleasant fragrance (Van Der Pol, 2003).

Nowadays, the effects such as irritation, drying and irritation on the skin can be observed due to increasing in cologne consumption. For this reason, it is important to include humectants in cosmetic formulations. Generally, moisturizers such as glycerin, MPG, panthenol and Sodium PCA are added to cologne formulations.

Glycerin is a humectant commonly used in cosmetic applications and has a trihydric alcohol structure. Glycerin is colorless, odorless, viscous and stable under many conditions. Because of pleasant odor and taste, glycerin is used in food and cosmetic application. Glycerin does not show toxic property, it is digestible and eco-friendly. Glycerin is a versatile chemical and good humectant because of degree of hydroxyl groups and high hygroscopic property. There is also an antimicrobial effect. Therefore, it has a wide field of usage (Fluhr et. al, 2005).

MPG is secondly widespread humectant in personal care formulations. It has transparent, odorless, viscous and as water-soluble as glycerin. MPG has limited use in oral care products and lipgloss because of its bitter taste. Because of its bacteriostatic and bactericidal properties, it prevents the development of microorganisms (Yılmazer et. al, 2019).

In this study, it is aimed to improve the moisturizing effect of colognes by adding humectant to colognes taking account of decreasing the microbial count. Glycerin and MPG were selected as humectants and their moisturization effect and the contribution of the microbial count were analyzed.

Materials and Methods

The cologne was formulated with alcohol, water and fragrance. The MPG and glycerin were added as 3% to observe the skin effects and bacterial count significantly.

As first study, the skin moisturizing effect was performed by the measurements of corneometer and transepidermal water loss (TEWL). MPA 5 (Khazaka, Germany) equipment was used for these measurements. In conditioned room of 20°C, 11 people were taken to the tests. In corneometer measurements, the hydration level of the skin is given directly by the equipment which shows the indicative numbers representing the moisture content. The fundemental principle of the method is on the strength of the difference between the dielectric constant of water (81) and other substances through measuring the capacitance of a dielectric medium. The span of variation of the values of skin moistening value is between 0-130 arbitrary units (AU) (Constantin et. al, 2014).

The numbers that gives the hydration level are depicted in Table 3.

Table 3. Skin types according to the result of skin hydration value (Zuang et. al, 1997)

Skin Hydration Value (AU)	Skin Type
< 30 AU	Very dry skin
30-45 AU	Dry
>45 AU	Sufficientyl hydrated

In measurements of TEWL, the tewameter is used and the open chamber assesses the loss of water from the skin according to time and area. Its unit is g/hm^2. TEWL is related to skin barrier function while the corneometer directly gives the moisture content of the skin at that time (Wan et. al, 2014).

Corneometer and tewameter were kept on the forearm and the measurements were read before and after applying the cologne formulations.

As second study, the microbial count were measured by Kikkoman Lumister PD-20. As mechanism of action, it is based on the measurement of bioluminescence, a product produced during the enzymatic decomposition of adenosine triphosphate (ATP) and adenosine monophosphate (AMP) using luciferase and pyruvate phosphate dikinase of all living organisms including fungi, yeast and bacteria. A swab is dipped into water and read as negative control on the equipment. The second swab is dipped into water and the palm is rubbed with the swab to hold the microorganisms. The swab is read by equipment again. Then, 5 sprayings of cologne formulations are applied on the palm for 20 seconds. Third reading is made with new swab. The readings of the equipment are given in Relative Light Units (RLU) (Hyserve Lumitester PD20, 2020).

Results and Discussion

The mean of corneometer readings were given in Table 4. Also, Table 5 shows microbial count before and after cologne application for all three formulations.

Table 4. Mean corneometer and TEWL results

	Cologne without humectant		Cologne with glycerin		Cologne with MPG	
	Corneometer	TEWL	Corneometer	TEWL	Corneometer	TEWL
Before application	51.5	6.9	48.2	6.0	48.5	6.4
After application	78.0	36.2	93.9	31.1	94.0	33.5
After 30 minutes	45.8	8.3	71.0	3.9	61.4	6.2
After 1 hour	48.1	5.9	66.2	4.2	58.8	5.1
After 3 hours	48.9	8.2	64.8	4.9	55.1	5.5

Before application, corneometer values for all three formulations are almost the same. Considering the values immediately after the application, the highest moisturizing effect was seen in MPG and glycerin. In the cologne sample without moisturizer, there is a decrease in the moisture values after 30 minutes, and at the end of 3 hours moisture value is lower than the initial value. On the other hand, in cologne formulations containing glycerin and MPG, moisturization effect is higher than the beginning after 3 hours. However, while glycerin and MPG give the same moisturizing value after 30 minutes, glycerin has a higher moisturizing effect after 3 hours. It seems that glycerin provides moistening by holding more water in a long time.

Considering the TEWL measurements, it is seen that the water loss of the skin in all formulations after the application is very high. The reason for this is the presence of the product after application on the skin in large amounts. TEWL values decrease in all formulations with the absorption of the product. Although there is an improvement in the TEWL value at the end of 1 hour in the cologne formulation without humectant, the TEWL value after 3 hours indicates that the barrier function of the skin is damaged and the water lost by the skin increases.

Considering the formulations containing humectants, TEWL values are lower than before the application even after 3 hours. It shows that the formulations do not adversely affect the barrier function of the skin and that the water retention properties of humectants reduce water loss in the skin.

The moisturizing properties of humectants are important parameters for the skin. However, in addition to moisturizing, it is important to choose the right humectant in order not to reduce the effectiveness of the alcohol in the cologne. For this reason, the glycerin and MPG ratio added to the formulations were determined to be 3%in order to better analyze the changes in microbial counts. Table 5. shows the average of the measurement values made in 11 people before and after the application.

Table 5. Mean microbial counts

	Cologne without humectant (RLU)	Cologne with glycerin (RLU)	Cologne with MPG (RLU)
Before application	4266	4979	5150
After application	2276	4487	1939

In the cologne formula that does not contain humectant, the RLU value decreases from 4266 to 2276 after the application. In the formula with glycerin added, the RLU value decreases from 4979 to 4487 and almost similar results were obtained before the application. In the formulation with MPG added, the initial RLU value was 5150, while the post-application value was read as 1939 RLU. This result revealed the antimicrobial properties of MPG as well as moisturizing properties.

	Cologne	Cologne with gliycerin	Cologne with MPG
■ Decreasing of mo (%)	48,1	13,80	64,09
■ Moisturizing (%)	-5,18	34,25	13,73
▬ TEWL (%)	17,78	-18,43	-14,06
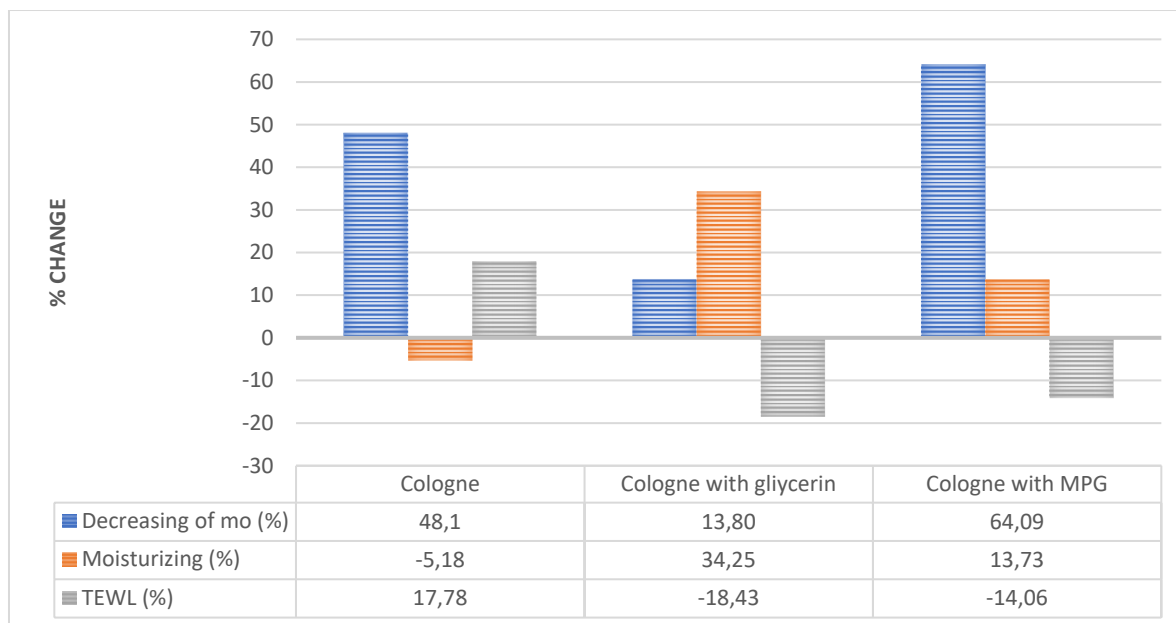
Figure 1. Percentage change of microbial count, skin moisture and TEWL

Figure 1. summarizes the decrease in microbial count and rate of change of skin moisture and TEWL. According to the results, the cologne formulation with the addition of MPG provided the highest antimicrobial efficacy, while the cologne formulation containing glycerin provided the lowest antimicrobial efficacy. Regarding the moisturizing results, the cologne formulation with glycerin provided the highest moisturizing, while the cologne formulation without the addition of humectant showed the lowest moisturizing feature. The TEWL value in the humectant-free formulation indicates a serious water loss. It appears that the rate of reduction in water loss is almost the same in formulations containing glycerin and MPG.

Conclusion

Glycerin and MPG are known to have antimicrobial activity. With this study, attempts were made to reduce the negative effects of colognes with high alcohol content on the skin. Within the scope of the studies, it is seen that the antimicrobial activity obtained by adding glycerin to cologne formulations is less than MPG and its effect on skin moisture is higher. Although the effect of MPG on skin moisture is not as much as glycerin, it contributed significantly to the antimicrobial effectiveness of cologne formulations. In this study, it is analyzed that the humectant addition must be performed by considering both the moisturizing effect and the antimicrobial efficacy.

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THE EFFECTS OF MATHEMATICS TEACHERS AND ATTITUDES TOWARDS MATHEMATICS ON SUCCESS RATES OF 6TH GRADE STUDENTS İZMİR-BAYRAKLI SAMPLE

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Abstract: Students' success rates on mathematics lesson is still an important problem nearly all grades. The aim of the study is to analyze the relationship between success rates of 6th grade students on mathematics and loving mathematics lesson, finding the mathematics teacher boring, their attitudes towards mathematics. Students' attitudes towards mathematics are determined by using "Secondary School Students' Attitudes Scale Towards Mathematics" developed by Önal (2013). Students' success rates are based on the first term grades of 2018-19 school year. Sample group consists of 234 students studying 6th grade at three different secondary schools in İzmir, Bayraklı. As a result of applied Chi-square analysis, it is seen that there is a statistical significance between students' attitudes and success rates on mathematics (X^2 = 43,847, sd = 8, p < .001). Another result shows that the relationship between loving mathematics lesson and finding the teacher boring and success rates on mathematics are statistically significant (X^2 = 25,075, sd = 14, p < .05; $X2$ = 15,527, sd = 14, p = .050). One of the most important findings of the study is that 4th and 8th grade students loving mathematics, emerged as a result of the evaluation of TIMSS 2015 exam, had high success rates on mathematics.

Keywords: 6th grade students, attitude towards mathematics, loving mathematics lesson, success rates on mathematics

Introduction

Mathematics achievement at secondary schools continues to be a problem not only in Turkey, but also many countries. In particular, mathematics exam results of the 8th grade students at national and international levels clearly reveal this situation (MEB,2009; MEB, 2012; MEB,2018).

In the internationally held TIMMS – 2007 *(Trends in International Mathematics and Science Study)* exam, it is seen that the 8th grade Turkish students are below the general average of mathematics exam *(Mullis, Martin ve Foy, 2008).* According to the TIMMS 2015 evaluation report, a decrease in average mathematics performance of secondary school students is seen nearly in all countries, but in Turkey it is stated that decline is more (TEDMEM,2015).

The Programme for International Student Assessment, abbreviated as PISA, is used for testing and comparing the success rate of 15-year-old students' every three years since 1997. Three years earlier, in PISA exam, while Turkey was 48th country on the list, it finally recorded a positive development by going up to 42nd in 2018. Yet, nearly 37% of students were able to showed a performance at first level and under the first level. Moreover, the ratio of students performing at the top, fifth and sixth levels was 2.8 times below the OECD average (10.9%) with a total of 3.8%. It is worth exploring with which changes this developments achieved (TEDMEM, 2018).

Especially 8th grade students' low mathematics achievement led to numerous studies done about the parameters affecting success rate on mathematics (Bosker, 1999., Papanastasiou, 2000., Kiamanesh, 2004., Wang, 2004., Yayan ve Berberoğlu, 2004; Adesoji ve Yara, 2008., Demir, Kılıç ve Depren, 2009).

When those research are examined it is seen that variables such as students' studying habits (Küçükahmet, 1999), their physical and pscyhological problems, social environment, incompatibility to school, curriculum at school,

teachers' communication methods with students, their field knowledge and professional experience (Anderson, Ryan, ve Shapiro, 1989., Aydın, 1993., Centra ve Potter, 1980), class size (Wright, Horn ve Sanders,1997) are effective. Besides, there can be additonal reasons such as family issues, personal differences, methods used by teachers' in class (Bloom, 1976., Elçi, 2002., Jones and Jones, 2012., Özler, 1998).

In addition to all these reasons, parameters such as students' attitudes towards mathematics lesson and whether they love the lesson and the teacher are important. Attitude is a tendency attributed to an individual, and formed their psychological thoughts, emotions, and behaviors related to an object (Kağıtçıbaşı, 1999). Attitudes lead to positive or negative behaviours. It is stated that positive or negative attitudes towards mathematics affect mathematics achievement by 14% (Bloom, 1979).

Baykul (1990), who has significant studies about programme of mathematics and its success, states that many students in our country find mathematics difficult, have anxiety of failure and negative attitude. Previous studies show that students having positive attitudes are more successful than students having negative attitudes (Reyes, 1984., Ma, 1997).

Studies showing that students' who have positive perception towards their teachers have higher academic success and relationship between success and attitude is positive and significant (Akkoyunlu, 2003., Baykul, 1990., Bloom, 1976, Jones and Jones, 2012., Ma, 1997., Elçi, 2002., Özler, 1998), reveal how important the teacher factor to mathematics achievement. It is observed that evaluation of success rate on mathematics is mostly done at 8th grade students. Mathematics teachers usually change in the first term of the 6th grade at the beginning of secondary school. Whether the relationship between students' attitudes towards teacher and mathematics lesson and the success rates on mathematics has continued while they just started to form a perception about their teachers was the motivation of conducting research with 6th grade students.

The aim of the study is to examine the relationship between success rates of 6th grade students on mathematics, whether they love mathematics and their teacher, and their attitudes towards mathematics.

Questions to be Answered in the Study

Of the 6th grade Secondary School Students in İzmir, Karabağlar,

1-What is the success point of mathematics lesson?

2-Does the mathematics achievement of students differ according to mathematics teachers?

3-Is there a difference of mathematics success between students who do like and do not like mathematics?

4-Is there a relationship between mathematics achievement and students' attitudes towards mathematics?

5-Is there a relationship between mathematics achievement and finding the teacher boring?

MATERIAL AND METHOD

Universe and Sample of the Research

The universe of the research is the 6th grade students of 2018-19 academic year in İzmir while the sample group is 234 students attending 6th grade in the academic year of 2018-19 from three different secondary schools in İzmir, Karabağlar. Since the schools do not want their name to be given, the names are coded as "L" , "R", "U" and, schools, in themselves, are coded as class/branch and students.

Research Model

In this study, relational screening model was used in order to examine the relationship between students' academic success and their attitudes towards mathematics, loving mathematics lesson and teachers.

Data Collection Tools used in Research

"Attitudes Scale Towards Mathematics", developed by Nezih Önal, consists of 22 items. The scale items are 5-point likert type, "Strongly agree", "Agree", "Neither agree nor disagree", "Disagree" and "Strongly disagree". Internal consistency coeffecient (Cronbach's alpha coeffiecent) was found as .90 for the entire scale (Önal, 2013).

In the academic achievement of 6th grade students, 1st semester grades are based on.

Data Analysis

Percentage and Chi-square test are used on data analysis. All of the statistical analysis were done in SPSS 17.0 program.

FINDINGS

1.What is the Success Point of the Students on Mathematics Lesson?

Table 1: Success rates of the 6th grade students on mathematics lesson

Mathematic Grade	Frequency	%	%Valid	% Total
0-45	**22**	9.4	**9.7**	9.7
46-54	**34**	14.5	**15.0**	24.8
55-69	60	25.6	**26.5**	51.3
70-84	47	20.1	**20.8**	72.1
85-100	63	26.9	**27.9**	100.0
Total	226	96.6	**100.0**	
No data	8	3.4		
Total	234	100.0		

Table of frequency analysis applied to see how many 6th grade students are failed/passed in mathematics lesson is given above. As it can be seen in the table, number of students having the lowest grades in the grade interval of 0-45 grade is 22 (9.7%), the number of the students in the grade interval of 46-54 is 34 (15.0%). Also, the number of the students in the grade interval of 55-69 is 60 (26,5%), the number of the students in the grade interval of 70-84 is 47 (20,8%) and the number of the students in the grade interval of 85-100 is 63 (27,6%).

2.Does the mathematics achievement of students differ according to mathematics teachers?

School, branch and students codes of 63 students with a mathematics grade in the interval of 85-100 are given on the table below. Since the schools do not want their names to be given, their names are coded as "L", "R", "U" and branches are coded as "A, B, C, D…"

Table 2: School, branch and students who have mathematics grade in the range of 85-100

School*Branch*	Number of students who have mathematics grade in the range of 85-100
LA	3
LB	3
RA	13
RB	7
RC	3
UA	4
UB	3
UC	10
UD	5
UE	2
UF	6
UG	3
Total	63

3.Is there a difference of mathematics success between students who do like and do not like mathematics?

Table 3: Difference of mathematics success between students who do like and do not like mathematics?

GRADE		The ones who do not like mathematics lesson	The ones who like mathematics at moderate level	The ones who like mathematics	Total	X^2	sd	p
0-45	N	11	5	4	20	25,075	14	.034
	%(column)	20,8	10,2	3,3	9,0			
46-54	N	17	9	8	34			
	%(column)	32,1	18,4	6,6	15,2			
55-69	N	13	23	24	60			
	%(column)	24,5	46,9	19,8	26,9			
70-84	N	8	8	31	47			
	%(column)	15,1	16,3	25,6	21,1			
85-100	N	4	4	54	62			
	%(column)	7,5	8,2	44,6	27,8			
Total	N	53	49	121	223			
	%(column)	100,0	100,0	100,0	100,0			

Students gave their answers based on 5-digit scale. Accordingly, 1 point (Strongly disagree) and 2 points (Disagree) represents the negative attitude (not loving the course). 3 points (Neither agree nor disagree) represents neither positive nor negative attitude, in other words, the moderate level. 4 points (Agree) and 5 points (Strongly Agree) represents the positive attitude (loving the course). So, points between 1 and 2.5 show the group who does not like mathematics, points between 3 and 3.5 show the group who like mathematics moderately and points between 4 and 5 show the group who likes mathematics.

The relationship between loving mathematics lessons and mathematics achievement is tested by Chi-square analysis. 11 students who did not answer the questions about whether they love mathematics or their mathematics grades are excluded, thus, analysis was made with 223 students.

Applied Chi-square test showed that there is a statistically significant relationship between success and loving mathematics lesson ($X^2 = 25,075$, sd = 14, p < .05).

4.Is there a relationship between mathematics achievement and students' attitudes towards mathematics?

Table 4: The relationship between mathematics achievement and students' attitudes towards mathematics

GRADE		Negative	Neither positive nor negative	Positive	Total	X^2	sd	p
			Attitudes Towards Mathematics					
0-45	N	5	9	3	17	43,847	8	.000
	%(column)	18,5	13,0	2,8	8,4			
46-54	N	9	12	8	29			
	%(column)	33,3	17,4	7,5	14,3			
55-69	N	8	22	23	53			
	%(column)	29,6	31,9	21,5	26,1			
70-84	N	3	17	24	44			
	%(column)	11,1	24,6	22,4	21,7			
85-100	N	2	9	49	60			
	%(column)	7,4	13,0	45,8	29,6			
Total	N	27	69	107	203			
	%(column)	100,0	100,0	100,0	100,0			

The relationship between mathematics achievement and students' attitudes towards mathematics is tested by Chi-square analysis. 31 students who did not answer the questions about attitude scale or their mathematics grades are excluded, thus, analysis was made with 203 students.

Applied Chi-square test showed that there is a statistically significant relationship between success and attitudes towards mathematics ($X^2 = 43,847$, sd = 8, p < .001).

Table 4 shows that students with negative attitudes have low mathematics grades while those with positive attitudes have high mathematics grades.

5.Is there a relationship between mathematics achievement and finding the teacher boring?

Table 5: The relationship between mathematics achievement and finding the teacher boring

GRADE		Not boring	Neither boring nor interesting	Boring	Total	X^2	sd	p
			Mathematics Teacher					
0-45	N	14	1	4	19	15,527	8	.050
	%(column)	7,8	3,4	28,6	8,5			
46-54	N	24	6	4	34			
	%(column)	13,3	20,7	28,6	15,2			
55-69	N	48	9	3	60			
	%(column)	26,7	31,0	21,4	26,9			
70-84	N	42	3	2	47			
	%(column)	23,3	10,3	14,3	21,1			
85-100	N	52	10	1	63			
	%(column)	28,9	34,5	7,1	28,3			
Total	N	180	29	14	223			
	%(column)	100,0	100,0	100,0	100,0			

14 of total 231 students (6.1%) find their mathematics teacher boring. 186 of the students (%80.5) do not find their mathematics teacher boring.

The relationship between mathematics achievement and finding the teacher boring is tested by Chi-square analysis. 11 students who did not answer the questions about finding the teacher boring or their mathematics grades are excluded, thus, analysis was made with 203 students.

Applied Chi-square test showed that there is a statistically significant relationship between success and finding the mathematics teacher boring (X^2 = 15,527, sd = 14, p = .050).

When the distributions presented in Table 5 are examined, it is seen that most of the 14 students who find their mathematics teacher boring have low mathematics grades (N=4, 28.6%, grade=0-45; N=4, 28.6%, grade=46-54) or moderate (N=3, 21.4 %, grade=55-69), however, less of the students have high mathematics grades (N=2, 14.3%, grade=70-84; N=1, 7.1 %, grade=85-100). Also, it is seen that most of the 180 students who do not find their mathematics teacher boring have high grades (N=42, 23.3%, grade=70-84; N=52, 28.9%, grade=85-100). Thus, as a general tendency, it is concluded that those who find their mathematics teachers boring have low mathematics grades while those who do not find their mathematics teachers boring have high grades.

COMMENTS AND DISCUSSIONS

Based on the studies in the literature, hypothesis that there is a relationship between 6th grade students' mathematics achievement and their attitudes towards mathematics class and the teachers has been verified as a result of the research.

Considering the mathematics grades of 6th grade students studying at secondary school in 2018-19 school year, it is seen that only 9.7% of students are failed, 47.3% of them are moderate and good, 27.9% of them are very good. These results reveal that students' mathematics achievement are significantly moderate and good, and the number of very successful students are higher than those who are unsuccessful.

Since the schools do not want their names to be given, those three schools' names are coded as "L", "R", "U" and branches are coded as "A, B, C, D…" Considering the codes of 63 students with a mathematics grades between 85-100 showing the school, branch and student (Table. 2), it is seen that the group with the highest success grades between 85-100 is the "A" branch of "R" school. Success rates of students differ in the classes of different teachers who have different branches of the other two schools. Assuming that all the students at the same schools have the same average socio-economic levels and there are not any private students classes, this result suggests that teachers are effective on students' achievements.

In another research called "Examination Of Students' Attitudes Towards The Use Of Smart Board In Maths Classes Regarding Various Factors" it is stated that mathematics teachers have an important role on students' attitudes towards mathematics (Alkan, Güzel ve Elçi 2004). Also, the evaluation of TIMSS 2015 exam results point out that teachers are very effective in changing negative biases of students towards mathematics lessons and mathematics achievement (TEDMEM, 2015). These resultls match with our verified hypothesis.

Another results obtained from the study is that there is a statistically significant relationship between loving the mathematics lesson and mathematics achievement, those who find their teachers boring have lower grades than those who do not. The Report of TIMMS 2015 Results on Turkey Perspective reveal that students who love the mathematics lesson have higher averages, and when they pass to 8th grade they love mathematics less (TEDMEM,2015). That result interestingly matches to the result of our study.

In a descriptive study determining the students' attitudes towards mathematics teachers, it is revealed that factors such as students' level of understanding the lesson and difficulty, interest in mathematics, having fun in class, teaching methods of the teacher play an important role in attitudes towards mathematics lesson and teacher (Sullivan, 2008). In the analysis of TIMMS 2015 exam results it is stated that some parameters about teachers are effective in students' mathematics achievements (TEDMEM, 2015).

Another question looking for an answer in the study is that the relationship between students' mathematics achievement and their attitudes towards mathematics. In statistical analysis of data, a statistically significant relationship was found between students' mathematics achievement and their attitudes towards mathematics (X^2 = 43,847, sd = 8, p < .001). This result supports the results of other studies conducting with 7th and 8th grade students (Akkoyunlu, 2003., Baykul, 1990., Bloom, 1976., Jones and Jones, 2012) .

A statistically significant relationship between students' mathematics achievements and their attitudes towards mathematics lesson and teacher does not give any cause and effect relationship. In other words, it is difficult to make a judgment such as "Students are successful because they love mathematics lesson" or "Students love mathematics because they are successful". However, considering that asking for something is related to knowing and it is not possible to asking for unknown,it can only be wondered, it can be said that it is important mathematics subjects to be understood and known.

Additonally, giving the pleasure of success to students will increase the interest in the lesson and their teacher. Motivations of teachers, using appropriate teaching methods for the subjects, providing functional feedback to students during teaching process, giving appropriate homeworks which has educational value, interacting with their students and taking care of them, creating an environment full of trust and love, providing a support for

subjects they cannot understand will increase the success rates on mathematics. Summarizingly, teacher is said to play an important role in mathematics achievements.

Results of the study show that there is a statistically significant relationship between mathematics achievement of 6th grades students and their attitudes towards mathematics lesson and whether they love their mathematics teachers. Evaluation of TIMMS 2015 exam results draws attention that the rate of students who really love mathematics is higher in 4th grade than 8th grade. It is seen that students love mathematics less when they pass to 8th grade and students' self-confidence rate is lower in 4th grade than 8th grade (TEDMEM,2015). Therefore, it can be considered as not only a problem in Turkey but also a problem in every country attending TIMMS 2015 exam.

There are some studies showing that there is a relationship between mathematics achievements and types of school, level of family income, attitudes towards mathematics and doing a mathematics course. It is quiet difficult to control some factors such as level of family income and facilities of doing courses. Remedial measures relevant to teachers' field knowledge and pedagogical formation can be taken (Savaş, Taş, Duru,2010).

Teachers have important responsibilities for developing positive attitudes towards mathematics class. Studies revealing positive changes in students' attitudes as their positive experiences and success increase (Ruffell, Mason ve Barbara, 1998), show that we are not desperate about increasing students' success rates on mathematics.

SUGGESTIONS

Research findings regarding that students who love mathematics lesson and their teachers are more successful than those who do not, may contribute to solve the problem of failure in mathematics lesson. Teachers' field knowledge and their motivations, using appropriate teaching methods for the subjects, interest in mathematics, providing an entertaining learning process, giving appropriate homeworks which have educational value, interacting with their students and taking care of them, creating an environment full of trust and love in order to make students' ask for a support for subjects they cannot understand will increase the interest towards mathematics and teacher, therefore their success. Experimental studies with control groups can be done in order to see the results. Also, in-house training programmes can be organized for mathematics teachers about the topics mentioned above.

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THE INVESTIGATION OF THE ANTIBACTERIAL ACTIVITY OF DIFFERENT NATURAL AND ORGANIC AGENTS

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Abstract: The increasing need of natural antimicrobial agents has started a new field of investigation due to the global diseases. Synthetic antimicrobial agents are found to be causing skin problems and other toxic effects in long term. Therefore, antimicrobial activity of three natural extracts tea tree oil, tree moss extract, oakmoss extract and organic o-phenylphenol were evaluated in the study. These agents were added to a bar soap formulation and tested for antimicrobial activity EN 1276 standard method. The agents were added to five bar soap formulation as i) bar soap base; ii) bar soap base and tea tree oil; iii) bar soap base, tea tree oil, tree moss extract and oakmoss extract; iv) bar soap base, and o-phenylphenol; v) bar soap base, tea tree oil, tree moss extract, oakmoss extract and o-phenylphenol were prepared. As a result, in formulation (i) bar soap could not only pass the antibacterial test. The maximum antimicrobial activity was seen in formulation (v).

Keywords: bar soap, antimicrobial, antibacterial, tea tree oil, oakmoss, treemoss, o-phenylphenol

Introduction

The diseases evoking all over the world has become a global issue for humankind. The chemicals used as antimicrobial agents have entered our lives substantially. However, their effects on our skin and body have crucial risks in long term. The irritation on skin and toxicity are some of these health effects. Therefore, biocidal formulations which have low side effects has gained importance and natural ingredients are focus of interest for these formulations.

Tea Tree Oil (TTO, Tea tree oil) is an essential oil obtained by steam distillation from the leaves of *Melaleuca alternifolia (Myrtaceae)* that grows naturally in Australia. Studies have shown that tea tree oil has a broad-spectrum antimicrobial activity with its high terpinen-4-ol content (Carson et. al, 2005). In Turkey, as in Europe and North America it has also begun to be used in various cosmetic preparations and care products. In recent years, tea tree oil has been described as a safe antiseptic, more preferred due to its natural origin. TTO is regarded as an ideal disinfectant for topical use due to its antimicrobial effect against a wide range of microorganisms even at very low concentrations, easy penetration into the skin and no irritation (Çakır et. al, 2005).

TTO is currently not subject to any restrictions for use in cosmetic products. The oil is used in cosmetic ingredients, such as skin and body care products, toothpaste, mouth wash and bath oils, as well as in aromatherapy products. "Scientific Committee on Consumer Products, 2008" evaluated the use of TTO as an active ingredient used in cosmetic products. Accordingly, 0.2% in toothpaste and mouth wash products, 1.25% in skin care-moisturizers, 1.25% in body lotions, 2% in hair care - shampoo and conditioner products, 20% in nail care products, 0.7% in face washing products, 0.7% in hand washing, 2% in soap, 2% in foot spray, 1% in foot powder, 2% in shaving products, and 1.25% in post-waxing procedures may be used (Scientific Committee on Consumer Products SCCP, 2008).

Lichens are fungi living symbiotically with algae. They produce some secondary metabolites providing antibiotic, antiviral and anti-inflammatory effects (Aoussar et. al, 2017). Certain lichens are significant sources of natural extracts which are used in fragrances. The most well-known lichens are *Evernia prunastri* (oakmoss) (CAS 90028-68-5 or 68917-10-2, EINECS 289-861-3) and *Evernia furfuracea* extract (CAS 68648-41-9, EINECS 289-860-8) (Uter et. al, 2012).

o-Phenylphenol are antibacterial agents that are commonly used as bacteriostats, fungicides and disinfectants. It is an aromatic compound and organic chemical that is a white, crystalline (sand-like) solid (Centers for Disease Control and Prevention, 2020). o-Phenylphenol has biocidal properties, making it useful for a variety of preservation applications (Roberts, 2009).

In this study, ingredients TTO, o-phenylphenol and fragrance containing treemoss and oakmoss which have antibacterial activity were added to bar soap formulation with high pH and the antibacterial efficacy performance were evaluated by EN 1276 standard test method.

Materials and Methods

The soap base content is given in Table 1. TTO 1%, fragrance 0.75%, o-phenylphenol 0.15% were added to the bar soap base formulation as suitably for efficacy and compliance with regulations. Table 2 shows four different soap formulations.

According to European Cosmetic Regulation Annex V/7, o-phenylphenol is limited and its use must be under 0.2%.

Table 1. Bar soap base content values

SOAP BASE (SB)	
Total Fatty Acid Matter, % Min	78,0 min.
Free Fatty Acid (as Oleic), %	1 max.
Free Alkali (as NaOH), %	absent
Chlorides (as NaCl),%	0,5 - 1
Iodine Value, Gm of I$_2$/100 g	36 min.
Volatile Matter (105°C), %	14 max.

Table 2. Bar soap formulations

F1	Bar soap base
F2	Bar soap base + TTO (1%)
F3	Bar soap base + TTO (1%) + fragrance (0.75%) (including oakmoss and treemoss)
F4	Bar soap base + o-phenylphenol (0.15%)
F5	Bar soap base + fragrance (0.75%) + o-phenylphenol (0.15%)

Results

The bar soap removes the dirts and some microorganisms from the skin due to the micelles which are formed by the contact of bar soap and water. However, the performance of bar soap is not enough to remove all bacteria and it cannot kill them. Therefore, some antibacterial agents are added to bar soap formulations as other biocidal products to increase the efficacy. Synthetic antimicrobial agents cause skin irritations and other health problems in long term. Therefore, in this study; natural and organic alternatives were added to bar soap that is a natural cleaning product in order to obtain an antibacterial soap.

The results of antibacterial activity were given in Table 3. In EN 1276 test, the logarithmic reductions of four bacteria strains are evaluated: *Staphylococcus aureus ATCC 6538, Pseudomonas aeruginosa ATCC 15442, Enterococcus hirae ATCC 10541, Escherichia coli ATCC 10536.* Minimum 5 log reduction is needed for a positive test result for all bacteria strains. The contact duration of the antibacterial formulation and the skin contact is standardized as 1 minute.

Table 3. Antibacterial activity results of bar soap formulations (EN 1276)

Bacteria	Contact duration (min)	Activity range	F1	F2	F3	F4	F5
			Logarithmic reduction (cfu/ml)				
Staphylococcus aureus ATCC 6538	1	>5	3.8	5.4	7.8	6.2	8.5
Pseudomonas aeruginosa ATCC 15442	1	>5	3.7	5.3	7.8	6.3	8.5
Enterococcus hirae ATCC 10541	1	>5	2.8	5.3	7.6	6.1	8.6
Escherichia coli ATCC 10536	1	>5	3.6	5.3	7.7	6.2	8.6
Efficacy result			**(-)**	**(+)**	**(+)**	**(+)**	**(+)**

The formulation 1 composes bar soap base and the logarithmic reduction values are under limit 5 log after 1 minute contact duration. Therefore, the bar soap does not have the necessary efficacy to kill the bacteria which place on the standard test method EN 1276. In formulation 2, TTO was added to bar soap base and the logarithmic reduction values exceeded the 5 log limit a little bit and positive result was obtained. In formulation 3, the fragrance was selected due to its content of oakmoss and treemoss. When fragrance was added to bar soap base and TTO, an increase of more than 2 log was observed. In formulation 4, the organic ingredient o-phenylphenol was added to bar soap. Normally, it has both anti-fungal and bacteriostatic activity. The maximum log reduction values were seen as 6.1 – 6.3 with formulation 4. When fragrance added to bar soap base and o-phenylphenol, an increase of more than 2 log reduction was also observed in case of formulation 5. The fragrance addition has a crucial effect on formulations 3 and 5 as 2 log that provides 100 times better antibacterial activity.

Conclusion

The different natural and organic antibacterial agents were added to bar soap formulation for antibacterial efficacy. Both TTO and o-phenylphenol provided antibacterial properties to bar soap for selected concentrations. The results may have changed with various concentrations of fragrance, TTO and o-phenylphenol.

Additionally, the fragrance which included treemoss and oakmoss increased the efficacy in significant ratios when added to TTO and o-phenylphenol. The fragrance may also have synergistic effect with TTO and o-phenylphenol on the bacteria. The main components of essential oils are mono- and sesquiterpenes, along with carbohydrates, phenols, alcohols, ethers, aldehydes and ketones, which are responsible for the biological activity and fragrances of aromatic and medicinal plants (Rotar, 2017). Both tea tree oil and oakmoss, treemoss extracts may show these activities due to rich contents. Interactions between such compounds may lead to antagonistic or synergistic effects. Therefore, a safe result may be obtained for EN 1276 test, especially if products containing natural antibacterial active are supported with components such as fragranced used in the study.

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THE STRUCTURE OF VIRUSES AND VIRUS TYPES THAT AFFECT HUMANS

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Abstract: From the Latin, the word virus means poison and "infectious disease agent", before Dmvitri Ivanovsky discovered viruses in 1892, was first recorded in 1728. The debate on whether viruses are alive or not is still running and since viruses are found wherever life exists, it is thought that viruses have been present ever since living cells first developed. Viruses can exist as virions and independent viral particles in the infected cell or in the process of infection. Virion, a single virus particle that contains all the structures of a virus, consists of two or three parts; a viral genome, which may be either DNA or RNA and large molecules carrying genetic material, a protein layer called capsid that surrounds and protects genetic material and a lipid envelope surrounding the protein layer. In this study, the sections that compose the structures of viruses were generally examined and types of viruses that derive from different sources, have different genetic structure and affect people were discussed.

Keywords: Disease, pandemic, epidemic, DNA virus, RNA virus, virion

Introduction

Almost every ecosystem in the world contains viruses. Viruses exist in a form called virion (represents a whole virus particle with a nucleic acid (RNA or DNA) inside its core structure that has a protein shell). It is roughly one hundredth the size of a bacteria and consists of two or three parts.

The parts that make up a virus are briefly explained below.

*__Genetic material (DNA or RNA);__ This is the nucleic acid (RNA or DNA), the most important part of the virus. Nucleic acid, acting as a preservative, cooperates with one or more viral polypeptides that are in the form of a protective sheath (shell) to form a helical nucleoprotein complex or that are in close communication with the nucleic acid (NA). Nucleic acid/protein or protein/protein interactions play an important role in the morphology (origin and development of structural characteristics) of viruses. These interactions determine whether the nucleoprotein complex structure, an arrangement of nucleosomes or an icosahedral shell.

*__Protein protecting genetic material, capsid;__ This is the outermost protein sheath surrounding the nucleic acid or nucleoprotein complex. Capsids generally have a cubic symmetry (mostly icosahedral) however, there are also ones with cylindric form. Morphological units, in other words building blocks, that form the capsid, are called **capsomeres**. These capsomers are arranged in different ways in different viruses, and these sequences form the symmetrical structures of viruses. The shape of the virus depends on this structure. **Nucleocapsid (NC);** this is a nucleic acid containing a protective protein shell complex, which can be of icosahedral, helical or complex symmetry.

*In some viruses, there are enveloped **lipids,** on the protein on the outer surface of the virus. They usually occur by budding from the host cell membrane. Some viruses bud through special parts of the plasma membrane of the host cell, e.g. The Ebola virus is associated with sphingomyelin, cholesterol and glycoprotein-rich lipid stack. The Pox virus is a rare virus budding with a mechanism different from the mechanism used by other viruses (Crosta, 2020).

*__Envelope__ or **virus membrane** are lipid bilayer with glycoprotein projections (spikes, knobs, etc.) called **peplomer.** The membrane (envelope) of some viruses such as *Coronaviridae* also contain an extra protein (Nermut, 1987). Enveloped viruses are able to bud outside without having to kill the host cell, which is why they can cause

permanent infection. If the enveloped virus is not corrupted it can easily be transmitted (due to the viral envelope of the host cell receptor recognizing the protein fragment) (Hunt, 2003).
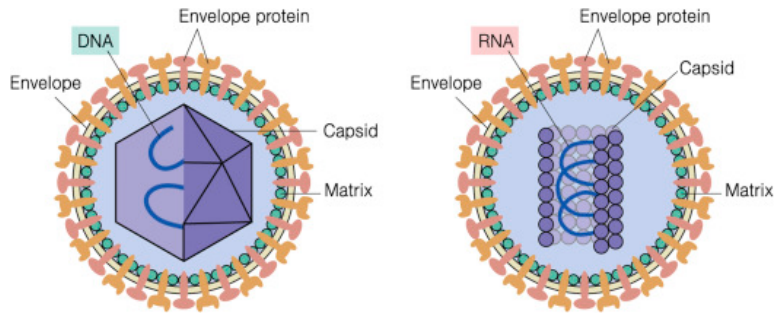

Figure 1. The parts of a virion, which is a whole virus particle (Ryu, 2017).

If viruses are similar to pavoviruses as diameter, it can vary from 20 nanometers to hundreds of nanometers (in case of filovirus) (Hunt, 2003).
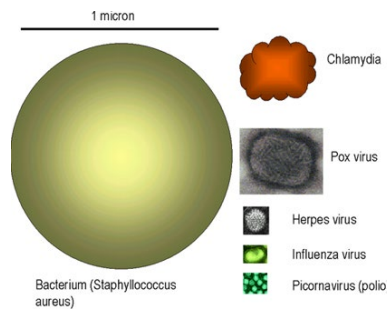
Figure 2. *Staphylococcus aureus* bacteria and relative sizes of some viruses (Hunt, 2003).
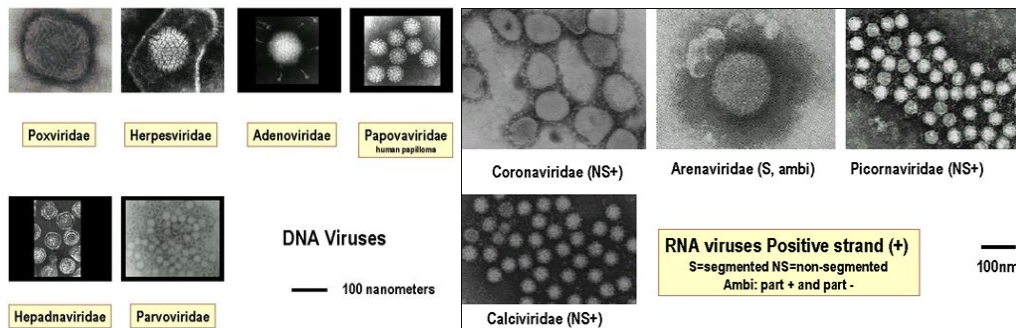
Figure 3. Relative sizes of some DNA viruses (left), relative sizes of some RNA viruses (right) (Hunt, 2003).

Viruses do not possess ribosome. Thus, they do not produce protein. This makes them completely dependent on the host cell. In other words, they are the only microorganisms that cannot reproduce without the host cell. After they get into contact with the host cell, the virus sends its genetic material into this host cell, through which it seizes the functions of the cell and takes over its management. After capturing the cell, the virus starts copying itself and starts producing more viral protein genetic material (Crosta, 2020).

Classification of Viruses according to the Symmetric Structure created by Capsids

Viruses can be of different sizes and shapes. They can be classified according to nucleic acid type, size and morphology, additional structures such as envelopes and tail and type of cell it infects (animal, plant, human) According to the symmetrical structure of their capsids, viruses are categorized as follows.

- Icosahedral symmetry viruses
- Helical symmetry viruses
- Complex symmetry viruses

Icosahedral symmetry viruses

They are also called viruses with cubic symmetry. The icosahedral symmetry structure has 12 corners and 30 edges, which is formed by the combination of capsomers arranged in 20 equilateral triangles. An icosahedron has two, three and five rotational symmetrical axes passing through the edges, surfaces and corners of the icosahedron, respectively (Burrell et al., 2017).

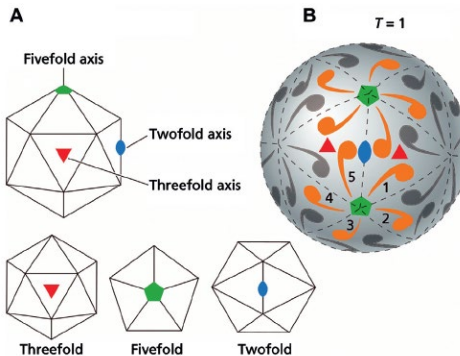**Figure 4.** Schematic view of the icosahedral symmetry structure (Burrell et al., 2017).

Helical symmetry viruses

The nucleocapsid of most RNA viruses is in a cylindrical structure, in which the protein structures are arranged in a helix, hence they are called viruses with helical symmetries. The plurality of identical protein-protein interfaces on structural units supports the symmetrical structure of the helix. In a helical symmetrical nucleocapsid, the RNA genome forms a helix together with the nucleocapsid. Most of plant viruses with helical nucleocapsid are rod-shaped and do not have an envelope. The helical structure of tobacco mosaic virus is among the first viral structure determined by electron microscopy. Later, its detailed structure was revealed by X-ray crystallography. In addition, in all vertebrate viruses with helical symmetry, the nucleocapsid is wrapped in a secondary coil and wrapped with a lipoprotein envelope. Examples for this are rhabdoviridae and paramyxoviruses (Burrell et al., 2017).
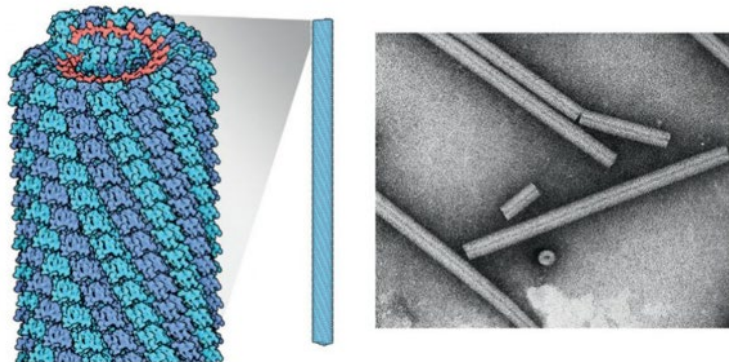
Figure 5. Tobacco mosaic virus model with helical symmetry (left), electron microscope image of tobacco mosaic virus particle (right) (Burrell et al., 2017).

Complex symmetry viruses

Some viruses do not have a specific symmetry structure. These have more complex and different capsid structures. Tubular elements are found on the surfaces of such viruses. For example, in poxviruses the viral genome with DNA character is located in the middle and shows a biconcave localization. In addition, lateral bodies are found in the central parts (orthopoxviruses). Parapoxviruses have diagonal structures on their surface. A lipid-rich envelope surrounds the poxviruses (Arda, 2020).

Some diseases caused by viruses in humans are smallpox, the common cold and the flu, measles, rubella, mumps, zoster, hepatitis, herpes, polio (infantile paralysis), rabies, ebola and hemorrhagic fever, AIDS and SARS.

Some Types of Viruses Deriving from Various Sources and Affecting Humans
Some types of viruses deriving from various sources and affecting humans are explained below.

Influenza (Flu) Virus
Influenza viruses are characterized by segmented negative chain RNA genomes that require an RNA polymerase bound to viral origin RNA for replication. There are 4 types of influenza viruses; A, B, C and D. Human influenza viruses (A and B) cause seasonal diseases every year. The influenza A viruses is the only known flu virus to cause global outbreaks of flu disease. When a new and different influenza A virus emerges, it will not only be able to infect people but also spread among people causing a pandemic. Influenza C viruses generally cause mild diseases and it is thought that they do not cause flu epidemics. Influenza D viruses mostly affect cattle and it is not known to infect or cause disease in humans (Centers for Disease Control and Prevention, 2020a).
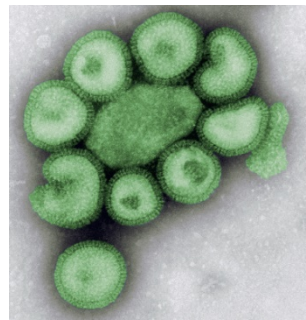
Figure 6. Microscopic image of influenza A virus (Burrell et al., 2017).

Variola virus (Smallpox virus)
The origin of smallpox, one of humanity's biggest threats, is not known, which creates a concern for the scientific community. Smallpox is caused by the variola virus (VARV) of the genus orthopoxvirus. In the last century it had been declared that humanity had overcome smallpox and that this disease is in fact beatable. However, the structure of the mechanisms responsible for the emergence of dangerous pathogens has not been fully resolved. Evolutionary analysis of molecular genomic data of various orthopoxviruses containing a wide range of epidemiological and historical information about smallpox, had made it possible to date the emergence of VARV. Comparison of the VARV genome with genomes of the most closely related orthopoxviruses showed that VARV emerged 3000 to 4000 years ago in the East of the African continent. Camels' entry into Africa and simultaneous changes in climate are possible main factors for triggering different evolutions of an ancestor virus and thus the emergence of VARV (Babkina and Babkin, 2015).
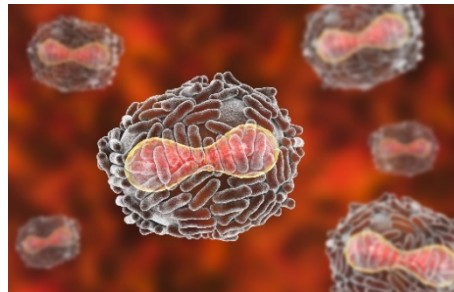
Figure 7. Variola (smallpox) virus (Bryner, 2020).

HIV (Human Immunodeficiency Virus)
The first AIDS (Acquired Immune Deficiency Syndrome) cases were reported in the spring of 1981 in the United States of America. The virus was first isolated in 1983 and in 1984 it was found to be linked to AIDS. The second HIV virus emerged in West Africa. Therefore, the viruses were named HIV-1 and HIV-2, respectively. The HIV-1

and HIV-2 viruses belong to the *Retroviridae* family and the *Orthoretrovirinae* subfamily. *Retroviridae* are enveloped RNA viruses. They copy their genomes from RNA to DNA with enzyme reverse transcriptase, which is then integrated into the host cell genome with an integrase enzyme. Thus, they become part of the cellular DNA and they start replicating themselves. HIV-1 and HIV-2 are two known human retroviruses belonging to the Lentivirus genome (IARC Working Group on the Evaluation of Carcinogenic Risk to Humans, 2012).

HIV is a virus that spreads through certain body fluids and attacks the body's immune system, especially the CD4 cells called T cells. HIV destroys most of these cells, which makes the body incapable to fight against infections and diseases. These special T cells help the immune system fight against infections. If not treated, HIV will reduce the number of CD4 (T cells) in the body. This damage to the immune system makes it difficult for the body to fight against infections and some other diseases. Infections or cancers take advantage of this situation and benefit from the weak immune system, leading to the person getting AIDS (Acquired Immune Deficiency Syndrome). Unlike some other viruses, humans cannot fully recover from HIV, even when treated. In other words, HIV will last a lifetime once infected (Centers for Disease Control and Prevention, 2020b).

Hepatitis Viruses

Viral hepatitis has emerged as a major public health problem throughout the world affecting several hundreds of millions of people. Viral hepatitis is a cause of considerable morbidity and mortality in the human population, both from acute infection and chronic sequelae which include, in the case of hepatitis B, C and D, chronic active hepatitis and cirrhosis. Hepatocellular carcinoma which is one of the ten most common cancers worldwide, is closely associated with hepatitis B, and at least in some regions of the world with hepatitis C virus.

Hepatitis A (HAV); The Hepatitis A virus (HAV), classified as Hepatovirus, is a small, unenveloped, symmetrical RNA virus with many features of the picornavirus family, caused by an orally transmitted infection or epidemic. Humans generally get infected by Hepatitis A virus from eating or drinking something contaminated with the virus.

Hepatitis B (HBV); Hepatitis B virus, a member of the Hepadnavirus family, is a double chain DNA virus that reproduces by reverse transcription. Hepatitis B virus is endemic in the human population and hyperendemic in many parts of the world. It is known that this virus has several variants. Natural hepadnavirus infections are also seen in other mammals, wood beetles, beech squirrels and also ducks. It spreads through body fluids of an infected person.

Hepatitis C (HCV); Although it is not transmitted by arthropod vectors, it is a coiled single chain RNA virus that is remotely related to flaviviruses. The infection of this virus is very common in many countries. Hepatitis C virus is related to chronic liver disease and primary liver cancer in some countries. The Hepatitis C virus does only spread through contact with blood.

Hepatitis D (HDV); This is a rarely seen, single-stranded round RNA virus. This virus needs the auxiliary functions of the hepadnavirus to reproduce in hepatocytes and is an important cause of acute and severe chronic liver damage in many parts of the world (Zuckerman, 1993).

Swine Flu Virus

H1N1 influenza virus is an orthomyxovirus and a enveloped virion with a diameter of 80 to 120 with a 13.5 kb RNA genome.

H1N1 swine flu is a subtype of influenza A virus (an infectious viral disease) and causes upper and lower respiratory tract infections in the infected host with symptoms such as runny nose, chills, fever and decreased appetite. H1N1 swine flu is a common infection in pigs worldwide, which is why it is known as swine flu. H1N1 swine flu causes respiratory diseases that can potentially infect the pig's respiratory tract. Sometimes people who closely work with pigs or are near them can get infected with swine flu and swine flu viruses can potentially cause infections in humans.

In 1918 the deadly flu epidemic caused by H1N1 influenza virus, also known as Spanish flu, infected 500 million people worldwide and caused the death of approximately 50 to 100 million people (3% 5% of the world's population). It has gone down in history as one of the deadliest disease outbreaks in human history worldwide. In 2009 a new type of H1N1 swine flu rapidly spread amongst humans and the World Health Organization (WHO) classified this as an epidemic (Jilani et al., 2018).

In the spring of 2009 scientists reported that there is a flu virus called H1N1. This virus is actually a combination of viruses coming from pigs, birds and humans. During the flu season of 2009-2010, H1N1 caused respiratory infection, commonly referred to as swine flu, in humans. Since most of the people got sick that year, the World Health Organization declared the flu caused by H1N1 as a global epidemic (Mayo Clinic, 2020).

As of August 2010, 73 cases of symptomatic human SIV infections have been documented in the medical literature (except 2009 pandemic H1N1 influenza virus case) and 10% of these cases resulted in death. While contact with pigs is generally considered a risk factor for human SIV infections, it was reported that 37 (51%) of the 73 cases did not have any known contact to pigs. As a result, it is thought that SIV is likely to be transmitted to people through transmission routes that are not yet known (Krueger and Gray, 2013).

In 2010 scientists started to change the names of the viruses. H1N1 virus is now known as H1N1v. The letter V represents the variant of the virus and shows that it normally occurs in animals but has also been detected in humans. Since 2011, H3N2v has been circulating in humans, causing flu (Mayo Clinic, 2020).

Avian Influenza Virus
Avian influenza refers to the infection of birds with avian influenza type A viruses. These viruses are naturally found worldwide amongst wild aquatic birds and can affect domestic poultry and other bird and animal species. Wild aquatic birds can be infected with avian influenza A viruses in their intestines and respiratory tract, but usually do not get sick. However, avian influenza A viruses are very contagious among birds and some of these viruses can sicken and even kill certain domesticated bird species including chickens, ducks, and turkeys. Avian influenza viruses can be found in the saliva, nasal secretions and feces of infected birds. Some susceptible birds get infected when they get in contact with other infected birds. They can also get infected by getting into contact with virus-contaminated surfaces. Avian influenza A viruses are classified in two categories: low pathogenic avian influenza (LPAI) A viruses and highly pathogenic avian influenza (HPAI) A viruses. These categories refer to the molecular properties of the virus and the virus's ability to cause disease and death in chickens in a laboratory setting. The infection of poultry with LPAI viruses causes almost no disease or only mild diseases (such as a decrease in egg production). The infection of birds with HPAI viruses can cause serious diseases with high mortality rates. Both HPAI and LPAI viruses can rapidly spread amongst poultry. However, it can also be transmitted to ducks without any signs of disease (Centers for Disease Control and Prevention, 2020c).

Even though avian influenza A viruses generally do not affect humans, there are some rare cases of infection. Infected birds spread the disease through saliva, mucosa and feces. Avian influenza viruses can infect people when it gets into the person's eyes, nose or mouth or when it is inhaled. This can happen when the virus is in the air (droplets or possibly dust) and when a person inhales it or touches their mouth, eyes, or nose after getting into contact with a virus-infected surface. The incidence of avian influenza A viruses spreading from one patient to another has rarely been reported. However, due to the avian influenza viruses gaining the ability to easily spread among people, monitoring human infection and person-to-person transmission has become extremely important for public health (Centers for Disease Control and Prevention, 2020c).

MERS-CoV
Middle East Respiratory Syndrome Coronavirus (MERS-CoV) derived from a 60-year-old Saudi patient who applied to a private hospital in the western part of the Kingdom of Saudi Arabia in 2012. Later, MERS-CoV caused many cases, multiple domestic contamination and major outbreaks in healthcare settings. Of all the cases reported within the Kingdom of Saudi Arabia, 38% of the cases were primary, 45% were healthcare-associated infection, and 14% were household infections. The clinical spectrum of MERS-CoV infection consists of asymptomatic infections, mild or moderate symptomatic cases, serious diseases requiring intensive care and fatal cases (Al-Tawfiq and Memish, 2016).

MERS-CoV was transmitted from desert camels to humans and from there from human to human. Current epidemiological evidence shows that direct contact with live camels or people with symptomatic MERS plays a huge role in the transmission of the virus (Killerby et al., 2020).

MERS-CoV is a coronavirus originally called HCoV-EMC. The virus was later renamed to MERS-CoV with global unanimous vote. Coronaviruses are common viruses amongst humans causing mild or moderate upper respiratory tract diseases. Human coronaviruses are enveloped RNA viruses and were first defined in the mid-1960s. There are

four virus clusters in the *Coronavirinae* subfamily. These are: alpha coronavirus, beta coronavirus and gamma coronavirus. The fourth cluster, delta coronavirus, is a temporarily assigned new group. All known human coronaviruses belong to the alpha coronavirus (HCoV-229E and HCoV-NL63) and beta coronavirus (HCoV-OC43, HCoV-HKU1 and SARS-CoV) type (Killerby et al., 2020).

SARS-CoV-2

This virus emerged in December 2019 in the province Wuhan of China. This virus (2019-nCoV), officially called "Severe Acute Respiratory Syndrome" (SARS) causes Covid - 19 disease with the associated Coronavirus 2 (SARS-CoV-2). Amongst people it is known as Coronavirus. The name Coronavirus comes from the Latin word meaning crown or halo and is related to the characteristic view of virions (infective form of the virus) under the electron microscope (Pal et al., 2020).

Coronaviruses are enveloped, 120- to 160- nm particles that contain an unsegmented genome of single-stranded positive-sense RNA (27–32 kb), the largest genome among RNA viruses. They are the biggest amongst RNA viruses. RNAs are infectious. The spiral nucleocapsid (the nucleus of the virus, consisting of nucleic acid surrounded by a protein envelope) is 9-11 inches in diameter. The envelope has widely spaced 20 nm long petal-shaped protrusions on the outer surface. he viral structural proteins include a 50–60 kDa phosphorylated **nucleocapsid (N) protein**, a 20–35 kDa **membrane (M) glycoprotein** that serves as a matrix protein embedded in the envelope lipid bilayer and interacting with the nucleocapsid, and the spike (S; 180–220 kDa) glycoprotein that makes up the petal-shaped peplomers. Spike glycoprotein is the virus's receptor. It is the part that binds to any cell and is referred to as angiotensin-converting enzyme 2 (ACE2) in the literature. It is also known as the receptor of the SARS-nCoV virus (Riedel et al., 2016).
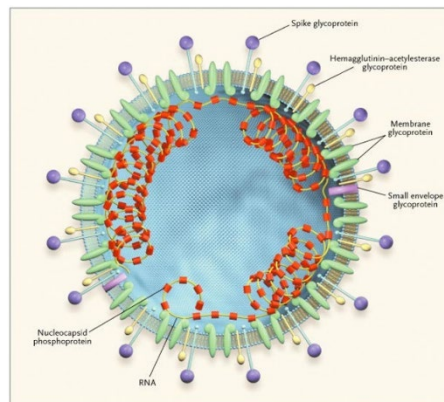
Figure 8. Structure of SARS-CoV-2 virus (İstanbul Üniversitesi, 2020)

More simply, it is a membrane-surrounded particle containing pointed proteins, in addition to the genetic material (RNA). Its structure resembles a crown, hence the name. There are different types of coronavirus according to the affected region (respiratory or digestive system). They can cause mild symptoms, such as the common cold. However, some types of coronaviruses can cause diseases that cause severe symptoms such as SARS-CoV emerging in China in 2003 or MERS-CoV emerging in the Middle East (Saudi Arabia) in 2012. The coronavirus that caused lung inflammation in China in 2019 was named (SARS-CoV-2). It is known that many coronaviruses are present in many animal species. In some cases, these viruses can spread from animals to humans (İnal, 2016).

The Journey of the Coronavirus in the Body

The main reason for the spreading of the coronavirus is coughing or contact with body fluids that occurs when the person touches his or her face after touching a contaminated surface. The journey of the virus begins here and continues deep into the body (Prompetchara et al., 2020).

The target is the lungs, the spleen and the intestines, where it creates the most severe effect. The lungs are surrounded by billions of epithelial cells. These cells are boundary cells that align organs and mucosa in the body. Thus, these are infected first. The coronavirus binds to a specific receptor in these cells to inject its genetic material (RNA).

The virus will then continuously copy itself without the cell knowing it. It continues to fill the cell with copies of the original virus until it reaches the critical point. After reaching said critical point it will destroy itself. The cell melts and releases the new coronaviruses, which are ready to attack more cells. Thus, the number of infected cells increases. After approximately 10 days millions of body cells become infected and billions of viruses will spread around the lungs. Immune system cells will come to the lungs to fight against the virus but the coronavirus will infect some of these cells, creating chaos. (Cells communicate with the help of small communication proteins called cytokines.) The coronavirus causes the immune cells that it infected to overreact and cause them to kill whatever comes their way. In this case the immune system sends more cells than needed to fight the virus, causing it to waste resources and ensuring environmental damage. There are two cells causing the chaos. Neutrophils and T cells (Li et al., 2020).

Neutrophils kill everything, including our cells. The neutrophil cells, which are send into the turmoil, start secreting lethal enzymes. T cells however, tell other cells to commit suicide in a controlled manner. Cells receiving this order tell healthy cells to also kill themselves. So, the more immune cells come in, the more damage they can cause and the healthier lung cells get killed. This may lead to permanent, irreversible damages. In some cases, the immune system takes control over the situation by killing the infected cells, preventing the virus from infecting other cells and cleaning the battlefield. After this the healing process begins. However, most cases progress and reach critical points. Although the exact percentage is not known, it can be said that there are more cases than the flu. In severe cases billions of epithelial cells die and the protective layer of the lungs disappears. In this case the alveoli, which take part in our breathing, can be occupied by bacteria. Patients get pneumonia and breathing becomes harder and may even stop. The immune system that has produced millions of antiviral weapons that have worked at full power until now has become tired and becomes more and more unable to fight against the rapid proliferation of bacteria. The bacteria then enter the bloodstream and envelop the whole body. As a result, death occurs (Prompetchara et al., 2020).

Coronavirus is not only much more dangerous than the influenza but also more infectious and more rapid in spreading.

The most important actions to be taken to be protected from coronavirus is to wash hands. The coronavirus is embraced by a simple oil sheath and soap prevents infection by breaking that sheath (Prompetchara et al., 2020).

According to a study published in the New England Journal of Medicine, SARS-COV-2 viruses are able to survive up to a few days in different environments. SARS-COV-2 viruses can survive up to 72 hours on plastic surfaces, up to 48 hours on stainless steel surfaces, up to 24 hours on carton, up to 4 hours on copper surfaces and up to 3 hours in the air (Valkin, 2020).

Conclusion

Since viruses do not contain ribosome and are unable to create protein, they are completely dependent on the host cell. Thus, they transfer their genetic material to the host cell, seize the functions of the cell and take over its management. Therefore, they can cause serious damage to the species it enters and even cause death in some situations. This study examined the structure of viruses and explained how different types of viruses' effect humans. Although the debate about whether viruses are alive or not continues, it is known that viruses are everywhere where life exists. Although their size is so small that they are invisible to the eye, it has been observed that its effects on people can have very serious consequences.

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UNIVERSITY WEBSITE EVALUATION: CASE STUDY OF RANGSIT UNIVERSITY, THAILAND

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Abstract: Rangsit University, established in 1985, is one of the top private higher educational institutions in Thailand. At present, the University has offered 138 degree programs in 36 faculties/colleges. In the 2019 Webometrics Ranking of World Universities, Rangsit University ranked 24th among universities of Thailand, and the 2nd among Thai private universities. Webometrics was first published in 2004 and updated periodically twice a year in January and July. The main purpose of Webometrics is to support Open Access Initiatives to improve access to information on scientific research and scholarly materials published under the electronic form. With the signification of digital transformation, Rangsit University has taken seriously on applying the technology in the teaching-learning process as well as for the marketing outreach. Over the last few years, its faculties and colleges have developed their webpages in order to provide information and communication channel. The University website and faculty webpages become the 24/7 hours communication channel between the University and students, prospective students, parents and public. All websites/webpages have provided the available information of their faculties and colleges such as: academic programs, professor information, research and publications, and students activities, etc. Regarding to the important role of websites and webpages, the objective of this study is to evaluate and report the result for the continuous website development. The webpages of the 36 faculties/colleges of Rangsit University have been evaluated in five (5) components: page and site design, content design, navigation, accessibility and usability. The 28 indicators checklist form has been developed. The results show that there are varieties in webpage component evaluation. For the page and site design component, regarding the units under the same parental institution, there are very different styles in fonts, color, graphic user interface, and homepage presentation. According to content design component, the qualified and accuracy of information are very concerned. More than 30 percent of linkages are broken. Most of websites are developed and hosted under the University main page. Whereas, the navigation technologies and tools are some different standards, for examples: html, asp.net, php, etc. Therefore, the evaluation shows that most of webpages provide the needed and beneficial information for users and readers, especially the academic program offering. The evaluation result indicates that the University shall take part in website development of its faculties and colleges in order to make the website as a digital university. The guideline of website design and development shall be established to create as a corporate identity. University shall constantly strive to maximize the utility and depth of information on their websites while offering pleasing and powerful image to attract potential students and public.

Keywords: Website Evaluation, Webpage Evaluation, Webometrics, Thai University Website, Rangsit University

Introduction

University websites are the gateway to an educational institution and the public face for both academics and athletics. According to Ruffalo Noel Levitz's study on consumer behavior (Levitz, 2014), websites play an important role in providing information for prospective students (both new and transfer), current students, parents, and alumni. Universities have started to create marketing and communication strategies which directly involve the website content and especially the redesign of their home page (Halvorsen, 2014). These strategies help convey various rhetorical messages for visitors. Both the textual treatment and graphic design/photography by designers play large roles in creating a site that gains aesthetic interest and continues to provide better information to the targeted audience.

Rangsit University, established in 1985, is one of the top private higher educational institutions in Thailand. At present, the University has offered 138 degree programs in 35 faculties/colleges. In January 2019 Webometrics Ranking of World Universities Report (2019a), Rangsit University ranked 24th among universities of Thailand, and the 2nd among Thai private universities. Webometrics was first published in 2004 and updated periodically twice a year in January and July. The main purpose of Webometrics is to support Open Access Initiatives to improve access to information on scientific research and scholarly materials published under the electronic form. With the signification of digital transformation, Rangsit University has taken seriously on applying the technology in the teaching-learning process as well as for the marketing outreach. Over the last few years, its faculties and colleges have developed their webpages in order to provide information and communication channel. The University website and faculty webpages become the 24/7 hours communication channel between the University and students, prospective students, parents and public. All websites/webpages have provided the available information of their faculties and colleges such as: academic programs, professor information, research and publications, and students activities, etc.

Literature Overview

Webometrics

The Ranking Web or Webometrics (2019b) is the largest academic ranking of Higher Education Institutions. The original aim of the Ranking is to promote academic web presence, supporting the Open Access initiatives for increasing significantly the transfer of scientific and cultural knowledge generated by the universities to the whole Society. The objective is not to evaluate websites, their design or usability or the popularity of their contents according to the number of visits or visitors. Web indicators are considered as proxies in the correct, comprehensive, deep evaluation of the university global performance, taking into account its activities and outputs and their relevance and impact.

At present, the website is the key for the future of all the university missions. It reflects significantly as the most important scholarly communication tool, the future channel for the off-campus distance learning, the open forum for the community engagement and the universal showcase for attracting talent, funding and resources (Ranking Web of Universities, 2019c).

University Website Design

The credibility of a website affects a user's interest in the site's content and consequently, users tend to spend longer sessions on the site and access more information. Aesthetics and the use of enhanced visual elements (i.e. color, graphics, texture, text formatting, lines, icons) increases the credibility of a website. Studies have shown that judgments on website credibility are 75% based on a website's overall aesthetics" (Alsudani & Casey, 2009, 1). This effect is made truly significant when observing that web users tend to value the professional appeal of a website when deciding which site to select for the same information and services.

Literature reviews shows there are theories and guidelines for universities and academic website design. University and college websites are the digital version of information window for students, parents and public. The design shall focus on an easy navigation, optimizing user experience, consistent information, clear identity, quality of content, and well-designed (Manoverboard, 2014). It is becoming more

concerned to make the university website more successful, more inviting, and attractive, such as simplicity, concise and detailed, keep contact or outreach links to a minimum external link providing, and embed media and images. Therefore, usability is considered the key credentials of effective higher education website design.

The core theory of website design has been focused in 2 concepts: **usability and accessibility**.
1. **Usability of a website** corresponds to how easy it is to find information and navigate the many pages of the site. Usability, or how easy it is to use a site, is critical because if a site is difficult to use, users will go elsewhere for the information or service. Poor usability has been demonstrated to undermine overall site credibility (Youngblood, 2013). It is a web designer's primary responsibility, for the sake of user retention, to create a design that makes it easy for users to find information through a clean and simple navigation system and well-organized content.
2. A**ccessibility of a website** is the usability of a site for users with disabilities related to vision, hearing, cognition, and motor skills, among others. "When websites are not accessible, disabled users are at a disadvantage in an arena that should serve as an equalizer rather than a barrier" (Youngblood, 2013). When designing for accessibility, designers need to create a layout that is adaptable to a variety of disabilities, including those related to vision, hearing, mobility, speech, cognition and learning (W3C, 2008). Designers should refer to the W3C rules and make sure that their design complies with accessibility standards, especially when designing websites for a governmental organization (universities sites included); otherwise, the organizations may face lawsuits related to lack of access. A website can be simultaneously accessible and aesthetically pleasing for the user; the two concepts are not necessarily separate.

University Website Evaluation
There are many frameworks in evaluation the website and related educational web-based systems. Khan (2010) stated that there are 8 dimensions in e-Learning system evaluation. Those are: institution, management, technological, pedagogical, ethical, interface Design, resource support, and evaluation.
	1. Institutional: the institutional dimension is concerned with issues of administrative affairs, academic affairs and student services related to e-learning.
	2. Management: the management of e-learning refers to the maintenance of learning environment and distribution of information.
	3. Technological: the technological dimension of e-learning examines issues of technology infrastructure in e-learning environments. This includes infrastructure planning, hardware and software.
	4. Pedagogical: the pedagogical dimension of e-learning refers to teaching and learning. This dimension addresses issues concerning content analysis, audience analysis, goal analysis, medium analysis, design approach, organization, and learning strategies.
	5. Ethical: the ethical considerations of e-learning relate to social and political influence, cultural diversity, bias, geographical diversity, learner diversity, digital divide, etiquette, and the legal issues.
	6. Interface design: the interface design refers to the overall look and feel of e-learning programs. Interface design dimension encompasses page and site design, content design, navigation, accessibility and usability testing.
	7. Resource support: the resource support dimension of the e-learning examines the online support and resources required to foster meaningful learning.
	8. Evaluation: the evaluation for e-learning includes both assessment of learners and evaluation of the instruction and learning environment.

Regarding the instruction for learning and teaching in academic environment, the website or homepage was an important interface for learners. Many academic institutions, namely Cornell University, Purdue University, Dalhouse

University, etc., applied and developed the website checklist evaluation framework for faculty members and students in order to assess the quality of websites as knowledge sources. The evaluation framework which has been used the most is the 6 (six) criteria for websites. These six criteria deal with the content of Web sites rather than the graphics or site design.

1. Authority: authority reveals that the person, institution or agency responsible for a site has the qualifications and knowledge to do so.

2. Purpose: the purpose of the information presented in the site should be clear. Some sites are meant to inform, persuade, state an opinion, entertain, or parody something or someone.

3. Coverage: it is difficult to assess the extent of coverage since depth in a site, through the use of links, can be infinite. One author may claim comprehensive coverage of a topic while another may cover just one aspect of a topic.

4. Currency: currency of the site refers to: 1) how current the information presented is, and 2) how often the site is updated or maintained. It is important to know when a site was created, when it was last updated, and if all of the links are current.

5. Objectivity: objectivity of the site should be clear. Beware of sites that contain bias or do not admit its bias freely. Objective sites present information with a minimum of bias.

6. Accuracy: there are few standards to verify the accuracy of information on the web. It is the responsibility of the reader to assess the information presented.

Interface Design is one of the important components in website design. Khan (2005) states that there are 5 main components in checklist for e-learning interface design: 1) Page and Site Design 2) Content Design 3) Navigation 4) Accessibility and 5) Usability Testing. Whereas Waterhouse (2005) stated that the website design could be evaluated in 3 issues: 1) reliability 2) quality and 3) content.

Research Approach

This study aims to evaluate the webpages of the faculties/colleges of Rangsit University, Pathumthani, Thailand. The evaluation includes five (5) components of website: page and site design, content design, navigation, accessibility and usability. The webpage evaluation indicator checklist form has been developed and used for the evaluation and analysis. Each component has been set its checklist indicators: page and site design (8 indicators), content design (6 indicators), navigation (4 indicators), accessibility (6 indicators) and usability (4 indicators). The evaluation process started on February 1, 2019 and ended on March 3, 2019.

Results

Website information

Rangsit University has 38 faculties and Colleges but only 36 of faculties and colleges which offer the academic degree programs have been selected in this study. The website URLs are listed in Table 1.

Table 1: Websites and URL of Faculties and Colleges of Rangsit University

Faculties/Colleges	Website URL
1. College of Medicine	https://www.rsu.ac.th/medicine/
2. College of Dental Medicine	1. http:// www.rsu.ac.th/dental/ 2. http://110.164.186.95/dental/
3. College of Pharmacy	https://www.rsu.ac.th/rsupharmacy/
4. Faculty of Nursing	https://www.rsu.ac.th/nurse/mainpage.php
5. Faculty of Science	https://www.rsu.ac.th/science/
6. Faculty of Physical Therapy and Sport Medicine	https://www.rsu.ac.th/ptrsu/
7. Faculty of Medical Technology	https://www.rsu.ac.th/medtech/page/home.html
8. College of Oriental Medicine	https://www.rsu.ac.th/orientalmed/
9. Faculty of Optometry	https://www.optometry-rsu.com/
10. College of Biomedical Engineering	http://bme.rsu.ac.th/
11. Faculty of Radiological Technology	https://sites.google.com/rsu.ac.th/rtrsu
12. Aviation Institute	https://www.rsu.ac.th/pilot/
13. College of Engineering	https://www.rsu.ac.th/engineer/
14. College of Digital Innovation and Information Technology	https://it.rsu.ac.th/
15. College of Agricultural Innovation Food and Biotechnology	https://www.rsu.ac.th/cab/
16. College of Communication Arts	http://ca.rsu.ac.th/
17. Faculty of Liberal Arts	https://www.rsu.ac.th/libarts/Index.asp
18. Faculty of Law	https://www.rsu.ac.th/law/
19. College of Social Innovation	http://www.csirsu.com/
20. Suryadhep Teachers College	https://www.rsu.ac.th/education/
21. Institute of Criminology and Justice Administration	https://www.rsu.ac.th/cja/
22. School of Politics, Economic and Globalization	http://www2.rsu.ac.th/PUBLIC-GOVERNANCE/Default.aspx

23. Institute of Public Policy and Management	http://www2.rsu.ac.th/PUBLIC-GOVERNANCE/Course-Public-Administration.aspx
24. Institute of Political Science	http://www2.rsu.ac.th/PUBLIC-GOVERNANCE/Course-Political-Science.aspx
25. Institute of Diplomacy and International Studies	https://idis.rsu.ac.th/
26. Institute of Economics	https://www.rsu.ac.th/econ/
27. Faculty of Business Administration	http://www.rbsrsu.com/
28. College of Tourism and Hospitality	https://www.rsu.ac.th/hospita/Default.aspx
29. Faculty of Accountancy	http://acc.rsu.ac.th/
30. Conservatory of Music	https://www.rsu.ac.th/music/
31. Faculty of Architecture	https://sites.google.com/rsu.ac.th/archrsu/
32. College of Design	http://www.artanddesignrangsit.com/
33. Digital Art	https://www.rsu.ac.th/digital/
34. International College	https://www.rsu.ac.th/international/
35. International Chinese College	http://www.rsuicc.com/index.php/th/
36. Rangsit Cyber University	https://cyberuonline.rsu.ac.th/

Source: Rangsit University Website, 2019.

Evaluation Results
1) Page and site design

As shown in Table 2, regarding the units under the same parental institution, there are very different styles in fonts, color, graphic user interface, and homepage presentation.

Table 2: Page and site design

No	Indicators	Yes	No
1	Institutional design	29	7
2	proper fonts and type setting; the text size and color readable	36	0
3	proper color and theme	36	0
4	colors are used harmoniously	25	11
5	appropriate composition	30	6
6	a site map menu	0	36
7	website visitor measurement/web countering	4	32
8	webmaster information on webpage	2	34

2) Content design

According to content design component, there are varieties on content. The most standard contents are provided on the website such as academic programs, lecturers, research, awards, student projects and activities. The similar content may be presented differently. Some presented as static photos and texts while some as multimedia ones. In other way, the currency and accuracy of information are very concerned.

Table 3: Content design

No	Indicators	Yes	No
1	Required contents/information are presented on website	32	4
2	content and information on website are organized in a good sequent	32	4
3	each page has a clear purpose	36	0
4	copywriting style appropriate for target group	36	0
5	any spelling errors or outdated content	16	20
6	contact information provided	36	0

3) Navigation system

Most of websites are developed and hosted under the University main page. However, the navigation technologies and tools are some different, for examples: html, asp.net, php etc. Most of them are not compatible for mobile device platform in term of page presentation and screen fitness.

Table 4: Navigation system

No	Indicators	Yes	No
1	How intuitive is it to navigate on website	30	6
2	Standard Navigation tool/technology used	36	0
3	Website can be browsed by any internet browser	36	0
4	Website can be surfed from mobile application platform	21	15
5	more than 10 seconds on website/webpage loading	6	30

4) Accessibility

There are 2 ways in accessing the websites, direct by its URL and redirect from the University main page. Most of websites are developed and hosted under the University webserver. However, 30 percent of websites have the broken linkages and not accessibility. The 10 webpages are found that the important links such as faculty member's curriculum vitae and research profile, academic program offers cannot be accessed or browsed.

Table 5: Accessibility

No	Indicators	Yes	No
1	Website can be accessed via direct URL	33	3
2	Website can be accessed indirectly from the University main page	33	3
3	Website can be browsed and presented the same by any internet browser	36	0
4	Website can be access and browsed via mobile platform	30	6
5	Website can be search from any search engine (Google, Yahoo, etc.)	36	0
6	Any Broken linkage	10	26

5) Usability

The evaluation shows that most of webpages provide the needed and beneficial information for users and parents, especially the academic program offering, professor information and research profiles. The webpages are designed in simple and user friendly concept. Therefore, a few webpages do not provide the access for downloading. In addition, when assessing the functional menus on pages, they are found that there are some lacks of important and related links such as library, student services, intranet registra service, research services, etc.

Table 6: Usability

No	Indicators	Yes	No
1	the provided information is really valuable for visitors	32	4
2	Any process on website is working through well	33	3
3	database on website is reachable	33	3
4	totally be comfortable and convenient to use (user friendly design)	36	0

Conclusion and suggestions

The websites of faculty, school and college of Rangsit University are mostly qualified in term of the website component indicators of 1) Page and Site Design 2) Content Design 3) Navigation 4) Accessibility and 5) Usability. The evaluation shows they are mostly developed under the same platform (on university hosting service). The standards of web technology development are varied but the presentation of content and process are quite similar. There are 30 percent of webpages that contain the broken links and inaccessible contents. There are a few that put the database links on its websites and cannot be reachable. Totally they are all user friendly and simple to use.

The evaluation result indicates that the University shall take part in website development of its faculties and colleges in order to make the website as a digital university. The guideline of website design and development shall be established to create as a corporate identity standard. University shall constantly strive to maximize the utility and

depth of information on their websites while offering pleasing and powerful image to attract potential students and public.

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