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I am always honored to be the editor in chief of TOJSAT. Many persons gave their valuable contributions for this issue.

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July 1, 2014

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Four years ago, we have started to publish the Online Journal of Science, Technology. Audience and readers of the journal is widening through out the World and increasing in each volume and especially after the conference series of Science and Technology. Tojsat journal is now indexed with Doaj, Cite Factor and Index Copernicus.

The journal favours papers addressed to inter-disciplinary and multi-diciplinary articles shown in the section of scopes. In this issue of on line journal, selected papers such as Carbothermal reduction of calcined and mechanically activated manganese carbonate ore; Recreational Forest Landscape Planning in Selangor, Malaysia; Effects of Integrating U-Msg Learning into College English Classes through Blended Teaching Approach; Sound Radiation from a Floating Runway due to an Airplane Taking off Affected by Mean Flow will be published.

I will thank to the readers for their supports by sending their valuable scientific works to publish in this journal.

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Carbothermal reduction of calcined and mechanically activated manganese carbonate ore

Gökhan Çil and Kenan Yıldız

Sakarya University, Metallurgy and Materials Engineering, Turkey
kenyil@sakarya.edu.tr

Abstract: The carbothermal reduction of calcined and mechanically activated manganese carbonate ore with graphite under an argon atmosphere was investigated at temperatures between 1100 and 1300°C and the effects of mechanical activation on the ore structure were analysed by X-ray diffraction, scanning electron microscopy and particle size analysis. The activation procedure led to amorphisation in the ore and accelerated the degree of reduction in the mixture of the calcined ore and graphite.

Key words: carbothermal reduction, mechanical activation, ferromanganese

Introduction

Manganese is an element which has numerous applications in industry. Roughly 95% of all manganese units are used in iron and steel production nowadays and the remaining parts are used for the production of dry cell batteries and for certain chemical aims. The first utilization of it can be traced back to ancient times. Spartans used the presence of manganese in the iron ore to make their steel weapons superior to their opponents. Ancient Egyptians and Romans used it to control the color of glass and to glaze the surface of pottery in brown and this had been the main use for manganese until the 18th century (Elyutin, 1961).

Manganese is used as an alloying element for its beneficial properties such as strength, hardenability, toughness and workability of ferrous products and it is also essential to iron and steel production by virtue of its sulphur-fixing, deoxidizing, and alloying properties. Most of the manganese used in iron and steel industry are in the form of ferromanganese and silicomanganese. The addition of manganese can be in the form of its ore during the ironmaking or as ferromanganese alloy in the steelmaking stage (Akıl, 2006).

Akdogan & Eric (1994) studied characteristics of carbothermic reduction of manganese ores by classical thermogravimetric techniques in the temperature range 1100°C and 1350°C. They stated that a two stage mechanism has been proposed. First stage includes the reduction of higher oxides to their lower states by carbon and carbon monoxide. During this rapid initial stage the products were porous to varying degrees. In this stage rate control appears to be mixed, both inward diffusion of carbon monoxide and outward diffusion of carbon dioxide across the product layer and the reaction of carbon monoxide on the pore walls of oxide phase play important roles. During the second stage, the reaction is limited to the interface between manganese oxide and a mixed carbide of iron and manganese. The chemical reaction between the oxide and carbon appears to be the rate controlling mechanism.

Welham (2002) studied the effect of extended milling on the carbothermic reduction of a manganese ore using a combination of thermal analysis and X-ray diffraction (XRD). Thermodynamic modelling indicated that reduction of MnO_2 to MnO was possible at 25 °C, although no reaction was found to occur during milling of the ore with graphite for up to 10 h. For a physical mixture, cryptomelane, KMn_8O_{16} , reduced at 500 °C and braunite, Mn_7SiO_{12} , at 700 °C after 10 h milling these temperatures were reduced by 200 °C. The initial product was Mn_3O_4 , although in the 10-h-milled powder, the reduction of braunite may have been directly to MnO . Reduction at 600 °C only formed Mn_3O_4 in the unmilled powder but the major product in the 10-h-milled powder was MnO . The increased extent of reaction after premilling may allow current processing plants to expand their throughput without increasing the size of reduction kiln.

Eric & Burucu (1992) studied the kinetics of reduction of the manganese ore from Mamatwan mine in South Africa. They observed that the rate and degree of reduction increased with increasing temperature and decreasing particle size. In the early stages of reduction, up to about 4 minutes of reaction time corresponding to about 30% reduction, reduction of higher oxides of manganese and iron (Mn_2O_3 and Fe_2O_3) to MnO and FeO, respectively, was observed. This stage was possibly controlled by diffusional process across the boundary layer between the solid phases. An apparent activation energy of 61.03 kJ was calculated for this diffusional process. Metallization started as random nucleation of iron, which subsequently was carburized around MnO grains inside the particle. Also, after about 30% reduction, the formation of a silicate phase was observed. Up to 70% reduction at 1350°C, reduction rate was possibly controlled by chemical reaction between the oxide and gaseous phases for which an activation energy of 153.32 kJ was calculated. The later part of the process proceeded by the reduction of MnO, covered by either the carbide or silicate phase, by carbon dissolved in the carbide phase $(Mn, Fe)_5C_2$. Diffusion of Mn^{2+} ions in the oxide phase is the most likely rate determining step for this stage for which an apparent activation energy of 310.4 kJ was found.

The mechanical activation of minerals makes it possible to reduce their decomposition temperature or causes such a degree of disordering that the thermal activation may be omitted entirely. In this process, the complex influence of surface and bulk properties occurs. The mineral activation leads to a positive influence on the reaction kinetics, an increase in surface area and further phenomena. Mechanical activation by high energy milling is an innovative procedure that improves the efficiency of mineral processing because of several factors, most importantly the formation of new surfaces and the creation of lattice defects (Balaz, 2008).

In this study, manganese carbonate ore was calcined and then activated mechanically in a planetary mill. The amorphization in the ore was calculated by using of X-ray diffraction data. The carbothermal reduction of the non-activated and activated (60 min) ore were studied between 1100°C and 1300°C, the effect of mechanical activation on the carbothermal reduction was studied.

Materials and Method

Manganese carbonate ore used in the experiments was obtained from Denizli-Tavas region in Turkey. The ore was ground to a size of <100 μm and calcined at 1000°C for 2 h. Manganese and iron contents in the ore was 39.69% and 5.45%, respectively. Graphite consisting of more than 98% carbon was used as the reductant.

The mechanical activation of the calcined ore was performed in a Planetary Mono Mill Pulverisette 6 under the following conditions: the weight of the sample was 10 g; the weight and diameter of tungsten carbide (WC) balls were 200 g and 10 mm respectively; the grinding bowl was 250 mL WC; the grinding times were 0, 15, 30, 60, 90 and 120 min; the speed of the main disk was 600 rev min^{-1} ; the grinding process was dry.

X-ray diffraction analysis was performed using a Rigaku Ultima X-ray diffractometer and Cu $K\alpha$ radiation. A JEOL 6060 LV scanning electron microscope was used for both the morphological analysis of the calcined ore after mechanical activation.

Reduction experiments were carried out in a horizontal furnace in the temperature range of 1100–1300°C under an argon atmosphere. Calcined manganese ore (2 g) and graphite (2 g) were thoroughly mixed, fed to an alumina crucible and placed inside the furnace. The furnace was heated to the reduction temperature under an argon atmosphere. The argon flow rate was 150 mL min^{-1} . At the end of the reduction time, samples were cooled in an argon flow. The reduction temperatures (1100, 1200 and 1300°C), reduction times (1, 3 and 5 h) and milling times (0, 15, 30 and 60 min) were investigated as parameters.

The degree of amorphization (A) of the mechanically activated manganese ore was calculated from equation (1),

$$A\% = \left(1 - \frac{B_0 I_x}{B_x I_0}\right) \times 100 \quad (1)$$

where I_0 is the integral intensity of the diffraction peak for non-activated manganese ore, B_0 is the background of the diffraction peak for non-activated manganese ore, and I_x and B_x are the equivalent values for the activated manganese ore.

Reduction degrees is calculated using equation (2), assuming that CO is the only gaseous element generated during reduction reactions.

$$R(\%) = \frac{16/28^{CO_{Evolved}}}{RO_{Total}} \quad (2)$$

where $R\%$ is reduction degree, $CO_{Evolved}$ is the total weight of CO generated from the mixture of the ore and graphite and RO_{Total} is the total weight of the removable in the mixture from reducible oxides in the ore.

Results and Discussion

The X-ray diffraction analysis of non-activated and activated manganese ore is given in Fig. 1. Comparing the peaks in the six diffraction patterns between 20 and 60° shows that the height of the diffraction peaks decreases after mechanical activation. This result reflects the partial amorphisation and structural disordering in the ore. Mechanical activation has already been reported to amorphise mineral particles (Balaz, 2008). Tromans and Meech (2001) found that mechanical activation results in a large number of dislocations and associated strain fields, which may lead to an overall decrease in long range lattice periodicity. This may be interpreted as the formation of a metastable amorphous phase because extended milling causes X-ray diffraction peaks to exhibit line broadening or disappear altogether. The degree of amorphisation of manganese ore as a function of mechanical activation time was calculated by equation (1) and the degree was 68.72% for Mn_2O_3 and 87.28% for Mn_3O_4 after 15 min of activation. These values increased to 78.6% for Mn_2O_3 and 94.38% for Mn_3O_4 after 120 min of activation. Disordering in the bulk of the manganese ore increased with the time of mechanical activation.

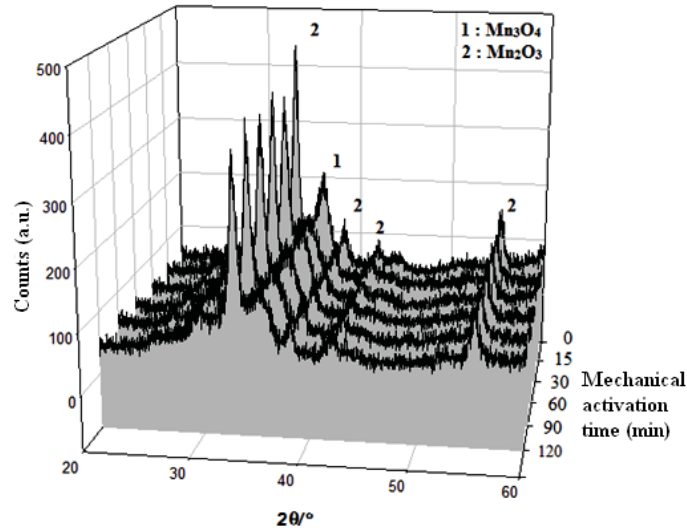


Figure 1: X-ray diffraction patterns of non-activated and activated manganese ore

D_{10} , D_{50} and D_{90} sizes corresponding to the particle sizes at the 10%, 50% and 90% points on the cumulative distribution for the non-activated and activated samples are shown in Table 1. Figure 2 shows the particle size distribution of the non-activated and activated (1 h) ore.

Table 1: Particle size analysis of the non activated and activated manganese ore samples

Samples	Particle size (μm)		
	$D_{10}(\mu\text{m})$	$D_{50}(\mu\text{m})$	$D_{90}(\mu\text{m})$
Non-activated ore	1,090	3,320	56,97
Activated ore (15 min)	0,625	1,121	8,97
Activated ore (30 min)	0,651	1,302	9,14
Activated ore (60 min)	0,668	1,351	8,27
Activated ore (90 min)	0,674	1,361	8,20
Activated ore (120 min)	0,671	1,345	7,49

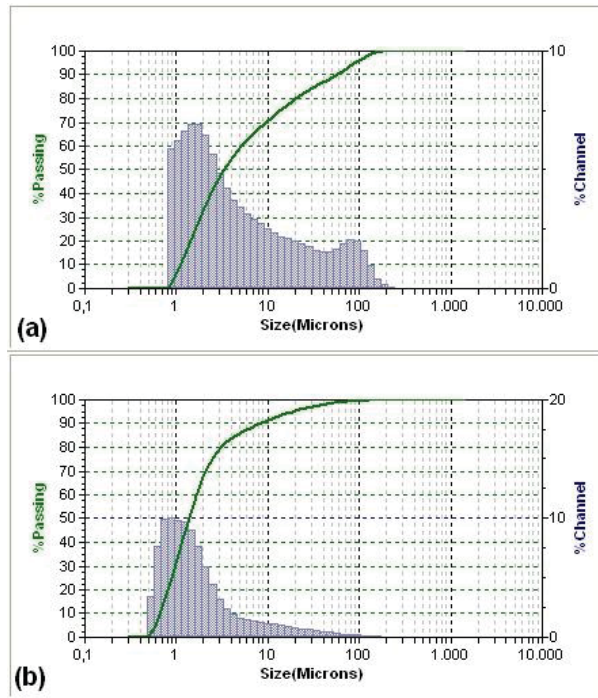


Figure 2: Particle size analysis of non-activated and activated (60 min) manganese ore

Reducible oxides such as Fe_2O_3 , Mn_2O_3 and Mn_3O_4 in the ore are reacted with graphite under argon atmosphere to form carbides according to following reactions. Reduction degrees for the non-activated and activated (60 min) manganese ore are given in Table 2.

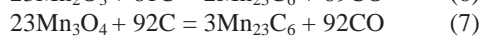
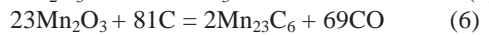
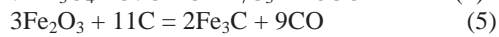
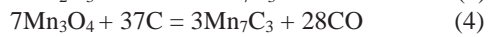
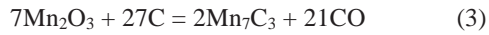


Table 2: Effect of reduction temperature and time on carbothermal reduction degree of non-activated and activated (60 min) manganese ore

Reduction temperature (°C)	Reduction time (h)	Reduction degree (%)	
		Non-activated ore	Activated (60 min) ore
1100	1	34,29	41,70
	3	43,97	50,89
	5	51,14	57,10
1200	1	55,11	70,43
	3	70,55	80,30
	5	79,43	89,17
1300	1	71,77	76,31
	3	79,98	84,58
	5	84,82	90,03

The reduction of manganese ore with graphite is an endothermic reaction and the reaction rate increases with increasing temperature. In the reduction of the non-activated ore, the degrees of reduction are 34.29% at 1100°C and 71.77% at 1300°C for a reduction time of 1 h. In the reduction of the activated (60 min) ore, the degrees of reduction are 41.70% at 1100°C and 76.31% at 1300°C for a reduction time of 1 h. The degrees of reduction are increased by mechanical activation due to structural disordering in the ore. Higher degrees of reduction were obtained at lower temperatures. Ferromanganese formation in high percent, up to 90%, was obtained for the activated ore at 1200°C for 5 h and this value was about 80% for the non-activated ore at the same reduction conditions.

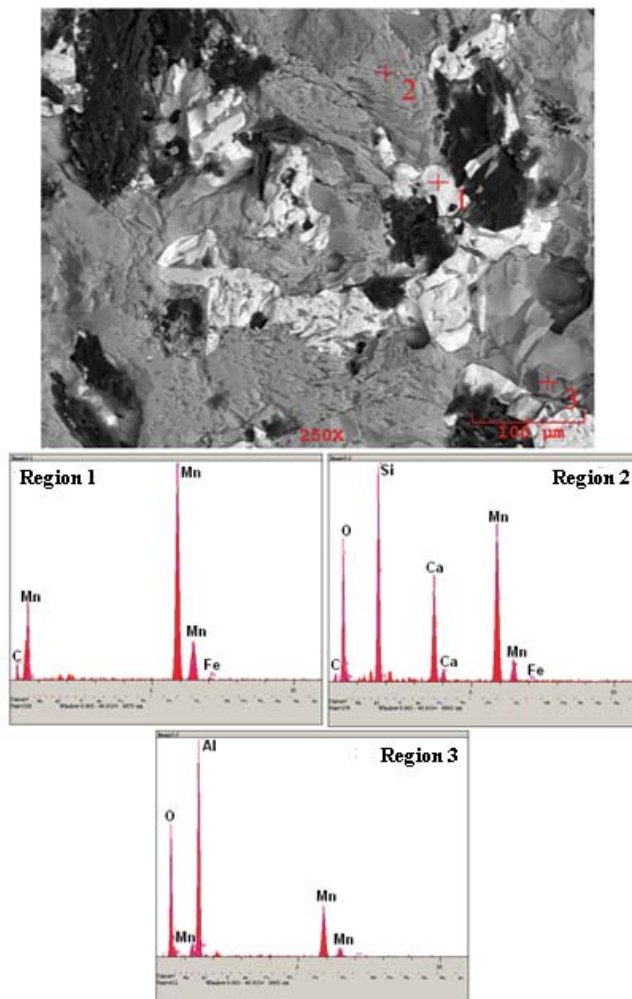


Figure 3: SEM/EDAX analysis for the activated and reduced ore (1300°C, 1 h)

Scanning electron micrographs of the activated and reduced sample are presented in Fig. 3. As seen in these figures, three zones can be observed on the polished sections of the reduced samples. The white zone (region 1) represents metallic beads, the grey area (region 2) is the original unreacted ore structure. Region 3 is the affected zone. The metallic portion of the sample is rich in manganese. Same regions are observed in SEM/EDAX analysis for the non-activated and reduced ore.

The XRD analysis of the activated and reduced manganese ore is given in Fig. 4. After carbothermal reduction, formation of manganese carbides (Mn_7C_3 and $Mn_{23}C_6$) and iron carbide (Fe_3C) was observed in the product. The other phases are carbon as graphite, calcium silicate (Ca_2SiO_4) and alumina (Al_2O_3).

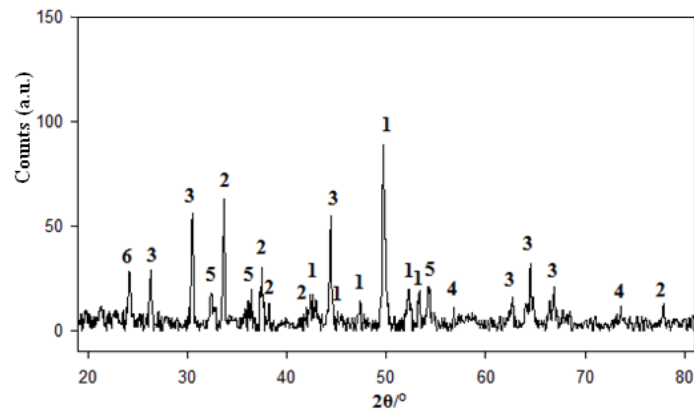


Figure 4: XRD analysis of the activated and reduced (1300°C, 1 h) ore. (1- Mn_7C_3 , 2- $Mn_{23}C_6$, 3-C, 4- Fe_3C , 5- Al_2O_3 , 6- Ca_2SiO_4)

Conclusions

The non-activated and activated manganese ore were reduced at temperatures between 1100 and 1300°C in the presence of graphite. The results indicate that high energy ball milling is effective for the reduction of manganese ore with graphite. The mechanical activation process increased the degrees of reduction and metallisation in the ore due to structural disordering in the ore structure. The reduction degrees of activated ore were higher than those of non-activated ore at the same reduction temperatures and times.

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Comparison of Quality of Service of Distance Education at Universities

Tolga Dursun, Kader Oskaybaş, Cansu Gökmen

Maltepe University, Faculty of Economics and Administrative Sciences
Department of Business, Istanbul,

tolgadursun@maltepe.edu.tr

Abstract: The difference between the distance education and the formal education system is to provide different requirements, expectations and environments the provision of training opportunities to people. In this way, there is a huge population that has an opportunity to get distance education. Increase of service sector firms and gain more profit by providing service to their customers have made the concept of quality of service more crucial today. This study seeks to compare the service quality between the universities.

Key words: Distance education, service quality, Servqual.

Introduction

While on the one hand developments and changes as the result of globalization have significant impacts on people's lives, needs and desires; on the other hand they influence the understanding and form of how these needs are met. Educational service is one of service fields at the most critical point of the service sector. Because, people who will work in their professional fields in the future are trained through education. In this respect, improving the quality of service of higher education at universities serves to the purpose of integrating people to society as individuals providing the highest benefit in the fields that they are trained for.

In the twenty-first century, with the explosion of information, it has been seen that the need for education of all communities has increased. The need for education has provided the development of new educational technologies and new methods of education and training, and these ultimately developed new technologies and different methods combined and gradually changed the education. Traditional educational institutions are not able to meet increasing demand for education. Emerging education gap is increasing every day. This requirement has pushed societies to search for alternatives to the traditional education, and the "distance education" concept has emerged. The most important reasons for this change in education are the increasing number of students, education demand of different masses of students, former students, and people's attempts to meet the educational needs because of that business and working have lead to life-long learning.

The concept of service is defined by Grönroos "an activity or series of activities which are more or less abstract and provide solutions to customer problems that occur during the encounter of customer with physical resources of the goods or systems of the staff serving or providing the service". (Göktolga and Ozkan, 2011, p.66). This definition focuses on the interaction dimension of the service. Concrete elements that impact and contribute to the interaction dimension of the service are involved in the process. Skinner service is also called as abstract works which are created by individuals and machines through people and tools, which provide direct benefit to the customers (Okumuş and Asil, 2007, p.8). Zeithaml and Bitner define services in its simplest definition as movements, processes, and performance (Karaca, 2011, p.69).

The concept of quality is defined by Deming as "customer judgment about the product or service produced by the business" (Deming, 1998, p.137), and by Crosby (1979) as the "degree of compliance of a product with the requirements" Definition of quality specified in the TSE standards is as follows: the sum of the features of a product or service based on the determined or probable needs. Defining the quality of service includes two perspectives as internal and external. According to the internal perspective, the quality of service is defined within the framework of customer perceptions, expectations, attitudes and satisfaction (Sachdev and Verma, 2004, p.97). The quality of service is to give an excellent service to meet customer expectations. In

another definition for the quality of service, the quality of service is defined as completely meeting customer expectations or exceeding those expectations.

When the quality of service is examined in terms of customer expectations and perceptions, it can be defined as a comparison between customer expectations and perceptions (Parasuraman, Zeithaml and Berry, 1985, p.42). Customer interprets the quality by herself/himself detecting many factors, and compares the services that she/he received and expected.

The purpose of research

The purpose of this research is to provide students, customers of educational institutions as one of the leading institutions in the service sector, to assess the quality of the service they receive. It will be tried to detect whether or not there are differences in the quality of service of education service provided by similar higher education institutions that include distance education programs in Turkey. It is aimed that ideas emerging from the evaluation of obtained results shall contribute to improving the quality of higher education services.

Materials and Method

While several methods and equipment have been developed to measure the quality until today, in the research project designed to measure the quality of service of e-mba programs provided in distance education programs, survey is applied as a method, and SERVQUAL is applied as a method of assessment. SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry (1994), is a model accepted and applied extensively to measure the quality of service. In this model, "perceived service quality" statement is used instead of the quality of service. Perceived service is the result of a comparison between customer expectations prior to receiving the service (expected service) and the actual experience of service s/he benefited, and it is evaluated as the degree and direction of the difference between customer expectations and the perceived performance. And expectations refer to customer wishes and desires for the service. And the relations between the expected service and perceived service are as follows: When expected service is greater than perceived service, the perceived quality is far from satisfactory, and an unaccepted level of quality will come into being. When expected service is equal to perceived service, the perceived quality will be satisfactory. When expected service is smaller than perceived service, perceived quality will be higher than the satisfactory and the ideal level of quality will come into being (Parasuraman, Zeithaml and Berry, 1985, pp.48-49). This model includes the differences between approach and practices of businesses providing the service and expectations of customers benefiting the service, and sources of these differences.

There are a total of 10 dimensions that determine the quality of service. Then, Parasuraman, Zeithaml and Berry (1991), assessing surveys that they applied through factor analysis and reducing the ten dimensions that determine the quality of service to five dimensions, developed a questionnaire which is a service of quality measurement tool and they called it as Servqual. These five dimensions in the survey consist of tangibles, reliability, responsiveness, credibility (ability, courtesy, credibility and security), and empathy (accessibility, communication, and customer understanding).

The questionnaire used in the study consists of a prior knowledge word addressed to respondents, 22 Likert-type questions measuring expectations and perceptions, and questions reflecting the demographic characteristics of the participants. In the first section of the study, 22 variables representing 5 dimensions (reliability, responsiveness, credibility, empathy, tangibles), which will help to understand the general expectations of students for the education that they receive, are adapted according to characteristics of the distance education.

Perceptions constitute the second part of the model. In this section, all of 22 variables that will measure the assessments of students about the universities providing distance education are compared. All in all, if the service received meets the expectations or is above expectations, it is concluded that the service is in good quality. Otherwise, the situation that the service received is below expectations comes into being, and there is a feeling of dissatisfaction. For this reason, SERVQUAL model is also called as gap analysis model.

In Turkey, distance education at universities include undergraduate, graduate, degree completion, post-graduate and applications as post-graduate. In recent years, the number of distance education students has increased significantly. Therefore, in order to use this potential, many universities have started to focus on distance education programs. Today, there are 156 universities (54 of which are private universities) in Turkey.

The number of universities providing distance education with an E-MBA program in Turkey is 21. However, this number includes universities which will be newly opened, newly accept students, and do not have students at the moment. These universities: Anadolu University, Ankara University, Ataturk University,

Bahcesehir University, Beykent University, Çukurova University, Ege University, Fatih University, Gazi University, Ankara University, Isik University, Istanbul Aydın University, Istanbul Bilgi University, Istanbul University, Karadeniz Technical University, Maltepe University, Mersin University, On Dokuz Mayıs University, Sakarya University, Süleyman Demirel University and Zirve University.

The research population consists of students studying in the universities with an e-MBA program. 21 universities with an e-MBA Education Program have been identified; however the questionnaire designed within this research has been applied to five universities with e-mba program in distance education by taking into account of the difficulty and time limit to reach all of these. The sample group of the study consists of all students of 5 universities selected from universities providing e-mba education through random sampling. The names of these five universities included in the study are not given in accordance with their privacy requirements, and referred to as 1-2-3-4-5. Simple random sampling is a method sampling selected units by giving an equal chance of being selected to each sampling selection. Here, purpose of giving an equal probability to each sampling is to select each sampling from sample space with equal probability (Gegez, 2005, p.189). All of the students attending distance education e-mba programs in these five universities were included in the sampling. All students within the scope of the research were informed about the study, and were requested to participate in the study online. Each student was given the right to participate in the Internet survey with a user name and password assigned to her/him. Total of 463 students entered the system during the period of study.

The data obtained from this study was transferred to Microsoft Excel and SPSS 18.0 program in order to make the calculation and analysis. In the research, specific calculations and statistical analyzes used in SERVQUAL model were performed in SPSS system.

Research Findings and Comments

In order to determine the internal consistency of applied SERVQUAL scale, reliability analysis was performed and alpha coefficients were determined. As well as descriptive statistics such as analysis frequency tables, cross tabulations, and average, t-test and ANOVA were used for comparison of scores of quality of service according to demographic characteristics of the participants and universities in which they have their education. In ANOVA analysis applied to determine whether or not levels of quality of service were different than each other in terms of demographic characteristics and universities, Levene test was used to test the homogeneity between the groups, and Tukey post hoc test was used to determine between which groups the difference are. If it is decided that there is no homogeneity between the groups as the result of Levene test, Welch test was used and evaluated instead of ANOVA test (Kurtuluş, 2004). Which of these analyses is used was stated in the tables. The findings obtained by questionnaire, were evaluated by unique calculation method of SERVQUAL method, and analyzed by statistical methods.

Findings of Reliability Analysis

For reliability analysis of research Cronbach's alpha model was used. Cronbach's alpha model is the one used for measuring internal consistency, it is an indicator of to what extent all the items in a scale can successfully measure any dimension. (George and Mallery, 2001, p. 209).

Reliability analysis comes to the front to gauge inter-closeness degree of questions when calculation is made by summing the values of answers to certain numbers of questions. This is also called as internal consistency. Alpha is a standard change mean and varies between 0 and 1 in social researches, alpha value of 0,70 is accepted as adequate for reliability. (Hair, Tatham, Anderson and Black, 1988, p.88)

Table 1: Reliability Coefficient

	Expectation	Perception
	Cronbach α	
Total scale	0,947	0,959
Tangibles	0,887	0,812
Reliability	0,791	0,873
Responsiveness	0,841	0,886
Credibility	0,857	0,873
Empathy	0,843	0,907

For in this study reliability values of scales and sub-dimensions are at acceptable levels, t-tests, variation and SERVQUAL analyses were proceeded for testing research hypotheses.

Results

34,1% of total participants was female and 65,9% were male, while 50,5% participants were married and 40,5% single. Initially students from age group between 21-30 with 60,7% and then age group between 31- 40 with 33,7% were enlisted. These two age groups (between 21-40) make up 94,4% of whole participation. Distribution of the professional sectors that e-MBA service quality measurement study participants work, is like this: 14,3% is in Banking , 8,4% in Health, 8% in Service, 7,3% in Informatics, 6,9% in Education, 5,6% in Construction while of them 27,6% serves as engineer, 16,4% as manager, 12,7% as banker, 6,3% as accountant. Almost all of the participatory e-MBA students (96,8%) resides in Turkey. In this distribution striking point is that participation from Afghanistan with 1,3% was the highest one among the participation ratios from abroad. When participation by city is examined, it is seen that the most participation was from Istanbul with 50,5%, and then comes Bursa with 7,3%, Ankara with 6,3%, Kocaeli with 5,2%, Izmir with 4,3%, Sakarya with 3,7% and Balikesir with 1,7%.

Table 2: Weighted SERVQUAL Scores Table for University 1

	N	University 1		
		Weightless Average Gaps	Weighted Average Gaps	t
Tangibles	-,1644	,2304	5,708	000
Reliability	-,2525	,3343	6,043	000
Responsiveness	-,2327	,2899	6,421	000
Credibility	-,2013	,3324	4,844	000
Empathy	-,1809	,2110	6,860	000
TOTAL GAPS	-1,02			
SERVQUAL SCORE	-0,204	,1940	8,507	000

*Servqual Score= Sum of the servqual scores (-1,02) / number of dimensions (5)

In order to investigate the difference between perceived service and desired service is different from zero for every dimension to perform t-tests for university 1's college students . The results of the t- tests is $p(\text{sig})=0,00$ that means statically significant.

The differences between perceived services and desired services of students receiving education at University-1 for each dimension were found statistically significant. While the dimension where expectations of students at University-1 have not been met most is Reliability, it is followed respectively by Responsiveness, Credibility, Empathy and Tangibles.

Table 3: Weighted SERVQUAL Scores Table for University 2

	Mean	Std. Deviation	University 2	
			t	p(sig)
Tangibles	-,2047	,3105	4,661	000
Reliability	-,1808	,1963	6,511	000
Responsiveness	-,1079	,1541	4,950	000
Credibility	-,1529	,1959	5,518	000
Empathy	-,1649	,1659	7,029	000
TOTAL GAPS	-0,8			
SERVQUAL SCORE	-0,16	,1396	8,214	000

* Servqual Score = Sum of the servqual scores (-0,8) / number of dimensions (5)

In order to investigate the difference between perceived service and desired service is different from zero for every dimension to perform t-tests for university 1's college students . The results of the t- tests is $p(\text{sig})=0,00$ that means statically significant.

The differences between perceived services and desired services of students receiving education at University-2 for each dimension were found statistically significant. While the dimension where expectations of students at University-2 have not been met most is Tangibles, it is followed respectively by Reliability, Empathy, Credibility, and Responsiveness dimensions.

Table 4: Weighted SERVQUAL Scores Table for University 3

	University 3			
	Mean	Std. Deviation	t	F (sig)
Tangibles	-,0863	,1571	-3,105	,004
Reliability	-,0514	,1907	-1,526	,137
Responsiveness	-,0938	,2295	-2,313	,028
Credibility	-,0119	,1514	-,444	,660
Empathy	-,0995	,1991	-2,827	,008
TOTAL GAPS	-0,34			
SERVQUAL SCORE	-0,068	,1333	-2,909	,007

* Servqual Score = Sum of the servqual scores (-1,02) number of dimensions (5)

While the differences between perceived services and desired services of students receiving education at University-3 for each dimension were found statistically significant, the differences in the dimensions of Reliability and Credibility were found insignificant, that is close to zero. While the dimension where expectations of students at University-3 have not been met most is Empathy, it is followed respectively by Responsiveness and Tangibles.

Table 5: Weighted SERVQUAL Scores Table for University 4

	University 4			
	Mean	Std. Deviation	t	F (sig)
Tangibles	-,1388	,1749	-9,079	000
Reliability	-,2170	,2830	-8,779	000
Responsiveness	-,1930	,2410	-9,163	000
Credibility	-,1628	,2484	-7,503	000
Empathy	-,1580	,1902	-9,504	000
TOTAL GAPS	-0,87			
SERVQUAL SCORE	-0,174	,1619	-12,294	000

* Servqual Score = Sum of the servqual scores (-1,02) / number of dimensions (5)

In order to investigate the difference between perceived service and desired service is different from zero for every dimension to perform t-tests for university 4's college students . The results of the t- tests is $p(\text{sig})=0,00$ that means statically significant.

The differences between perceived services and desired services of students receiving education at University-4 for each dimension were found statistically significant. While the dimension where expectations of students at University-4 have not been met most is Reliability, it is followed respectively by Responsiveness, Credibility, Empathy, and Tangibles.

Table 6: Weighted SERVQUAL Scores Table for University 5

	University 5			
	Mean	Std. Deviation	t	F (sig)
Tangibles	-,1217	,1730	-9,595	000
Reliability	-,1313	,2429	-7,375	000
Responsiveness	-,1781	,2466	-9,851	000
Credibility	-,1124	,1879	-8,154	000
Empathy	-,1462	,2023	-9,857	000
TOTAL GAPS	-0,69			
SERVQUAL SCORE	-0,138	,1616	-11,639	000

* Servqual Score = Sum of the servqual scores (-1,02) // number of dimensions (5)

In order to investigate the difference between perceived service and desired service is different from zero for every dimension to perform t-tests for university 4's college students. The results of the t- tests is $p(\text{sig})=0,00$ that means statically significant.

The differences between perceived services and desired services of students receiving education at University-5 for each dimension were found statistically significant. While the dimension where expectations of students at University-4 have not been met most is Responsiveness, it is followed respectively by Empathy, Reliability, Tangibles, and Credibility.

Comparison of Differences Between Universities Dimensions

Differences in service quality between universities are investigated by analysis of variance. According to the assumptions of analysis of variance, compared groups variances should be equal.

Table 7: Tests for homogeneity of variances Results Table

	Levene Statistic	df1	df2	Sig.
Tangibles	2,411	4	458	,048*
Reliability	3,139	4	458	,015*
Responsiveness	2,596	4	458	,036*
Credibility	4,396	4	458	,002*
Empathy	1,072	4	458	,370**
Servqual	2,310	4	458	,057**

*Welch test is to be made

**One-way-anova is to be made

According to the test results, tangibles, reliability, responsiveness and credibility's dimensions of the servqual score are not homogeneous between universities, empathy and the total servqual scores are found homogeneous. Based on these results, Welch test and total empathy scores are used to investigate the differences because first four dimensions are not met the one way variance assumption. One way variance test is used to find total servqual scores.

Table 8: Research on Differences Between Means with Welch Test

		Statistic	df1	df2	Sig.
Tangibles	Welch	1,859	4	125,826	,122
Reliability	Welch	5,846	4	135,012	,000*
Responsiveness	Welch	3,869	4	134,354	,005*
Credibility	Welch	6,340	4	131,988	,000*

* significant at $p=0,01$ level

The groups identified differences in size according to the welch test results in order to find which dimension is different between universities is used Dunnet T3 test, one-way analysis of variance and Tukey HSD test.

Table 9: Investigation of differences between means with ANOVA.

		Sum of squares	df	Mean square	F	Sig.
Empathy	Between Groups	,160	4	,040	1,040	,386
	Within Groups	17,661	458	,039		
	Total	17,821	462			
Servqual	Between Groups	,511	4	,128	4,830	,001*
	Within Groups	12,121	458	,026		
	Total	12.632	462			

* significant at p=0,01 level

Although there was no differences tangibles and empathy dimensions of the total servqual scores in E MBA programs, there was a significant statically differences credibility, responsiveness and reliability of the total servqual scores in eMBA programs.

Table10: The difference between Universities according to the Quality dimensions of Service

		UNIVERSITY				
Service quality dimension		University-1	University -2	University -3	University -4	University -5
Tangibles	University-1					
	University-2					
	University-3					
	University-4					
	University-5					
		University-1	University -2	University -3	University -4	University -5
Reliability	University-1					
	University-2					
	University-3	*	*		*	
	University-4					
	University-5					
		University-1	University -2	University -3	University -4	University -5
Responsiveness	University-1					
	University-2	*				
	University-3					
	University-4					
	University-5					
		University-1	University -2	University -3	University -4	University -5
Credibility	University-1					
	University-2					
	University-3	*	*		*	*
	University-4					
	University-5					
		University-1	University -2	University -3	University -4	University -5
Empathy	University-1					
	University-2					
	University-3					
	University-4					
	University-5					

		University-1	University -2	University -3	University -4	University -5
Servqual	University-1					
	University-2					
	University-3	*			*	
	University-4					
	University-5	*				

* significant differences at p=0,05 level

With t-tests, the total calculated SERVQUAL scores for the quality of service of the five universities were found to be different from zero. When the differences of service dimensions between universities are evaluated:

In tangibles dimension, while according to the students expectations are not fulfilled at all universities, in terms of the scores of quality of service, sufficient evidence has not been discovered to say that there is a difference between the universities.

In terms of the scores of quality of service in reliability dimension; students of University-3 are different than students of University-1, University-2 and University-4. University-3 meets its students' expectations for reliability more than University-1, University-2 and University-4. Sufficient evidence has not been discovered to make any comparison between University-3 and University-5 and other each of other universities. So there is no difference in terms of reliability.

In terms of the scores of quality of service in responsiveness dimension; students of University-2 are different than students of University-1. University-2 meets its students' expectations for responsiveness more than University-1. Sufficient evidence has not been discovered to make any comparison between each of other universities. So there is no difference in terms of responsiveness.

In terms of the scores of quality of service in credibility dimension; students of University-3 are different than other universities. University-3 meets its students' expectations for credibility more than other four universities. Sufficient evidence has not been discovered to make any comparison between each of other universities. So there is no difference in terms of credibility.

While in empathy dimension expectations are not met in all the universities, sufficient evidence has not been discovered to say that there is a difference between the universities in terms of quality of service.

Table 11: According to the universities Dimensions of the Weighted Servqual Scores

	University-1		University -2		University -3		University -4		University -5	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Tangibles	-,1644	,2304	-,2047	,3105	-,0863	,1571	-,1388	1,749	-,1217	1,730
Reliability	-,2525	,3343	-,1808	,1963	-,0514	,1907	-,2170	2,830	-,1313	2,429
Responsiveness	-,2327	,2899	,1079	,1541	-,0938	,2295	-,1930	2,410	-,1781	2,466
Credibility	-,2013	,3324	-,1529	,1959	-,0119	,1514	-,1628	2,484	-,1124	1,879
Empathy	-,1809	,2110	-,1649	,1659	-,0995	,1991	-,1580	1,902	-,1462	2,023
Sum of the servqual scores	-1,02		-0,8		-0,34		-0,87		-0,69	
Servqual Score *	-0,204		-0,16		-0,068		-0,174		-0,138	

* Servqual Score = Sum of the servqual scores / number of dimensions (5)

In terms of the total service quality scores (SERVQUAL score): University-3 students differ from the University-1 and University-4. University-3 meets the expectations of students more than University-1 and University-4. In terms of the total service quality scores (SERVQUAL score): University-5 students differ from the University-1. University-5 meets the expectations of students more than University-1. In terms of the total service quality scores (SERVQUAL score): Statistically sufficient evidence has not been discovered to make any comparison between University-2 and the other universities students. Similarly, statistically sufficient

evidence has not been discovered to make any comparison between University-5, University-3 and University-4; University-4 and University-1.

Conclusions

Information technologies which have lead all organizations to re-arrange their organizational has become one of the indispensable tools in the educational sector in the course of time. Computer and communications technologies which were used as support tools in education services in 90's, today appears to be as media through which all of the elements of the education service are provided. One of these media is the internet-based distance learning model. Internet-based distance learning model is applied in order to fulfill two basic objectives. The first of these is to provide support services to traditional education programs, and the second is to provide educational programs entirely over the network. In this context, the Internet-based distance learning is considered to be one of the most effective and appropriate means to meet the education requirements in the current period.

Through distance education, students are offered baccalaureate, master's, doctoral degrees as well as various certifications with an education for an academic degree at universities in the various countries without going to those countries. The method which is most frequently encountered in the literature on the measurement of the quality of service and which is the most reliable in terms of structure and internal consistency is Servqual method emerging as a marketing research tool. Owing to Servqual method, which dimension of the quality of service is affected and to which extent the overall quality of service is changed by innovation and changes in the structure of the services offered by businesses can be measured. And this can guide to make such vital and high cost decisions to be made as to which extent the innovation and change can be or can not be applied.

When low quality is determined as the result of the measurement, how much of this is from which dimension must be examined and improvement should be started from the proposition with the lowest quality. And in order to improve the issues addressed in the propositions, service delivery must be approached customer-oriented, and necessary arrangements should be made. Thus, quality of the service of the perceived service will be increased by raising the scores awarded to perception propositions.

The quality of service of distance education implemented in the education sector were examined in five dimensions as tangibles, reliability, responsiveness, credibility and empathy. Without taking universities providing education into consideration, for five dimensions determining the quality of service and the overall quality of service dimension, differences between expectations of students receiving education and perceived service quality were analyzed. The differences of scores given by students for the expected service and the expected service were statistically found significant for each dimension.

When partial SERVQUAL scores of dimensions are examined, while expected service are not met for students in all of the five dimensions affecting the quality of service at universities with e-mba education, the dimension with the most dissatisfaction is Responsiveness and it is respectively followed by Reliability, Empathy, Concrete features and Credibility. It can be said that the perceptions of the students are below their expectations. According to the survey, averages of all the expectations are higher than perceptions. It is found that expectations of participants in the research are not met and there is a dissatisfaction. It stands out that this difference is prominent particularly in variables of Responsiveness dimension. According to these results, it can be easily said that overall perceptions remained below overall expectations, and a there is a general dissatisfaction.

Whether or not there was a statistically significant relationship between demographic characteristics of the students and the quality of service that they perceived was investigated. And as demographic factors, age, marital status, income level and gender were examined. As a result of the test, no statistically significant relationship between perceived service of quality and income level, marital status and age was found.

Total SERVQUAL scores of the quality of service of E-MBA students do not differ from each other according to the gender. Only in the "Tangibles" dimension of Tangibles, reliability, responsiveness, credibility and empathy dimensions, a difference in the perception of the quality of service has been identified according to the gender, and that women were less satisfied than men has been determined.

While there is no difference in the dimensions of the quality of service at universities providing E-MBA education according to marital status, age, and income level of the students; differences in dimension of tangibles according to the gender have been identified. Satisfaction of women is less than men's in the dimension of tangibles. In order to increase the satisfaction, female students may be lead to fill out a detailed questionnaire, and what they expect from tangibles can be learned. In addition to this, by judging propositions in the dimension of tangibles, distance education portal can be arranged, and by providing the most recent resources in the library and access to these resources from library, level of satisfaction can be increased.

Distance education web pages should be kept constantly up to date; they must be remarkable and understandable. In addition to this, a secure environment in distance education portal must be provided by universities.

The differences between perceived services and desired services of students receiving education at University-1 for each dimension were found statistically significant. While the dimension where expectations of students at University-1 have not been met most is Reliability, it is followed respectively by Responsiveness, Credibility, Empathy and Tangibles. In this case, by examining sub-propositions particularly starting from the dimension of reliability and by making necessary improvements, expectations of students can be met. Application-oriented studies should be focused on. A competitive environment with degrees, encourage and reward should be provided to the students. The opportunity to interact with each other and with the faculty members should be provided to the students. Also elective courses should be included in the programs.

The differences between perceived services and desired services of students receiving education at University-2 for each dimension were found statistically significant. While the dimension where expectations of students at University-2 have not been met most is Tangibles, it is followed respectively by Reliability, Empathy, Credibility, and Responsiveness dimensions. In this case, by examining sub-propositions particularly starting from the dimension of tangibles and by making necessary improvements, expectations of students can be met. Distance education portal can be arranged, the most recent resources should be available in the library and access to these resources from library should be provided. Distance education web pages should be kept constantly up to date; they must be remarkable and understandable. In addition to this, a secure environment in distance education portal must be provided by universities.

While the differences between perceived services and desired services of students receiving education at University-3 for each dimension were found statistically significant, the differences in the dimensions of Reliability and Credibility were found insignificant, that is close to zero. While the dimension where expectations of students at University-3 have not been met most is Empathy, it is followed respectively by Responsiveness and Tangibles. In this case, by examining sub-propositions particularly starting from the dimension of empathy and by making necessary improvements, expectations of students can be met. Consultants should help the student to complete the program without any problems for the duration of education and students should be informed about the business opportunities created by the certificate/diploma that they receive at end of the program.

The differences between perceived services and desired services of students receiving education at University-4 for each dimension were found statistically significant. While the dimension where expectations of students at University-4 have not been met most is Reliability, it is followed respectively by Responsiveness, Credibility, Empathy, and Tangibles. In this case, by examining sub-propositions particularly starting from the dimension of reliability and by making necessary improvements, expectations of students can be met. In courses, application-oriented studies should be focused on. A competitive environment with degrees, encourage and reward should be provided to the students. The opportunity to interact with each other and with the faculty members should be provided to the students. Also elective courses should be included in the programs.

The differences between perceived services and desired services of students receiving education at University-5 for each dimension were found statistically significant. While the dimension where expectations of students at University-4 have not been met most is Responsiveness, it is followed respectively by Empathy, Reliability, Tangibles, and Credibility. In this case, by examining sub-propositions particularly starting from the dimension of responsiveness and by making necessary improvements, expectations of students can be met. Faculty members should provide to students every consulting service about the University and the program, and should be available to students. Administrative staff should deal with in person. The library staff should have the ability to meet demands and needs of the student.

While no difference was found between the scores of the quality of service of universities in terms of tangibles and empathy according to the students of E-MBA programs, statistically significant differences were found between the scores of the quality of service of credibility and overall quality of service (SERVQUAL score). Features such as the Internet, web page, education portal and their security which constitute tangibles are becoming features of first priority and providing a competitive advantage for any sector through advancing technological capabilities. Since almost identical facilities are available at universities, it is an expected situation that there may be a difference between them in terms of the dimension of tangibles.

While expectations of students at all university have not been met in the dimension of tangibles, sufficient evidence has not been discovered to say that there is a difference between the universities in terms of quality of service. This result does not alter the fact that universities need a certain period of time since their establishment in order to make up their deficiencies and to provide a good education. Universities established at

first with a large number of deficiencies reduce their deficiencies gradually within the course of time with the increase in the number of their students and experiences.

As for the score of the quality of service of the dimension of Reliability; the expectations of the students of the University-3 is different than the expectations of the students of University-1, of University-2, and of University-4. The dimension of Reliability is an indication of whether or not the administrative structure of the university providing the service has been created. The dimension of Reliability is also about activities such as doing jobs in time and as promised, and that faculty member do their jobs properly. University-3 meets expectations of students for reliability more than students of University-1, of University-2, and of University-4. Sufficient evidence has not been discovered to make any comparison between University-3 and University-5, and between each of other universities. That is, it can be said that there is no difference in terms of reliability.

As for the score of the quality of service of the dimension of Responsiveness; the expectations of the students of the University-2 is different than the expectations of the students of University-1. This dimension reveals the importance of teaching staff for good quality of educational to be provided by the schools. The dimension of responsiveness includes criteria such as efforts of faculty members to improve students' knowledge and skills, to be exemplary to the students; to deal with the students' problems, and to find answers for questions put to them at every opportunity. University-2 meets expectations of its students for responsiveness more than University-1. Sufficient evidence has not been discovered to make any comparison between other universities for responsiveness. That is, there is no difference in terms of responsiveness.

As for the score of the quality of service of the dimension of Credibility; the expectations of students of University-3 are different than those of students of other universities. University-3 meets expectations of its students for credibility more than other four universities. Sufficient evidence has not been discovered to make any comparison between each of other universities. That is, there is no difference in terms of credibility.

While in the dimension of Empathy expectations of students of all universities are not met; sufficient evidence has not been discovered to say that there is a difference between universities in terms of the score of the quality of service. Propositions that faculty members should help for the careers of students and advice them, that consultants should help the student to complete the program without any problems, that students should be informed about the business opportunities created by the certificate/diploma that they receive at end of the program are within the dimension of empathy.

According to these results, it is seen that the overall perceptions has remained below the overall expectations, and there has been a general dissatisfaction. In this case, it is clear that in order to increase the quality of services, and thus to increase student satisfaction, first of all the dimension of responsiveness should be displayed sensitivity. It should be followed respectively by dimensions of Reliability, Empathy, Tangibles and Credibility. In this case, by examining sub-propositions particularly starting from the dimension of responsiveness and by making necessary improvements, expectations of students can be met. Faculty members should provide to students every consulting service about the University and the program, and should be available to students. Administrative staff should deal with in person. The library staff should have the ability to meet demands and needs of the student In addition, propositions for the dimension of reliability should be handled. A competitive environment with degrees, encourage and reward should be provided to the students. The opportunity to interact with each other and with the faculty members should be provided to the students. Also elective courses should be included in the programs. By examining propositions for the dimension of Empathy, which is ranked as the third in the order of importance, improvements should be done in the practice. In accordance with this, faculty members should guide students for their careers. Consultants should help the student to complete the program without any problems, and students should be informed about the business opportunities created by the certificate/diploma that they receive at end of the program. The dimension which is ranked 4th is the dimension of Tangibles. According to this dimension, distance education portal should be arranged, the most recent resources should be available in the library and access to these resources from library should be provided. Distance education web pages should be kept constantly up to date; they must be remarkable and understandable. In addition to this, a secure environment in distance education portal must be provided by universities. The last dimension to meet the expectations of students is the dimension of credibility. By examining sub-propositions of the dimension of credibility, and by making necessary improvements, expectations of students can be met.

The demands and needs of students are critical to the design of educational systems and to improving in the following years. Identifying the expectations of the students from higher education, measuring the quality of the service they receive through the eyes of students, will be one of the most important elements that the higher education institutions should take into account to develop their quality management system. The authorities of the universities should examine the causes and consequences of assessments of the students, and produce solutions for their negative assessments. These assessments should be continuously repeated at regular

intervals, and to what extent applied solutions are realized should be followed. This and similar studies should be continuously and regularly conducted in all universities, and they can be used as an important tool to enhance the quality of education in universities.

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Recreational Forest Landscape Planning in Selangor, Malaysia

Mohd Kher Bin Hussein and Osman Bin Mohd Tahir

Department of Landscape Architecture, Faculty of Design and Architecture,
Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

mohdkher@upm.edu.my

Abstract: Recreational forest in Peninsular Malaysia has been established by the Forestry Department of Peninsular Malaysia for sustainable use since 1965. The purpose of the establishment is for preservation and conservation as well as wise use of natural resources. Until today, the numbers of recreational forest in Peninsular Malaysia had increased where it was reported that the total sites are 125 as for 2010. In Selangor itself, it was reported that 10 sites had been developed. Nevertheless, their landscape planning is based on *ad hoc* or *insitu* approach that is unsustainable attitude. Due to that, this study tries to comprehend a stakeholder perception towards recreational forest landscape planning related to planning implementation, development approach, facility development and criteria's that can pursue to sustainable planning approach. By understanding stakeholder perception, a more sustainable planning approach can be developed for the comfort of users and the environment in the future. Thus, objectives of the study was to analyze stakeholders' perception towards sustainable recreational forest landscape planning in order to benefited to future development in terms of environment, social and economy. Results shows that stakeholders' perception is still in line with the statement of landscape recreational forest planning was developed through *ad hoc* approaches that are unsustainable way. This is due to the fact that this site has been developed without landscape master plan, grounded on user demands and requirements. Therefore, a concrete actions need to be taken and landscape master plan should be prepared by the management to overcome the issue of unsustainable landscape development planning.

Key words: Landscape, planning, sustainable, recreational forest, perception.

Introduction

Recreational forest development in Peninsular Malaysia started in First Malaysia Plan (1966 – 1970). The aim of the establishment was to preserve, conserve and wise use of natural resources, especially the forest. Since the establishment, their landscape also changes where lots of man-made landscape elements were introduce such as bench, picnic table, shelter, walkways, office, changing rooms, toilets and others. The development was continued in the next five years Malaysia Plan (Table 1).

Table 1 Numbers of Recreational Forest in Peninsular Malaysia

Malaysia Plan	Years	Numbers of Recreational Forest That Have Been Developed
First	1966 – 1970	3
Second	1971 – 1975	1
Third	1976 – 1980	14
Fourth	1981 – 1985	28
Fifth	1986 – 1990	27
Sixth	1991 – 1995	22
Seventh	1996 – 2000	19
Eighth	2001 – 2005	7
Ninth	2006 – 2010	4
Total		125

Source: Peninsular Malaysia Forestry Department, 2007.

The more rapidly development of recreational forest started in the periods of Third Malaysia Plan (Table 1). The development has been further increase in Fourth Malaysia Plan (1981 – 1985) and the number of sites development in Fifth Malaysia Plan (1986 – 1990) is similar with the numbers in Fourth Malaysia Plan. Generally, the development of recreational forest continued in every development in the Malaysia plan. This is due to the increased of public awareness for outdoor recreational activity and environmental conservation. At the same time recreational forest development can fulfill public demand for outdoor activity such as picnicking, recreation and environmental appreciation. The fast development activity that has been faced by the country also contributed to the firm recreational forest development. Therefore, it's given some sort of pressure to the management to develop and planned the sites in sustainable way as well as to protect and conserve existing natural forest for human health.

Recreational forest landscape development in Peninsular Malaysia can be divided into three phases, based on man-made landscape development and recreational activity demand. The earlier phase (1966 – 1979), the development just provides a space for publics' to do basic recreation activities such as picnicking, swimming, camping and observing forest environment. The numbers of man-made landscape elements (e.g. accommodations) were developed in small quantities.

The development of recreational forest landscape came into second phase (1980 – 1989) due to the increased demand from public's for suitable space to carry out outdoor activities such as jungle trekking, environmental appreciation, research and education purposes and other active activity like mountain climbing. Visitor's demand also has urged the Peninsular Malaysia Forestry Department to increase the number of man-made landscape elements in recreational forest area. Thus, the number has increased, but has been implemented through *ad hoc* approach without any detail development plan and assessment study (Chee, 1986).

The development of recreational forest landscape enters into third phase (1990 - till now) when the area has become ecotourism site and in time with the first Visit Malaysia Year campaign in 1990. Visit Malaysia Year has encouraged public to appreciate recreation and tourism. Therefore, it attracts more tourists to come to recreational forest areas (either local or international tourists). Starting from this situation, recreational forests have been recognized as "tourism groups area" and have received large numbers of tourist every year. This situation has encouraged the management to increase the number of man-made landscape elements such as accommodation (chalets) that allow people overnight in the area.

Due to the above scenario, some recreational forest sites have been handover to other parties to be managed and develop such as state tourism and local authority. In Selangor for example, Sungai Chongkak Recreational Forest and Templer Recreational Forest have been handover to Selangor Tourism Sdn. Bhd. and Selayang Municipal Council, respectively. Now, there are three parties involved in managing and developing the recreational forest landscape in Selangor which are the (i) state government (ii) local authority and (iii) private sector (Mohd Kher et al. 2009).

However, how stake holders perceive recreational forest landscape planning is still in question. Therefore, this study tries to comprehend a stakeholder perception towards recreational forest landscape planning related to planning implementation, development approach, facility development and criteria's that can pursue to sustainable planning approach. By understanding stakeholder perception, a more sustainable planning approach can be developed for the comfort of users and the environment in the future. Objectives of the study was to analyze stakeholders' perception towards sustainable recreational forest landscape planning in order to benefited to future development in terms of environment, social and economy. Stakeholders in this study are referred to the management staff, local resident and user.



Photo 1: The beauty of Malaysia's recreational forests landscape has attracted people to visit the site and required proper management planning to ensure their sustainability.

Methodology

This study used case study as research approach. Three recreational forests in Selangor have been selected as case study namely Sg. Chongkak Recreational Forest, Sg. Tekala Recreational Forest and Templer Recreational Forest (Figure 1). In order to understand stakeholder perception regarding sustainable landscape planning of the study sites, structured questionnaire has been used. Likert scales were used to measure respondent perception level by using the scales of “strongly agree = 3”, “agree = 2”, “not agree = 1”, “strongly needed = 3”, “needed = 2”, “not needed = 1”, “very good = 3”, “good = 2” and “not good = 1”. Three scales were used in order to avoid middle answer compared to five scales that can cause bias to the middle answer.

In selecting the respondent, simple random technique has been apply where respondents were selected based on ready availability on site (Rea & Parker 1997) and they all have the potential to be selected as respondent. Respondent have been meet face to face and were asked whether agree to become respondent or not. If he/she agreed, then the survey was continuing, otherwise, other respondent were selected.

In this study, 533 respondents have been successfully selected. According to stakeholders group, 360 respondents are users, 83 are management staffs and 90 respondents are local peoples. This figure is big enough and reliable for carry out statistical analysis. The data were analyse using computer via Statistical Programme Social Science (SPSS). The study was carried out in May till August 2009.

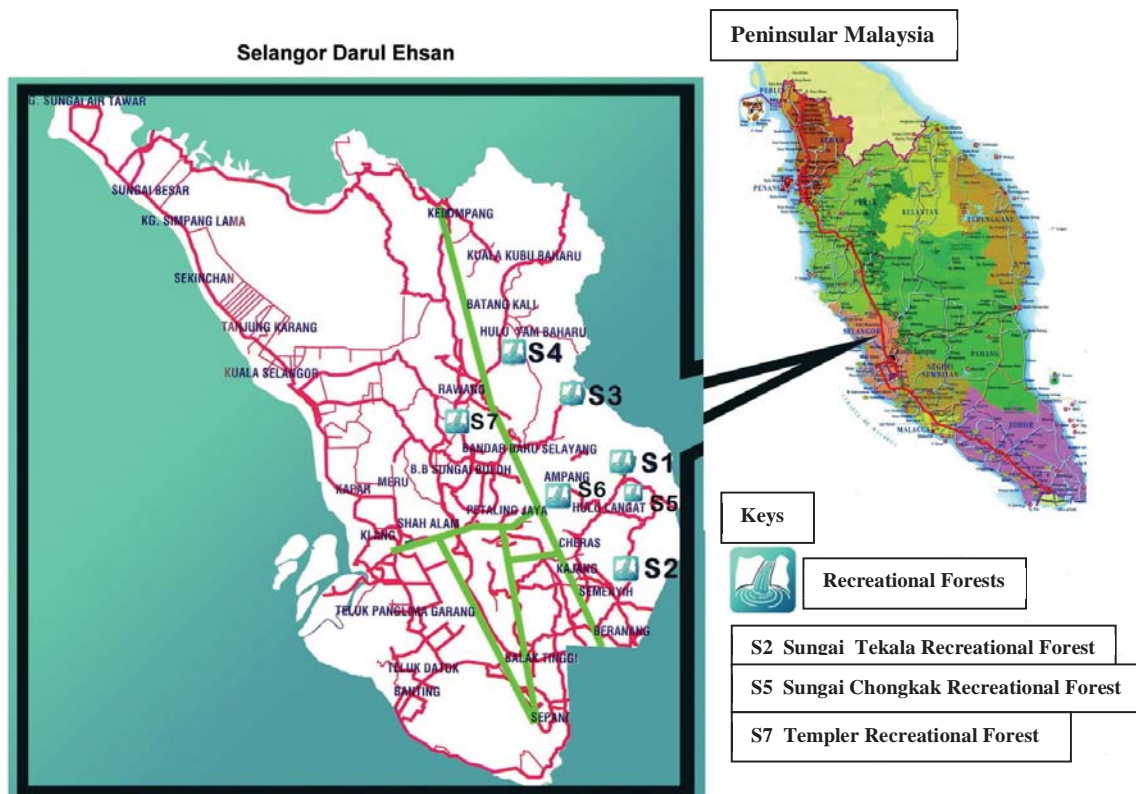


Figure 1: Location map of study sites

Results and Discussion

In this section, results and discussion have been focus on the topics related to landscape planning which is approach, infrastructure/accommodation development, designs, abandonment syndrome and respondents satisfaction towards recreational forest landscape development. KP is referred as management staff, PHR as user of recreational forest and PS as local resident.

Results in Table 2 shows that more than half of the respondents perceived that study sites have been developed according to detail recreational forest landscape planning plan (KP - 75.0%, PHR - 78.9%, PS - 64.4%). However, this result has contra with what has been mentioned by the park officers' during the interview where each of them has mentioned that there are no landscape development planning plan have been prepared and referred too. This perception occurred because nearly all landscapes are judged and enjoyed according to the degree that they clearly exhibit care (Nassauer 1997). Furthermore, the setting of man-made landscape elements in the study sites is according to layout plan that make their setting look like followed detail landscape master plan. Whatever respondents perceived towards landscape setting of the study sites, the most important things are the management must prepare landscape master plan based on the need to maintain sufficient areas of productive, protective and amenity forests while recognising at the same time the sustained efforts to promote economic activities in the form of secondary and tertiary processing, trading, and marketing are equally vital. The management should realize that landscape planning are the programme of work for nature conservation and landscape management as well as the contents of the landscape planning support other agencies and planning authorities to realise environmentally friendly and resource-sparing development (Haaren et al., 2008).

Table 2 also shows that more than half of KP (53.2%) and PHR (63.3%) perceived that study sites have been developed followed to certain development guidelines such as Ecotourism Guidelines. While, more than half of PS (57.8%) has contra perception due to they still perceived that most of the development that have been implemented did not produced Environmental Impact Assessment (EIA) or Soscial Impact Assessment (SIA) reports (Badaruddin 2008). Author believe that the differences in perception towards this item can be eliminate if the management had landscape master plan and the development information had been given to the public. Only awareness and high commitment among government, policy makers, policy implementers and the society can make it happen.

Landscape development of recreational forest in Peninsular Malaysia strongly depend on government allotment (KP - 93.8%, PS - 80.0%, PHR - 88.1%) (Table 2). This is due to the fact that recreational forests establishment is not for profits. This result is in line with the park officer's statement that the government allocation is very important for planning development and management of their site. In addition, efficient budget is very important for infrastructures and research development that can ensured recreational forest sustainability in future (Badaruddin 2008).

Table 2 Perception toward Recreational Forest Landscape Development Planning

Items	Yes		No	
	Total	%	Total	%
Have overall development planning plan				
*KP (N=80)	60	75.0	20	25.0
PS (N=90)	58	64.4	32	35.6
PHR (N=360)	284	78.9	76	21.1
According to certain guidelines				
*KP (N=77)	41	53.2	36	46.8
PS (N=90)	38	42.2	52	57.8
PHR (N=360)	228	63.3	132	36.7
Depends on government allotment				
*KP (N=81)	76	93.8	4	4.9
PS (N=90)	72	80.0	18	20.0
PHR (N=360)	317	88.1	43	11.9

Note: *Some respondents did not answered, KP – Management staffs, PS – Local people, PHR – User of recreational forest



Photo 2: Nearly all recreational forest landscapes are judged and enjoyed according to the degree that they clearly exhibit care.

In terms of planning approach, results have shown that 25 - 50% respondents perceived that landscape development of study sites were carried out base on *ad hoc* or *insitu* planning approaches (Table 3). This result has close related with Chee (1986) statement where he argued that the development of recreational forest in Peninsular Malaysia was implemented through *ad hoc* approach and without overall development plan. In addition, it's also related with users' perception on the condition of infrastructures in recreational forests that has been perceived by them as under their satisfaction (Roshanim dan Fazidah 2008). But, majority KP (71.6%) and more than half of PHR (68.6%) as well as less than half PS (44.4%) mentioned that landscape development planning of recreational forest is based on master plan (this result is in line with analysis on Table 2). Based on this result, the management must take serious action to transform their development strategy by developing overall landscape master plan. Otherwise the issue of *ad hoc* or *insitu* development will be continued even though the parks had been established for more than 47 years in Peninsular Malaysia.

Table 3 Landscape Recreational Forest Development Planning Approach

Stake Holders'	Development Planning Approach						Total N
	Via Master Plan		<i>Adhoc/Insitu</i>		Others		
	N	%	N	%	N	%	
*KP	58	71.6	20	24.7	3	3.7	81
PS	40	44.4	43	47.8	7	7.8	90
PHR	247	68.6	107	29.7	6	1.7	360

Note: * Some respondents did not answered (2 respondents), KP – Management staff, PS – Local people, PHR – User of recreational forest

On the other hand, more than ninety percent's PS and PHR (PS - 97.7%; PHR - 96.7%) perceived that man-made landscape elements is not harmonize and unsuitable with existing environment especially in terms of designs (Table 4). This is because most of the tourism site in Malaysia has significant problem with their developments where the "code of design" of landscape and architectural quality were absence (Noorizan, 1995). This situation also portrays that the development of accommodation and facility as well as other man-made landscape elements in recreational forest site influence people perception towards the landscapes (Manmohan, 1990). Analysis also showed that majority KP (79.0%) and PHR (91.7%) as well as more than half PS (58.9%) perceived that accommodation and facility development in recreational forest depends on ecotourism concept itself and required a good and detail planning plan. Therefore, recreational forest landscape development should be planned carefully and accordance to ecotourism norms as well as did not implemented via *ad hoc* approach (Badaruddin dan Nikmatul Adha 2007). Their accommodations development also needs to be develop according to existing environment characteristics (Roshanim & Fazidah 2008). The ignorance of this aspect by the management will cause to abandon syndrome of recreational forest sites in future.

Table 4 Infrastructure and Accommodation Development

Items	Strongly agree		Agree		Not agree	
	Number	%	Number	%	Number	%
Man-made landscape elements do not harmony and unsuitable with forest environment						
*KP (N=81)	2	2.5	18	22.2	61	75.3
PS (N=90)	31	34.4	57	63.3	2	2.2
PHR (N=360)	35	38.9	52	57.8	3	3.3
Accommodation development depends on ecotourism concept and required good planning						
*KP (N=81)	20	24.7	44	54.3	17	21.0
PS (N=90)	87	24.2	125	34.7	148	41.1
PHR (N=360)	68	18.9	262	72.8	30	8.3

Note: * Some respondents di not answered(1 respondent), KP – Management staff, PS – Local people, PHR – User of recreational forest

Looking at the conservation strategy that have been implemented for recreational forest, analysis in Table 5 show that more than eighty percent respondents (KP - 80.3%; PS - 97.8%; PHR - 94.5%) perceived that if the management fails to prepare recreational forest landscape master plan, conservation efforts will receive negative impacts and cannot satisfy publics. This is because the successfulness of development of landscape recreational forest is through strategic development approach that follows planning and management strategy in order to achieve function and role of recreational forest (Morgan 1996). Thus, without landscape planning plan can causes to difficulty in implementing sustainable recreational forest development itself. In addition, more than ninety percent PS (91.1%) and PHR (90.0%) as well as more than half KP (61.0%) perceived that accommodation development that base on international or modern style can causes visual destruction and not ecofriendly as well as can cause to the failure of recreational forest conservation too (Table 5). Therefore, this study urged related parties to be more sensitive when wanted to develop recreational forest in order to ensure their development can be accepted by the public's and more conserving the existing forest environment (Wan Sabri 1987).

Table 5 Perception towards Recreational Forest Conservation in Their Development

Items	Strongly agree		Agree		Not agree	
	Jumlah	%	Jumlah	%	Jumlah	%
Failed to prepared detail landscape development plan gives an impacts on recreational forest conservation						
*KP (N=81)	23	28.4	42	51.9	16	19.8
PS (N=90)	28	31.1	60	66.7	2	2.2
PHR (N=360)	200	55.6	140	38.9	20	5.6
Accommodation development that base on international or modern style causes to visual reduction and not ecofriendly as well as causes to conservation effort failed						
*KP (N=81)	24	29.3	26	31.7	32	39.0
PS (N=90)	31	34.4	51	56.7	8	8.9
PHR (N=360)	175	48.6	149	41.4	36	10.0

Note: * Some respondents did not answered. KP – Management staff, PS – Local people, PHR – User of recreational forest



Photo 3: The design of human made landscape elements in recreational forest should apply ecofriendly and harmonize designs with surrounding environment as well as with local design enhancement.

In terms of design planning, more than majority of KP (81.4%) and more than half of PHR (62.5%) perceived that the designs should apply ecofriendly and harmonize designs with surrounding environment. However, half of PS (51.1%) perceived with local design enhancement (Table 6). Both designs actually fulfill and follow sustainable landscape characteristics due to it portrays unique approach in relationship with environment (Schenaider 1981; Rykwert 1972). However, the most important things for related parties to take into account is they should implement sustainable landscape principles and standard requirements in serious ways especially in planning, implementation, management and landscape maintenance in order to achieve recreational forest sustainability (Beamiss 1987; Riry Zaimora 2006).

The development planning of recreational forest landscape should followed several criteria's to avoid abandonment syndrome. In this study, results show that more than half KP (75.9%) as well as majority PS (84.5%) and PHR (88.9%) perceived that trees cutting for construction area should be at 10 - 15% of overall site area (Table 7). This is in line with Fischer (1991) recommendation that trees cutting for protected area should be at 10 - 15% only for construction purposes.

Table 6 Types of Accommodation Design in Recreational Forest

Items / Stake Holders'	*KP		PS		*PHR	
	Total	(%)	Total	(%)	Total	(%)
Modern	2	2.5	3	3.3	21	5.8
Ecofriendly/harmony	6	81.4	28	31.2	225	62.5
Local	0	0.0	46	51.1	79	21.9
Contemporary	3	3.7	3	3.3	11	3.2
Combination	10	12.4	10	11.1	14	6.6
Total	81	100.0	90	100.0	350	100.0

Note: * Some respondents did not answered. KP – Management staff, PS – Local people, PHR – User of recreational forest

In term of structural construction, majority of the respondents (KP - 97.5%; PS - 83.8%; PHR - 93.0%) perceived that the structure should be built at area more than 30° slop and not at the flooding risk as well as landslide areas (Table 7). This perception is in line with the standards for avoiding structural from environmental danger such as erosion or heavy winds (Schwanke 1997). While, majority PS (93.3%) and PHR (90.6%) as well as more than half KP (78.1%) perceived that building construction (e.g. chalet) should not use air conditioner to coldness the internal buildings (Table 7). This matter is in line with Pearson and David (1994) suggestion where they encourage the use of natural wind as coldness tool for ecotourism site. At the same time, majority PS (88.9%) and more than half KP (71.6%) as well as half PHR (50.0%) has an agreement on the use of sun energy as alternative source for energy in recreational forest site (Table 7). This is due to the fact that previous study has shown the used of sun energy can protect and reducing huge impacts on environmental (McKercher 1993).

For structural elements development, almost all respondents (KP - 100.0%; PS - 94.5%; PHR - 96.3%) perceived that the form or design of structural elements (e.g. bench, bridge, and building) should portray local design and enhancing surrounding environment (Table 7). This is due to the fact that local designs are more appropriate with existing environment and can strengthen the architecture of the area itself (Walter 1987).

Furthermore, almost all respondents (KP - 100.0%; PS - 96.7%; PHR - 98.0%) also agreed that the structural/building designs should also portray vernacular design (Table 7). This is because combination between local and vernacular form and design strongly needed for creating a good relationship with the environment (Schmid 1983).

In term of construction materials aspect, majority respondents (KP - 92.7%; PS - 91.1%; PHR - 95.0%) perceived that the materials used must be local materials (e.g. wood, bamboo, paddy hay, *nypha* leaves and others) (Table 7). Lippsmiler (1997) and Schmid (1983) encourage the use of local materials for construction works in protected area for sustainability purposes. On the other hand, majority respondents (KP - 84.1%; PS - 96.7%; PHR - 98.3%) also agreed that color application on structural in recreational forest should apply natural colors such as brown and green (Table 7). Basically, natural colors are much suitable for forest environment due to the fact that those colors are calm and peaceful (Brenda and Robert 1996 in Riry Zaimora 2006). Majority of the respondents (KP - 84.2%; PS - 94.5%; PHR - 95.6%) also perceived that structural design should portray special characteristics of forest that only can be found in recreational forest (Table 7). Noorizan (2004) argued that enhancing special characteristics of recreational forest is necessary because it can control the important of history value, cultural, conserving ecosystem and aesthetic values, increasing economy and tourism sector as well as can educate the publics.



Photo 4: The development of human landscape elements of recreational forest should followed several criteria's to avoid abandonment syndrome such as portray local design and enhancing surrounding environment

Table 7 Perception towards Criteria that can Avoid Abandon Syndrome of Recreational Forest

Items	Strongly agree		Agree		Not agree	
	Number	%	Number	%	Number	%
Trees cutting for construction area should be at 10 %-15 % only						
* KP (N=79)	25	31.6	35	44.3	19	24.1
PS (N=90)	24	26.7	52	57.8	14	15.6
PHR (N=360)	203	56.4	117	32.5	40	11.1
Structural should be constructed on the slope more than 30° and not on the flood and landslide risk area						
*KP (N=81)	46	56.8	33	40.7	2	2.5
PS (N=90)	24	26.7	55	61.1	11	12.2
PHR (N=360)	215	59.7	120	33.3	25	6.9
Building construction such as chalet not use air conditioner						
*KP (N=82)	40	48.8	24	29.3	18	11.0
PS (N=90)	44	48.9	40	44.4	6	6.7
PHR (N=360)	221	61.4	105	29.2	34	9.5
Building construction such as chalet should use sun energy as energy source						
*KP (N=81)	31	38.3	27	33.3	23	28.4
PS (N=90)	39	43.3	41	45.6	10	11.1
PHR (N=360)	68	18.9	112	31.1	180	50.0
Structural form/design (bench, bridge and others) should enhance local design and portray natural environment						
*KP (N=81)	40	49.4	41	50.6	0	0.0
PS (N=90)	34	37.8	51	56.7	5	5.6

PHR (N=360)	232	64.4	115	31.9	13	3.6
Structural/building design enhance vernacular /local design						
*KP (N=81)	32	39.5	49	60.5	0	0.0
PS (N=90)	35	38.9	52	57.8	3	3.3
*PHR (N=359)	237	66.0	115	32.0	7	1.9
Construction materials for structure from local materials such as wood, bamboo and others						
*KP (N=82)	30	36.6	46	56.1	6	7.3
PS (N=90)	30	33.3	52	57.8	8	8.9
*PHR (N=359)	212	59.1	129	35.9	18	5.0
Colors application for structural must appropriate with existing environment which is enhance nature colors such as chocolate and green						
*KP (N=82)	28	34.1	41	50.0	13	15.9
PS (N=90)	41	45.6	46	51.1	3	3.3
PHR (N=360)	228	63.3	126	35.0	6	1.7
The structural design enhance special characteristics that can only be found in recreational forest						
*KP (N=82)	29	35.4	40	48.8	13	15.9
PS (N=90)	44	48.9	41	45.6	5	5.6
PHR (N=360)	244	67.8	100	27.8	16	4.5

Note: * Some respondents did not answered. KP – Management staff, PS – Local people, PHR – User of recreational forest

Looking at respondents' satisfaction toward recreational forest landscape development, Table 8 show that their satisfaction can be divided into two: firstly, nearly half of them feel satisfy (KP - 57.8%, PS - 62.3%, PHR 46.4%) and secondly, half of them feel unsatisfied (KP - 42.2%, PS - 37.8%, PHR - 53.3%). This results has similarity with the findings by Wahida 2006) where she found that majority of the visitors of Sungai Tekala Recreational Forest are not satisfy with infrastructural development of the site and nearly 58% satisfy with the development. Two category of satisfaction has occurred because respondents always have different attitude and norm (Dorwart 2007) and has been influenced by the differences in individual desire and taste that are always change according to time (Roshanim dan Fazidah 2008). Probably, it's also due to the perception made according to situation where respondents thinks it is necessary (Manning 1999). For instance, for PS respondents who received economic benefits from the recreational forest development will act positively (satisfy) towards tourism (Davis et al. 1995). PS respondents, who feel the development does not increase their quality of life, will neglect the existence of recreational forest (W. Mansor et al. 1991). Therefore, those perceptions urge related party to improve their landscape development implementation efforts that can change public's negative perception and can fulfill the needs of public at all level.

Table 8 Respondents Satisfaction Towards Landscape Recreational Forest Development

Item	Very satisfy		Satisfy		Not astisfy	
	Number	%	Number	%	Number	%
Are you satisfy with landscape recreational forest development currently?						
KP (N = 83)	4	4.8	44	53.0	35	42.2
PS (N = 90)	5	5.6	51	56.7	34	37.8
PHR (N = 360)	19	5.3	149	41.1	192	53.3

Note: KP – Management staff, PS – Local people, PHR – User of recreational forest



Photo 5: People's perceptions towards recreational forest landscape are different because people always have different attitude, norm, desire and taste that are always change according to time

Conclusions

This study has shown that recreational forest landscape planning in Peninsular Malaysia's needs further improvement and transformation. Stakeholders' still perceive that their development is less harmony with existing environment and does not fulfill the ecotourism as well as sustainability concept. Sustainability should stress on the ability to fulfill current needs without compromising the future generation requirements. *Adhoc* or *insitu* planning approach has resulted to the study sites have faced unsustainability. Thus, a good landscape planning should be given priority by the management. Recreational forest landscape development must have overall landscape master plan and accordance to related development policy plan, e.g. Ecotourism Policy. While, site problems that has been identify should be solve through landscape designs in order to achieve required landscape objective. The point is landscape development must give priority to environmental, social and economic aspects that can lead to sustainability of recreational forest landscape.

A clear picture of this study was the development that has been implemented without overall landscape master plan. Most probably, these developments were based on necessity, user needs and *adhoc* basis that causes to no special identity has been created to the infrastructures/accommodations. It was found that nearly all man-made landscape elements of the study sites have similarity in terms of design or forms and quite similar with recreational areas in urban park. Therefore, the management should prepare overall landscape master plan for their site in order to identify the site own identity, easy to make decision and to supervise the site. A part of that, planning, experts' collaboration, design, local people involvement and landscape maintenance should be given priority when developing and managing the site.

On the other hand, criteria's for avoiding recreational forest abandonment syndrome as perceived by the stake holders in this study should be given priority. Those factors are very important in helping to achieve sustainable landscape development. Fails to take into account of that factors can causes to landscape sustainability approach cannot be achieve, hence resulted to site elimination and abandonment.

Several improvements need to be taken by related party in order to strengthen the aspects of environment, social, economy and design as mentioned earlier. In addition, landscape recreational forest development must be planned before the development takes place in order to protect and preserve natural landscape resources (e.g. forest, river, hills, and water fall). It is also very important in strengthening the efforts of achieving higher sustainable development of recreational forest.

Finally, collaboration from all party involved is needed in ensuring the successfulness of sustainable landscape approach for recreational forest in Malaysia. All levels of public, no matter they are politician, professional, decision maker, local people and user must plays their own rule in ensuring landscape sustainability of recreational forest are success for the sake of our environment, social and economy. Recreational forest landscape development process should start from bottom to the top levels which start from user, local people, owner, decision maker and politician. In line with this, overall landscape master plan for recreational forest is very important and must be prepared in order to ensure all parties can be involved. Through that plan, the development also can be made more efficient and effective as well as can fulfill the sustainability principles. When it comes to reality,

stakeholders' perception towards recreational forest landscape can be improved and abandonment syndrome can be avoided.

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Prediction and Diagnosis of Diabetic Retinopathy using Data Mining Technique

Hayrettin Evirgen, Menduh Çerkezi

Sakarya University, Department of Computer Engineering, Serdivan-Sakarya/Turkey

evirgen@sakarya.edu.tr

Abstract Diabetic retinopathy is the most common form of eye problem affecting people with diabetes, usually only affects people who have had diabetes for a long time period and can result in blindness. The aim of this study is to examine the naive Bayes algorithm which is one of the classification methods in data mining, and to analyze real life dataset in order to built predictive system for diabetic retinopathy disease. A total of 385 diabetes patients' data were used to train the prediction system. All the categorical features in the dataset were selected by doctors and evaluation was made based on these features. The dataset was obtained at the Eye Clinic of the Sakarya University Educational and Research Hospital. It has been proven with cross-validation that naive Bayes algorithm can be used for diabetic retinopathy prediction with an improved accuracy of 89%.

Keywords: Naive Bayes, Diabetic Retinopathy, Data Mining.

Introduction

Data mining is the exploration of large datasets to extract hidden and previously unknown patterns, relationships and knowledge that are difficult to detect with traditional statistical methods (Han and Kamber, 2006). The areas where data mining is applied recently include engineering, marketing, healthcare and financial forecasting. Data mining in healthcare is an emerging field of high importance for providing prognosis and a deeper understanding of medical data (Liao and Lee, 2002). The availability of huge amount of patient's data from which to extract useful knowledge, researchers have been using data mining techniques to help health care professionals in diagnosis of diseases. Developing a tool to be embedded in the hospitals management system to help the healthcare professionals in diagnosing patients is important.

The disease predictions play an important role in data mining. Researchers are using data mining techniques in the diagnosis of several diseases such as diabetes (Fang et al., 2009), cancer (Salehi et al., 2010) and heart diseases (Shouman et al., 2012).

In these studies, several data mining techniques are used, such as Naïve Bayes, K-Nearest Neighbor, Decision Tree, Neural Network and also Clustering methods.

Mohammad R. Shakouriet et al. proposed two different techniques from data mining and case-based reasoning. They used K-Nearest Neighbor and Decision Tree-techniques to predict diabetic retinopathy (Shakouriet , 2012). On the other hand, in (Chan et al., 2008) the authors explored the relationship between physiological data and retinopathy using two data mining techniques, namely C5.0 and Neural Network.

In another study, the authors proposed to examine the relationship between the retinal vessel diameter and the risk of retinopathy using the measurement of retinal vessel diameter from fundus photographs (Klein et al., 2004).

This study aims to design a software tool to help health care professionals. At the same time, this application shows the applicability of data mining methods for many problems in the medical field.

Materials and Methods

a. Description of Dataset

The dataset was obtained at the Eye Clinic of the Sakarya University Educational and Research Hospital. The dataset consists of 385 records. In dataset each record consists of 9 features. These are, namely, Glycated Hemoglobin (HbA1C), Hemoglobin (HGB), URE, High-Density Lipoprotein (HDL), Low-Density Lipoprotein (LDL), Diabetes Duration, Triglyceride, Creatine and Glucose. Because Naïve Bayes algorithm does not permit continuous data type, all the values in the dataset are treated as categorical. In Table 1, the diagnosis columns show the categorical values for the corresponding features. The diagnosis column is identified as predictable feature with value “1” for patients with diabetic retinopathy and value “0” for patients with non diabetic retinopathy. All the categorical features in the dataset were selected by doctors and evaluation was made based on these features.

Table 1: Demonstrates the clinical feature of the patients in the dataset.

Feature Number	Description of Feature	Diagnosis (1)	Diagnosis (0)
1	Glycated Hemoglobin (HbA1C)	< 6.5	>= 6.5
2	Hemoglobin (HGB)	> 12	<= 12
3	High-Density Lipoprotein (HDL)	> 40	<= 40
4	Low-Density Lipoprotein (LDL)	< 130	>= 130
5	Diabetes Duration	< 5	>= 5
6	Triglyceride	> 150	<= 150
7	Creatine	> 1,2	<= 1,2
8	Glucose	> 140	<= 140
9	URE	> 45	<= 45

b. Naïve Bayes

The Bayesian Classification represents a supervised learning as well as a statistical method for classification. Assumes an underlying probabilistic model and it allows us to capture uncertainty about the model in a principled way by determining probabilities of the outcomes. It can solve diagnostic and predictive problems. Naïve Bayes algorithm is based on Bayesian Theorem.

Steps in algorithm are as follows:

1. Each data sample is represented by an n dimensional feature vector, $X = (X_1, X_2, \dots, X_n)$, depicting measurements made on the sample from n attributes, respectively A_1, A_2, A_n .
2. Suppose that there are m classes, C_1, C_2, \dots, C_m . Given an unknown data sample, X (i.e., having no class label), the classifier will predict that X belongs to the class having the highest posterior probability, conditioned if and only if:

$$P(C_i|X) > P(C_j|X) \text{ for all } i < j \leq m \text{ and } j \neq i$$

Thus we maximize $P(C_i|X)$. The class C_i for which $P(C_i|X)$ is maximized is called the maximum posteriori hypothesis. By Bayes theorem,

$$P(C_i|X) = (P(X|C_i)P(C_i))/P(X)$$

3. As $P(X)$ is constant for all classes, only $P(X|C_i)P(C_i)$ needs to be maximized. If the class prior probabilities are not known, then it is commonly assumed that the classes are equally likely, i.e. $P(C_1) = P(C_2) = \dots = P(C_m)$, and we would therefore maximize $P(X|C_i)$. Otherwise, we maximize $P(X|C_i)P(C_i)$. Note that the class prior

probabilities may be estimated by $P(C_i) = s_i/s$, where s_i is the number of training samples of class C_i , and s is the total number of training samples.

c. Cross Validation

Cross-Validation (CV) is the standard data mining technique for evaluating performance of classification technique. Mainly it's used to evaluate the error rate of a learning technique. In CV a dataset is portioned in n folds, where each is used for testing and the remainder is used for training. The procedure of testing and training is repeated n times so that each partition of fold is used once for testing.

In a stratified 10-fold Cross-Validation the data is divided randomly into 10 parts in which the class is represented in approximately the same proportions as in full dataset. Each part is held out in turn and the learning scheme trained on the remaining nine-tenths; then its error rate is calculated on the holdout set. The learning procedure is executed a total of 10 times on different training sets, and finally the 10 error rates are averaged to yield an overall error estimate.

d. Confusion Matrix

Confusion matrix is a visualization tool which is commonly used to present the accuracy of the classifiers in classification (Han and Kamber, 2006). It is used to show the relationships between outcomes and predicted classes.

The entries in confusion matrix have the following meanings in the context of our study:

- a is the number of correct predictions that an instance is negative,
- b is the number of incorrect predictions that an instance is positive,
- c is the number of incorrect predictions that an instance is negative,
- d is the number of correct predictions that an instance is positive.

Table 2: Confusion Matrix

		Predicted	
		Negative	Positive
Actual	Negative	a	b
	Positive	c	d

The accuracy (AC) is the proportion of the total number of predictions that were correct. It is determined using equation below:

$$AC = \frac{a+d}{a+b+c+d} \tag{1}$$

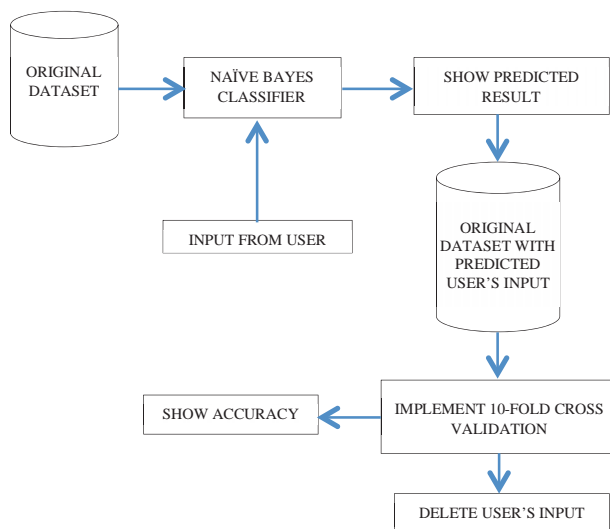


Figure 1: Model of Implementation

Model of Implementation

Fig. 1, depicts the functional block diagram of implementation. Mainly system is working in two phases, in prediction phase and in accuracy evaluation of algorithm. As shown in Fig. 1, the original dataset and input from user is given as input to the classifier. When user enters 9 parameters Naïve Bayes Classifier will predict users' input state, and the prediction will be shown. In the second phase the dataset with predicted user's input will be evaluated with 10-fold cross validation. When 10-fold cross validation finishes the accuracy evaluation the results of evaluation will be shown with confusion matrix. After prediction and accuracy evaluation in the system users' input will be deleted, so the dataset will be original again.

Application

In this section, implemented software tool for predicting diabetic retinopathy will be introduced. MySQL Database Management System and PHP programming language are used to implement this tool.

The application consists of two parts in the user interface. In these parts users can input patient's record and see the result of prediction. Fig. 2, shows the interface of application. After executing the algorithm, obtained result of disease diagnosis, percentage of accuracy and also some details of test results are shown to users in the result part of user interface. Details of test results contains of 10 confusion matrices with accuracy values obtained from 10-fold cross validation method.

Fig. 2, shows a sample output for a healthy prediction. In this example, the input for 9 variables was entered, and Naïve Bayes predicted with 89.11% accuracy rate.

PREDICTION AND DIAGNOSIS OF DIABETIC RETINOPATHY USING DATA MINING TECHNIQUES

App Retinopathy

New Patient Records:

HGB: 13.5 DM (year): 10 GLU: 133
URE: 59 TRIG: 155 HDL: 44
LDL: 170 CREA: 0.9 HbA1c: 5.5

Prediction: Healthy Predict the Diagnosis

Results

10-fold Cross Validation Results

7 2
3 27
Sum of diagonal: 34
Number of rows: 39
Accuracy: 87.18%

10 3
5 21
Sum of diagonal: 31
Number of rows: 39
Accuracy: 79.49%

6 2
1 30
Sum of diagonal: 36
Number of rows: 39
Accuracy: 92.31%

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Figure 2: Application User Interface

Results

To obtain and evaluate the test results of Naïve Bayes classifiers, 10-fold cross validation method was used. Hence the dataset is randomly divided into training set and testing set 10 times. Table 3, shows the detail results of 10-fold cross validation. Number of rows column represents testing set of each fold whereas Sum of Diagonal column represents the total number of predictions that were correct. As we mentioned earlier the accuracy is calculated using equation (1).

The result of the accuracy that is obtained is very good using Naïve Bayes algorithm in the real life dataset. The accuracy rate is 89%.

Table 3: Detail results of 10-fold cross validation

Fold	Sum of Diagonal	Number of rows	Accuracy
1	34	39	87.18%
2	31	39	79.49%
3	36	39	92.31%
4	35	39	89.74%
5	33	39	84.62%
6	33	39	84.62%
7	38	39	97.44%
8	38	39	97.44%
9	35	39	89.74%
10	31	35	88.57%
Accuracy: 89.11%			

Conclusion

This study clearly shows that the results are promising for the application of the data mining techniques into predictions of problem in medical databases.

In this paper, a decision support system was designed for diabetic retinopathy. The system can be served as training tool for medical students. Also, it will be helping hand for doctors. The system can be further enhanced and expanded; it can incorporate other medical features besides in the Table 1, also it can incorporate other data mining techniques. Continuous data can be used instead of just categorical data.

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Effects of Integrating U-Msg Learning into College English Classes through Blended Teaching Approach

Keng-Chih Hsu, Chun-Yi Lee, Ru-Chu Shih*

Department of Modern Languages
National Pingtung University of Science and Technology, Taiwan

vincent@npust.edu.tw

Abstract: This study aims to investigate the effects of integrating U-Msg learning into college English (listening and speaking) classes through the blended teaching approach. A total of 59 participants participated in the study and grouped into U-Msg and Moodle (a virtual E-learning platform) learning groups for seven week teaching experiment. The research instruments include pre and post-oral tests, survey questionnaire, and interview. The findings of the study show that while significant improvements were achieved in both of the groups, superior performance and learners' feedbacks were identified in the mobile APP-based group. Additionally, with positive attitudes, the students also regarded the U-Msg system as an effective learning supplement, which provides a convenient learning environment. Nevertheless, the system instability could jeopardize learners' satisfactions. Finally, the results of this research might shed some lights for ESL instructors with enthusiasms in U-Msg blended learning and oral ability enhancements.

Keywords: blended teaching, college English learning, ESL, U-Msg,

Introduction

The advancement of information and communication technology has created substantial opportunities for educators to engage students in language learning. The integration of electronic learning (E-learning) into traditional learning via blended learning (BL) approaches has been widely accepted in higher education (Evans, 2007). Compared to traditional classroom-based instructions, E-learning achieves greater progress, since the virtual environment provides users novel experiences with enormous flexibilities in terms of learning paces, time & spaces (Jia et al. 2012). However, pitfalls of E-learning, such as slow interactions and delayed information reception caused by the immobility of desktop PCs, may be detrimental for learning. Fortunately, thanks to the development of mobile technology and practical applications, mobile learning (M-learning) has been prominent and has received mounting attentions in language learning (MALL) recently. The portability of mobile devices with internet renders users great conveniences, and generates a learner-centered environment which allows just-in-time learning (Evans, 2007). Due to this benefit, learners could develop their personal learning strategies without time and space limitations. More recently, major step ups in functionality of smartphones along with their high market penetration have increased possibility and acceptance of M-learning. It is worth noticing that some physical characteristics of smartphones (e.g. inbuilt microphones and recording software) even surpass those of the computers. An emerging number of researches have been delved into M-learning by various instruments, such as mobile E-mails (Thornton & Houser, 2005), podcast learning (Evans, 2007), and mobile recording features (Gromik, 2012). It is argued that considerable benefits, effectiveness, and positive learners' feedbacks are received in MALL. Nevertheless, little and scattered exploration in mobile APP for ESL learning through BL has been done. Consequently, the purpose of this paper is to ascertain the effectiveness and perceptions of learners in the utilization of an APP through BL in college listening and speaking classes. Additionally, the comparative effects of the integration of mobile APP and E-learning are also investigated.

Method

The participants were 59 students from the college of management at a technical university in Taiwan. To ensure the homogeneity of language proficiency, all participants were selected from the identical language level according to their scores in the placements test held by the university. Furthermore, none of the participants have prior APP language learning experiences. The participants

were assigned to the APP group- the experiment group (EG), N= 30 and PC group- the control group (CG), N=29. The research instruments include both qualitative and quantitative methods, including the APP, pre and post oral test, questionnaire, and interview.

Firstly, C & U message, a U-Msg App supported by the free Google Cloud Messaging (GCM) for Android service and the push and pull technology was developed by Professor Cheng and his team. GCM enables data to be automatically pushed from the server to users' Android- power device; thereby, receivers would be notified new information to fetch from the server. Motiwalla (2007) argued that the push and pull mechanism, an effective way for content delivery, can avoid information overload and send personalized multicasting messages feedbacks, such as feedbacks, tailored for the users' needs. The main features of the APP are "learners' performance evaluation", "feedback", "digital resource", and "the latest news". Secondly, the pre and post oral tests containing 3 open-ended questions focusing on tenses (past, present perfect, and past continuous) expression were also developed. The grading was made according to the assessment criteria of the Analytic Oral Proficiency adapted from (Kost, 2004). The grading scale consists of 3 subscales: (1) pronunciation/fluency (2) accuracy/structure (3) comprehension (relevance and adequacy). The total score=(1)+(2)+(3)/3. The results were evaluated by two raters, and the final grade was the average scores of these two raters. Thirdly, the questionnaire developed by Tseng (2013) with the title "experience of using U-Msg system for English learning" was adapted by the researcher. Six domains, including system quality, learning content, system support, system usefulness, user satisfaction, and system use, consisting of 22 five-point Likert questions were developed. The questionnaire obtained a .932 Cronbach Alpha, indicating the internal consistency reliability was high; besides, the content was also validated by professionals to ensure its validity. Finally, an interview was conducted to obtain in-depth information regarding students' perceptions on both of the BL approaches. The interview was carried out with the assistance of 9 volunteers, with the following two questions:

- (1) What are your ideas of integrating the APP into our speaking/listening class?
- (2) In comparison with the Moodle BL, what are the pros and cons of APP BL? Which method would you prefer?

Results

To maintain the objectivity in grading, inter-rater reliability was calculated using the *Pearson* correlation coefficient. Achieved level was high in every part, with the average score of .86 and .83 for pre and posttest respectively. Additionally, an independent two-sample *t-test* was adopted to analyze the homogeneity between the two groups. The difference in average score in the pre-test ($p=.695 > .05$) is not significant, indicating that students' language proficiency were similar. Table 1 presents the statistics of pre and posttest. The pretest mean scores of the EG and CG are $M= 40.33$ ($SD= 15.46$) and $M= 41.86$ ($SD=14.38$) respectively; posttest mean scores are $M= 75.55$ ($SD=15.38$), and $M=71.72$ ($SD=16.59$) for the EG and CG, respectively. Significant progress is shown in the EG ($p<.001$, $d=-2.08$) and CG ($p<.001$, $d=-1.58$) in accordance with the paired *t-test*, indicating APP and Moodle- integrated BL are both effective instructional supplements. The researcher further compared the difference in the progression of both groups by the independent paired *t-test*, and it is revealed that no significant disparity was yielded ($p=.24$, $p>.05$); nevertheless, the improving scores of the EG slightly outnumbered that of the CG by 5.36.

Table 1: Paired *t-test* results and effect size of pre and posttests

	N	Pre-test		Post-test		t	p	Cohen's d	Difference between pre-and post test
		M	SD	M	SD				
EG	30	40.33	15.46	75.55	15.38	-11.42	.000	-2.08	35.22 (46.10%)
CG	29	41.86	14.38	71.72	16.59	-8.51	.000	-1.58	29.86 (39.59%)

The survey questionnaire was distributed to all members in the EG, and 25 valid samples were analyzed. The one-sample *t-test* result reveals that all factors obtained means ranging from 3.48 to 4.16, $df=24$, test value=3, t values ranging from 3.12 to 8.41, p values ranging from .000 to .005<.05, indicating that students' general perspectives about APP BL were highly positive, especially in parts of

learning content, system support, system usefulness, and user satisfaction. In learning content part, the statistics of item 7 'Learning content is up-to-date' ($m=4.16$, $t=7.77$, $p=.000$, $d=1.55$) indicate that learners firmly believed that the latest practices were frequently received. For learning support, the statistics of item 10 'U-Msg system staff is pleased to deal with my problems in using the system' ($m=4.08$, $t=5.66$, $p=.000$, $d=1.14$) reveal that students' attitudes towards the technical assistances were favorable. It is worth noting that item 12 in system usefulness 'U-Msg system allows me to learn conveniently' ($m=4.12$, $t=7.72$, $p=.000$, $d=1.54$) has the second highest mean score and effect size, showing that learners agreed that they were enormously benefited from the system by its convenience. Additionally, results of item 13 'U-Msg system effectively support my English learning' ($m=4$, $t=6.55$, $p=.000$, $d=1.32$) yield that students were greatly satisfied with the pedagogical supplement. For user satisfaction, data of item 19 'Overall, I am satisfied with U-Msg system for English learning' ($m=3.72$, $t=4.04$, $p=.000$, $d=.81$) indicates that students' perceptions towards the system use were significantly positive. Nevertheless, the data of item 3 'U-Msg system is stable' in system quality and item 21 in system use 'I entirely rely on U-Msg system for English learning' were excluded from the result for further explanation. The mean scores of item 3 and 21 are lower than 3 ($m < 2.8$), reflecting that the system instability could reduce learners' dependences on MALL. It is noticed that the technical problems occurred in the initial phase of system testing; nevertheless, thanks to the technical supports from the development team, criticisms on the system scarcely appeared in the later phase.

The findings of the evaluative questionnaire also provide an insightful analysis on learners' perspectives on these 2 BL methods. Highly positive attitudes were reflected in the results. With highly favorable opinions, the students approved that mobile BL had a significant effect on the enhancement of listening/oral, and grammar skills. Five students considered that they were greatly benefited from 'Convenience' and 'timely interactive and personal response'. Eight interviewees indicated that the portability of smartphones offered them autonomous learning environment without constraints of fixed classrooms and time, which increased their motivations and confidences in honing speaking skills. However, the disadvantage such as 'system instability' was also reported. Students argued that defects such as system automatic shutdown should be remedied. Additionally, when asked to choose preferable teaching method, 7 interviewees were in favor of mobile-APP BL. Students agreed that mobiles had superior hardware features, such as the built-in microphone and pop-up alert, than computers, which saved troubles in recording and avoided delayed submissions.

Discussion

In accordance with the results of the pre and posttest of the APP users (Figure 1), a significant progress was shown, suggesting that mobile APP could be an efficacious instructional supplement. This result is consistent with previous studies in which MALL also appeared to be a feasible and effective pedagogical tool (Evan 2008; Gromik, 2012; Thornton & Houser, 2005). Likewise, considerable improvements were also found in the CG. The researcher further compared the disparity in the progression between the 2 groups, and it revealed that while the improved scores of the EG slightly exceeded those of the CG, non-significant difference was given. It could be because in the experiment, identical teaching materials, such as digital resources and audio instructional files, and personalized and interactive feedbacks are provided to both of the 2 groups; different learning tools do not seem to cause a significant difference in the learning result. It could be proposed that both learning strategies were believed to be promising; nevertheless, their disparity of contribution was indistinguishable. This finding is compatible with previous studies (Katz & Yablon, 2011; Manlan & Ibrahim 2012; Stockwell 2010), in which varied instructional approaches also contribute to similar language progress. Consequently, it might be suggested that different learning supplements may not significantly impact students' accomplishments.

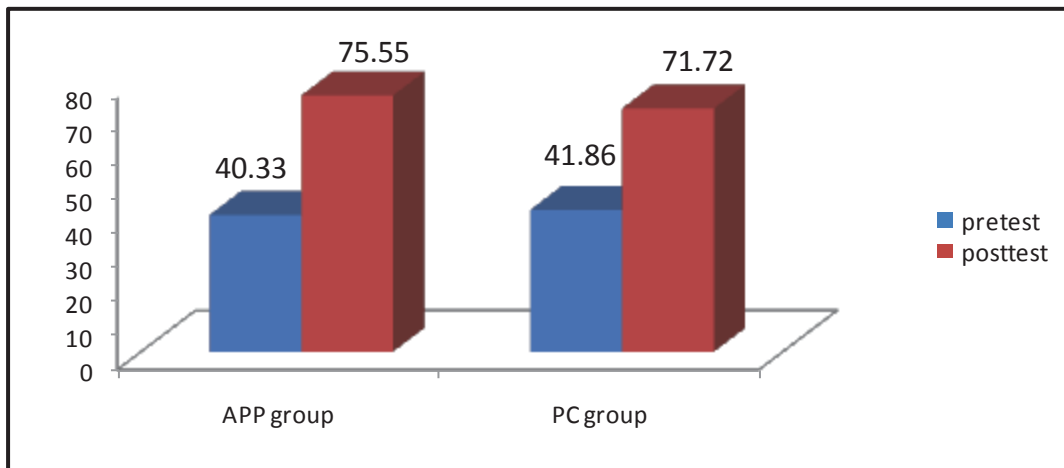


Figure 1: Differences between App and PC group in pre and posttest

To further investigate learners' perceptions towards integrated mobile APP learning, a survey questionnaire and interview were conducted. Significantly positive responses and attitudes indicate participants were highly content with its supplementary effects. This result is in line with previous studies (Evans 2008; Motiwalla 2007), in which MALL also received favorable feedbacks. It is noted that mean scores in the questionnaire were particularly salient in aspects of system immediacy, usefulness, and satisfaction. This finding corroborates with that found in the interview, in which interviewees believed that they were highly motivated by this effective and learner-centered approach because they were offered great conveniences and individualized interactive opportunities. This result echoes Motiwalla's finding (2011). It revealed that M-learning system is an effective learning aid to the existing class for its built-in features e.g. communication aids and access to interaction; it extends learning for its flexibility and convenience. However, both quantitative and qualitative data also yielded that technical problems may jeopardize users' satisfactions. Thus, for future study in MALL, it is suggested that a more rigorous system test should be performed. Besides, the aforementioned result indicated that while different learning strategies may not distinguish achievement outcomes, learners showed more positive attitudes in APP BL. It was reflected that 7 out of 9 students preferred mobile blended learning for its convenient built-in features, such as microphones, and the pop-up alerts of the APP. This result is in line with Katz & Yablon's (2011) research, in which mobile learners also achieved higher level of satisfactions in flexibility, control, motivation, and autonomy, compared to those utilizing E-learning and tradition learning. It could be suggested that learners' affective feelings are needed to be emphasized, because they are well connected with learners' preferences and willingness in accepting a new learning strategy.

Conclusion and Suggestions

In the present research, the combination of the U-Msg App, with traditional face-to-face speaking and listening classes is indicated to be effective, feasible, and promising. Although it is shown that similar achievements were produced by M-learning and E-learning, learners expressed enormous enthusiasms on MALL. The present study may have limitations, including system instability and short period for learners to use MALL, but it is hoped that it can serve as a basis to invite future study in the field. In order to obtain more reliable and objective data in the future, it is suggested that a well-tested APP with stable functionalities should be developed. Additionally, the APP should also be adaptable to all mobile system, not being restricted to merely Android or IOS system. Besides, the experiment could be extended to 10 weeks so as to incorporate more topics for oral and listening practices. Finally, the quality and convenience of internet access should also be emphasized. Since the development of advanced mobile devices and APP has made learning more flexible and convenient, the investigation of different learning strategies related to MALL might become more vital in the future.

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Investigation of natural convection from intermittent foam blocks in a cavity

Ayla Dogan, Oguzhan Ozbalci, Ibrahim Atmaca

Department of Mechanical Engineering, Faculty of Engineering, Akdeniz University
TR-07058, Antalya, Turkey

ayladogan@akdeniz.edu.tr

Abstract: Natural convection heat transfer from intermittent open-celled aluminum metallic foams in a cavity has been investigated experimentally. Air was used as the working fluid. The test section was equipped with 3x3 aluminum-foam blocks placed on copper blocks subjected to uniform heat flux. The convective heat transfer rate from smooth heated surfaces without foam blocks is compared with the results obtained from 10 PPI aluminum foam blocks. The averaged temperature and the averaged Nusselt number distributions on the heating surface were tested under different heating power. The experimental study was made for modified Grashof numbers 1.19×10^6 to 7.45×10^6 . As a result of comparisons, the aluminum-foam blocks with the pore density 10 PPI showed about 86% higher averaged- Nusselt number than that without the foam blocks in a cavity.

Keywords: Natural convection, Aluminum-foam blocks, Electronics cooling.

Nomenclature

A_s	heat source surface area, m^2
g	gravitational acceleration, m/s^2
Gr^*	modified Grashof number
k	thermal conductivity, W/mK
L	length and width of metal foam sample or heater (m)
Nu_{avg}	average Nusselt number
q_c	convection heat flux, W/m^2
Q_c	convection heat transfer rate, W
Q_{cond}	conduction heat transfer rate, W
Q_{tot}	total power dissipation, W
R	electrical resistance, Ω
T_{avg}	average surface temperature, $^{\circ}C$
T_0	ambient temperature, $^{\circ}C$
V	voltage, V

Greek symbols

β	Thermal expansion coefficient, $1/K$
ε	Porosity
ν	Kinematic viscosity, m^2/s

Introduction

Because of the excellence physical characteristics and good mechanical properties, open-celled metal foam is a kind of new engineering materials. The main advantage is the high surface-area-to-volume ratio, which leads to enhanced heat transfer and miniaturization of thermal system. Use of metal foams in electronic cooling applications is novel. Overheating which causes failure is mainly a major problem for electronic equipments. Almost all of the electrical energy consumed by electronic devices appears as heat energy, the power density that must be dissipated by individual chips called heat sources. Natural convection in a confined

space has extensive application prospects, such as, compact heat exchangers for electronic cooling, nuclear reactor, porous radiant burner and heat pipes.

There are relatively few investigations of the heat transfer with free convection in very high porosity media $\epsilon \sim 0.9$, such as metal foams. Xu et al. (2011) comprised an experimental study for natural convection from horizontally-positioned copper metallic foams having different porosities and pore densities. They quantified the effects of porosity and pore density on the total thermal resistance of the foam sample. It is found that porous surface enhanced natural convection and reduced thermal resistance by about 20% in comparison with a smooth surface. The porosity influenced on the heat transfer performance was more remarkable when the pore density was higher. Zhao et al. (2005) investigated natural convection and its effect on overall heat transfer in highly porous, open-celled cellular FeCrAlY foams experimentally and numerically. They found that natural convection is very significant in metal foams due to the high porosity and inter-connected open cells, contributing more than 50% of the effective conductivity at the ambient pressure. Zhao et al. (2004) measured the effective thermal conductivity of five FeCrAlY foam samples with different pore sizes and relative densities using a guarded-hot-plate apparatus under both vacuum and atmospheric conditions. The obtained results showed that effective thermal conductivity increases rapidly as temperature raises, especially in the higher temperature range where the thermal radiation dominated the transport. Chamkha et al. (2002) considered thermal buoyancy-induced, hydromagnetic flow of an absorbing fluid along an inclined, semi-infinite, ideally transparent flat plate embedded in a variable porosity porous medium due to solar radiation. Phanikumar and Mahajan (2002) resented present numerical and experimental results for buoyancy-induced flows in high porosity metal foams heated from below. They obtained Brinkman–Forchheimer-extended Darcy flow model and a semi-heuristic two-equation energy model by relaxing the local thermal equilibrium (LTE) assumption are adopted. Experiments conducted under natural convection conditions for the same configuration were used to test the numerical model and the validity of the thermal equilibrium assumption for metal foams. They found that heat transfer rate for a given Rayleigh number decreased as the pore density increased from 5 to 40 PPI.

Natural convection flow of micro-polar fluid from a permeable uniform heat flux surface in porous medium was considered by Hassanien et al. (2004). It was found that the enhancement of the wall heat transfer represented by increasing in the Nusselt number. But the values of the skin friction and couple stress decreased as the suction parameter increased. Also, it was seen that the Darcy number and inertia effect tend to decrease the skin friction, Nusselt number, and couple stress. The micro-polar parameter enhanced the skin friction and reduced the heat transfer rate. Bhattacharya et al. (2002) presented experimental results on buoyancy-induced convection in aluminum metal foams of different pore densities [corresponding to 5, 10, 20, and 40 pores per in. (PPI)] and porosities (0.89–0.96). The obtained results showed that compared to a heated surface, the heat transfer coefficients in these heat sinks were five to six times higher. However, when compared to commercially available heat sinks of similar dimensions, the enhancement was found to be marginal. The experimental results also showed that for a given pore size, the heat transfer rate increased with porosity, suggesting the dominant role played by conduction in enhancing heat transfer.

As a result of an extensive literature survey, there are few natural convection investigations of metal foams and few works have been reported for air natural convection of aluminum foam in a cavity. The objective of this research is to investigate experimentally the buoyancy induced flow in open-celled aluminum-foam blocks heated from below and surrounded by air. What makes this work realistic is to choose 3x3 configurations in a cavity.

Experimental set-up

A summary of that information is presented below. Fig.1. shows a schematic representation of the experimental set-up. The test section is stationed inside a large plexiglass housing (42x25x25cm) with two windows on both sides 5x25cm and a window on the top with 10x25cm in dimensions. The test section is made of 5 mm thick pure Teflon (PTFE) ($k = 0.25$ W/m K) in which the heat sources extended by aluminum foam block are embedded. This heated section was insulated with 20 mm Glasswool (Izopan) and 50 mm Styrofoam ($k = 0.028$ W/m K). Distribution of aluminum-foam blocks in the test section is shown in Fig. 1 with all the necessary dimensions. Aluminum-foam blocks were arranged 3x3 in the test section. The block dimensions were 25x25x20mm. The heater sections of the teflon substrate were cut using an industrial laser.

Here, 25x25x20mm aluminum-foam blocks placed on 25x25mm copper plates ($k = 386$ W/m K) were used and tightly fit to the teflon substrate. The area of resistance wire heating elements was the same as the copper plate. The heating elements were electrically insulated and the resulting assembly was screwed to the copper plates using a heat sink compound providing the least possible contact resistance. The thermocouples on the heated section were inserted through holes drilled in the insulation, and were pushed into drilled cavities

placed inside the copper plates and soldered for rigidity. All thermocouples were separately calibrated. Signals from the thermocouples were collected, processed, stored and analyzed with a data acquisition system. It was observed that experimental conditions reach a steady-state condition after approximately 5 hours. After conditions had been steady for some time and differences in temperatures between two intervals became negligible ($\Delta T < 0.1$ °C), all temperatures were collected, averaged and stored.

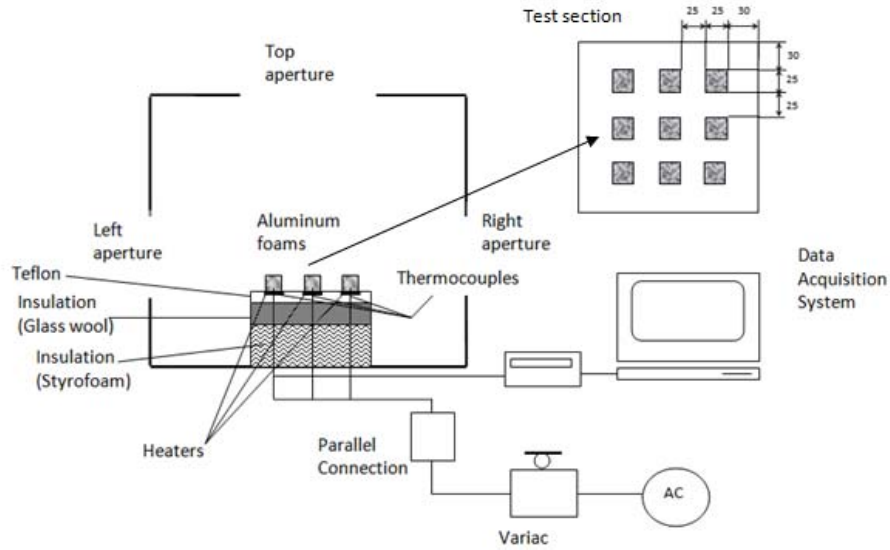


Figure 1: Schematic diagram of the experimental set-up, heat sinks layout and assembly (the measures are in mm).

The porous materials that situated in the test section are aluminum-foams having pore density of 10PPI. The aluminum foam block is shown by scaled photographs in Fig. 2, and also its particulars are displayed in Table 1. The parameters to specify the aluminum-foam block are the porosity, i.e., the volumetric fraction of void inside aluminum-foam, the pore density in pores per inch (PPI) and the permeability, i.e., the flow conductance (Kim et al. 2000). The permeability was determined by a direct measurement of pressure drop through the specimen installed in an air wind channel without air bypass.

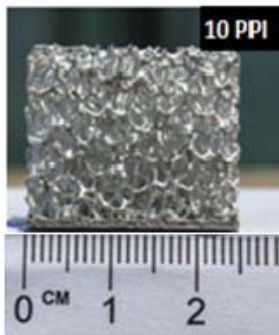


Table 1: Particulars of the Aluminum-foam Block.

Specimen	Porosity (ϵ)	Pore density (PPI)	Permeability(m^2)
(Al-6101)	0.912	10	7.73×10^{-8}

Figure 2: Pictures of 10 PPI aluminum-foam samples

Processing of the experimental data

In the analysis of heat transfer performance of the aluminum foams, averaged Nusselt number was defined as,

$$Nu_{avg} = \frac{Q_c L}{A_s (T_{savg} - T_0) k_{air}} \quad (1)$$

Here T_0 is the ambient temperature and all thermophysical properties were evaluated at this temperature. T_{savg} is the averaged surface temperature calculated from the thermocouple measurements. A_s is the total heater area. Q_c is the corrected heat dissipation rate, which represents the heat transferred to the fluid

directly by convection from the aluminum foam blocks. Q_c was calculated from an energy balance as given below:

$$Q_c = Q_{tot} - Q_{cond} \quad (2)$$

Conduction losses (Q_{cond}) calculated from one dimensional Fourier's law.

In these calculations, first the total heat addition from the resistance heaters was calculated from:

$$Q_{tot} = 9 \frac{V^2}{R} \quad (3)$$

where V is the voltage drop across the heater and R is the resistance of the heater. From this value Q_c was calculated by subtracting losses due to conduction.

Other dimensionless number affecting the heat transfer is the modified Grashof number:

$$Gr^* = \frac{g\beta q_c L^4}{k_{air} \nu_{air}^2} \quad (4)$$

where, q_c is the average convection heat flux for all the heaters.

In order to determine the reliability of the experimental results an uncertainty analysis was conducted on all measured quantities as well as the quantities calculated from the measurement results. Uncertainties were estimated according to the standard procedures reported in the literature. Overall, the uncertainty in the Nusselt number is around $\pm 4.9\%$ and for the Grashof number it is around $\pm 4.1\%$, which is primarily due to uncertainties in the convective heat flux values.

Results and Discussion

Fig. 3 shows the relation between the average temperature distribution and Grashof numbers for with 10 PPI and without aluminum foam blocks (i.e. smooth surface) in a cavity. The average temperatures are considered in the calculations since the aluminum-foam block temperatures have almost the same values after the system has reached the steady state conditions. As can be seen from the figure, the averaged temperature monotonically increases with increasing Grashof numbers. It is obvious that for different Grashof numbers, average surface temperatures for no aluminum foam blocks is much higher than that of 10 PPI aluminum foam cases. Namely, the foam surfaces can be operated in higher heat flux range. The advantages of large surface-area-volume ratio and intense mixing of flow as a result of aluminum foam resulted in a much lower surface temperature distribution.

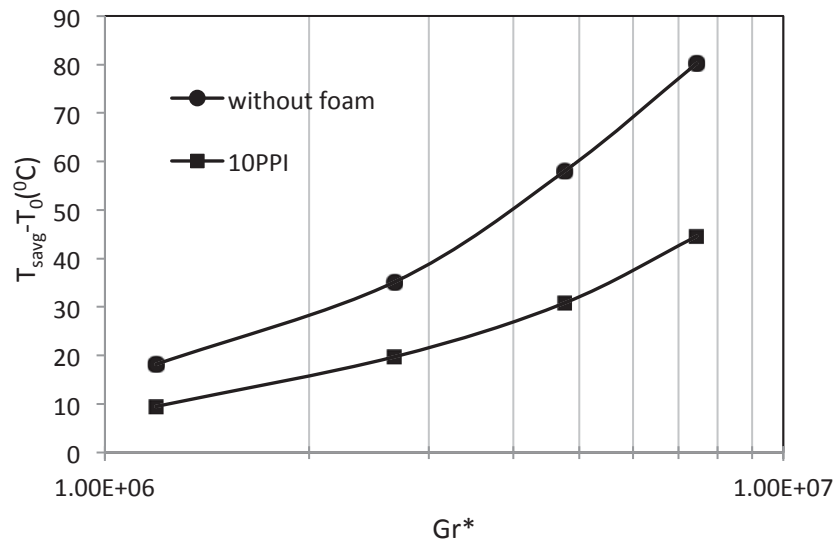


Figure 3: Effect of Grashof numbers on the average surface temperature for with 10 PPI and without foam blocks

Fig. 4 shows the average Nusselt number versus Grashof number for with 10 PPI and without aluminum foam blocks in a cavity. The average Nusselt number Nu_{avg} is obtained by averaging the separate-averaging the block Nusselt number Nu_b over the heater surface area. As anticipated, Nu_{avg} values substantially increase with the increase of Grashof number both with and without foam case. Although form drag and viscous drag tend to suppress the natural convection and weakened the heat transfer, the heat transfer is finally enhanced by aluminum-foams due to significantly extended heat transfer surface area. The 10 PPI aluminum foam blocks offered the most superior heat transfer performance and its average Nusselt number was approximately 2 times higher than that of the without foam blocks or smooth surfaces in the range of $1.19 \times 10^6 \leq Gr^* \leq 7.45 \times 10^6$.

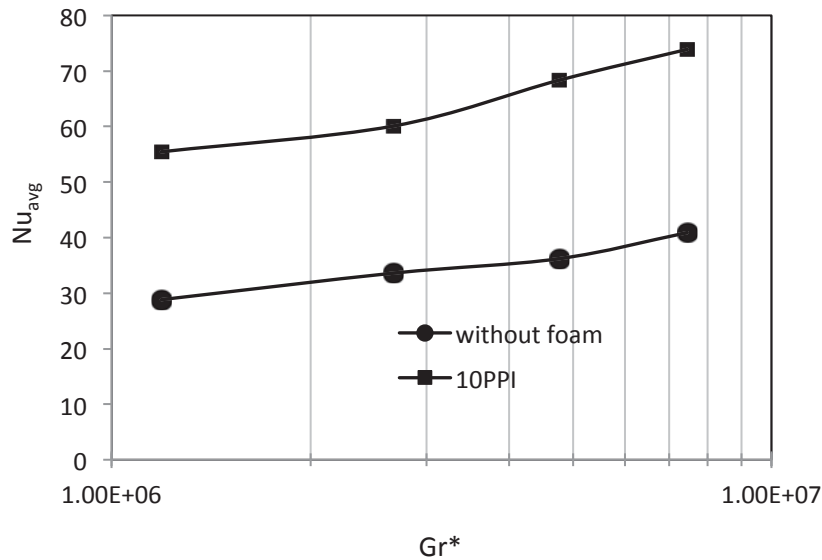


Figure 4: Effect of Grashof numbers on the average Nusselt number for with 10 PPI and without foam blocks

Conclusions

The experiments were carried out to investigate the thermal performance of aluminum-foam blocks for electronics cooling. The obtained results showed that the foam blocks with the pore density of 10 PPI showed about 86% higher average thermal performance than that of the smooth surfaces in the range of $1.19 \times 10^6 \leq Gr^* \leq 7.45 \times 10^6$ in a cavity.

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Control of Traffic Congestion in Agona Swedru Municipality

Albert K. Arkoh

Department of Agriculture Engineering, School of Agriculture,
University of Cape Coast, Cape Coast, Ghana

kumiarkoh@yahoo.com

Abstract: For many authorities in Ghana's metropolitan areas, public transport provision is increasingly becoming problematic as daily trips of city dwellers tend to cover numerous suburbs, thereby increasing travel cost in terms of time, money and comfort. Rather than reducing travel times, enhancing economic activities and productivity of commuters.

In order to control the traffic congestion, improve upon the movement of both vehicular and pedestrian, the existing traffic management in the municipality is studied.

This study identifies demerit of existing traffic management and suggest a way of reducing the cause and effects of traffic congestion.

It was realized that 80% of respondents was in agreement that traffic congestion within the municipality are cause by: sellers on the street, absence of road shudders, increasing number of vehicles, careless driving and road closure during funerals / other functions.

It is recommended that: road shudders should be factored in the road designs, sellers on the pavement should be stopped and parking facilities as well as by-passes should be constructed within the municipality.

Keywords: Congestion; Management; Capacity; Pavement; Shudders

Introduction

The demand for vehicular transport keeps on increasing from all areas of human settlement due to the rapid growth of population. Motor car is an invention which within a short time has simplifies man's way of life; it has offered a wide choice of employment and has increased scope of recreational activities to remarkable extend. According to Lowe (2002) traffic congestion is a condition on any network as use increases and is characterized by slower speeds, long trip times, and increased queuing.

The most common example is the physical use of the small road by vehicles National Road Safety Commission (2008).

When traffic demand is great enough, the interaction between vehicles slows down the speed, and then traffic stream congestion occurred. When demand approaches the capacity of the road or of the intersections along the road it is known as traffic jam (Abane, 2012, Wikipedia, n.d.).

The rapid growth of vehicle ownership together with population and attraction of activities into urban areas which demands for physical space in other to improve free traffic flow within the municipality (Eshun, personal communication, May 5, 2009).

Many roads that some years back were meant for high speed are now experiencing traffic congestion due to rapid growth of vehicle.

The purpose of the study is to suggest a means of controlling the motion of vehicles as results of aggressive driving, rapid acceleration and braking and also the conflict between pedestrians and vehicles.

Traffic control system exist to provide for the safe and orderly movement of traffic to resolve conflict between vehicles, vessels or aircraft and to some extent to minimize the cost of transportation (Banks, 1998)

As traffic volume increases on highway passive devices such as signs marking and traffic signals supplement the rules of the road (Rodrigue and Notteboom, 2013, Lowe 2002).

Materials and Methods

Study Area

General Description of Agona Swedru Municipality.

The Agona District can be found in the eastern portion of the Central Region with total land area of 540 sq.km. and a population of about 164,000.

The District is divided into eleven zones. It lies within latitude 5 30' and 5 50'N and longitudes 0 35' and 0 55'W (Municipal News letter, 2006).

The area is bounded to the east and west by Awutu-Efutu-Senya and Asikuma –Odoben –Brakwa districts respectively. The District shares a border to the northeast with West Akim District, to the northwest with Birim-South District and to the south with Gomoa District.

The District has an undulating topography, which slopes from north to south. This includes isolated hillocks of granite rocks which mostly allow for two main seasons. The dry season lasts from December to March with the highest mean monthly temperature of 33.8°C being recorded between March/April. The lowest mean monthly temperature of 29.4°C is however recorded in August (Municipal News letter, 2006).

Agona Swedru is the municipal capital and has a population of about 59,000.

Agona Swedru lies to the north of Winneba and is about 15km off the main Accra-Takoradi high way. The location of township makes it the commercial center of the region and a nodal point from which roads radiate to the rich cocoa growing countryside of the region (Municipal News letter, 2006)

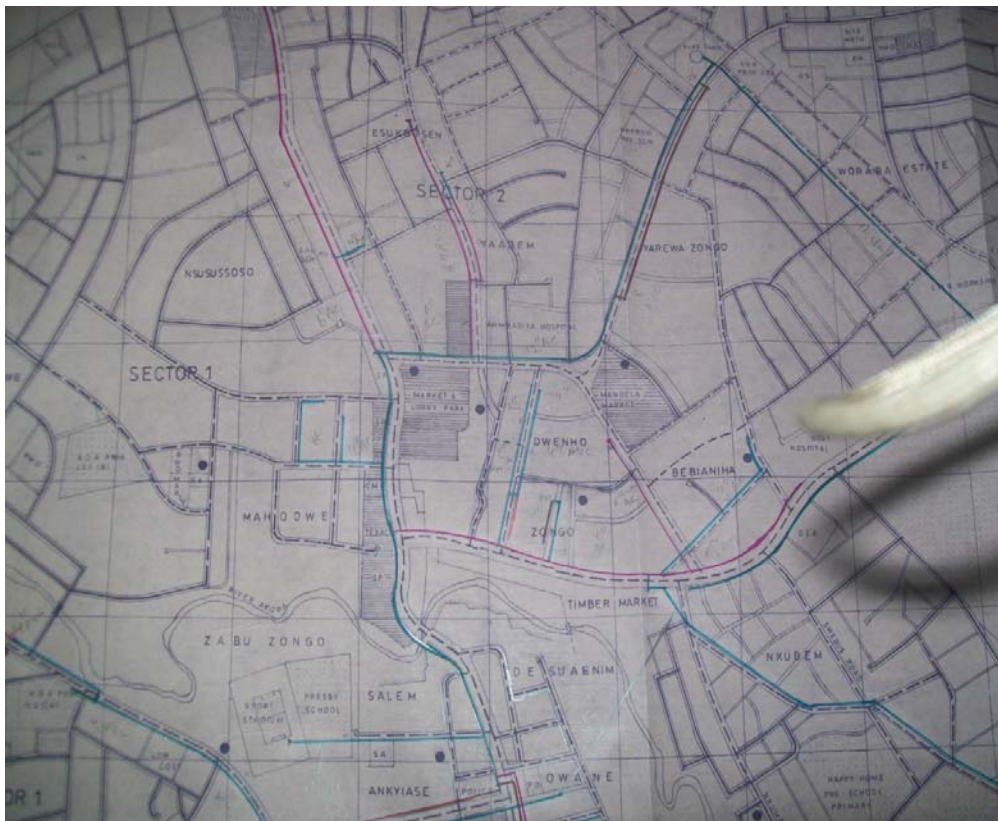


Figure 1: Municipal Town and Country Planning, 2006

Affected Areas

Most areas experience traffic congestion in the municipality during rush hours.

The traffic jam in peak hours in the Municipality causes a lot of problems, some being delay of workers, business, students, traders and others within and around municipality at the long round affects social and economy in entire country.

The traffic congestion over crowded the following places in Agona Swedru municipality; Chapel square, Texaco, Oda Kweano, Mandela and ‘99’ area

Results

Presents a summary of responses that were gathered from the field of Human Factors on Traffic Congestion

Table 1: Human Factor on Traffic Congestion

No	Items	Yes		No		Total	
		Freq	%	Freq	%	Freq	%
1	Careless driving affects traffic congestion?	40	80	10	20	50	100
2	Does loading and unloading affects traffic congestion?	22	44	28	56	50	100
3	Does road closure during funerals/functions cause traffic congestion?	42	84	8	16	50	100
4	When the Police direct traffic, does it ease traffic congestion?	32	64	18	36	50	100
5	Police random check on vehicles cause traffic congestion?	23	46	27	54	50	100
6	Listening of radio programme cause traffic congestion?	10	20	40	80	50	100

In the light of the study, the following observations were made; drivers make calls when driving, also 80% of the respondents reported that careless driving (make calls whiles driving) cause traffic congestion.

It was also realized that majority of respondents 84% respond positive that road closure during funerals/functions cause traffic congestion meanwhile 16% respondents were not in support that, road closure during funerals/functions cause traffic congestion.

Road Geometry on Traffic Congestion

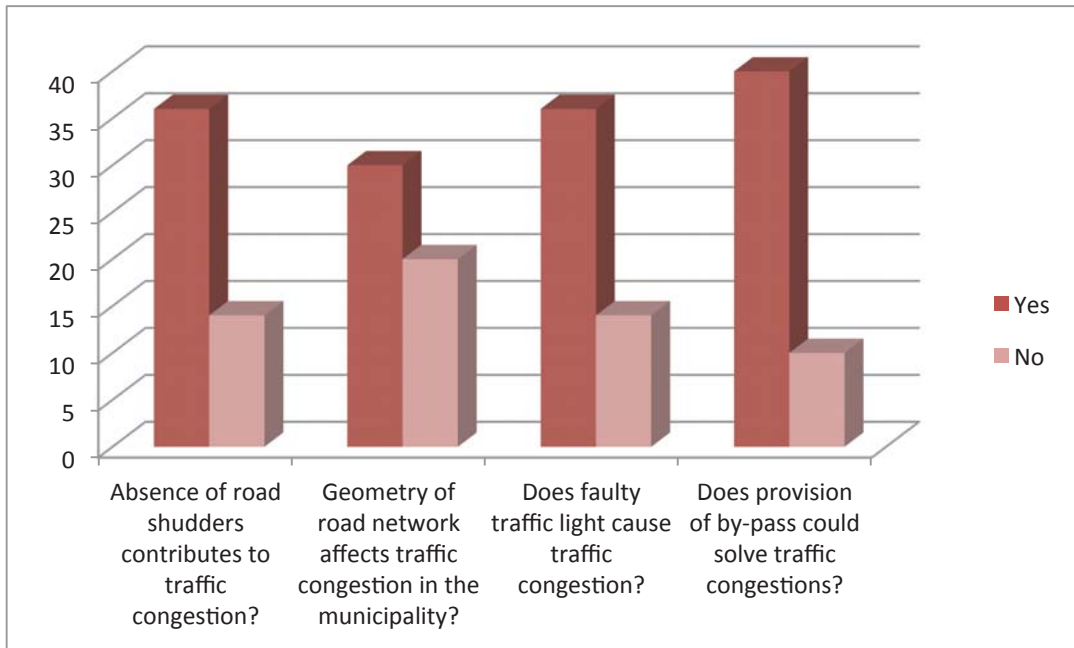


Figure 2: Effect of Geometry on traffic congestion

Inadequate parking facilities within the municipality cause traffic congestion, also majority of respondents 80% are of the view that, lack of by-passes in the municipality affect traffic congestion while 20% respondents were against the assertion.

It was realized that 60% respondents accepted that geometry of road network affects traffic congestion in the municipality whereas 40% against the statement. Most of the respondents 72% were in support that faulty traffic light cause traffic congestions, however, 28% of respondents were against.

Climate Change on Traffic Congestion

Majority 76% were against assertion that weather condition causes traffic congestion in the municipality while 24% were in support of the statement.

Vehicular Factor on traffic Congestion

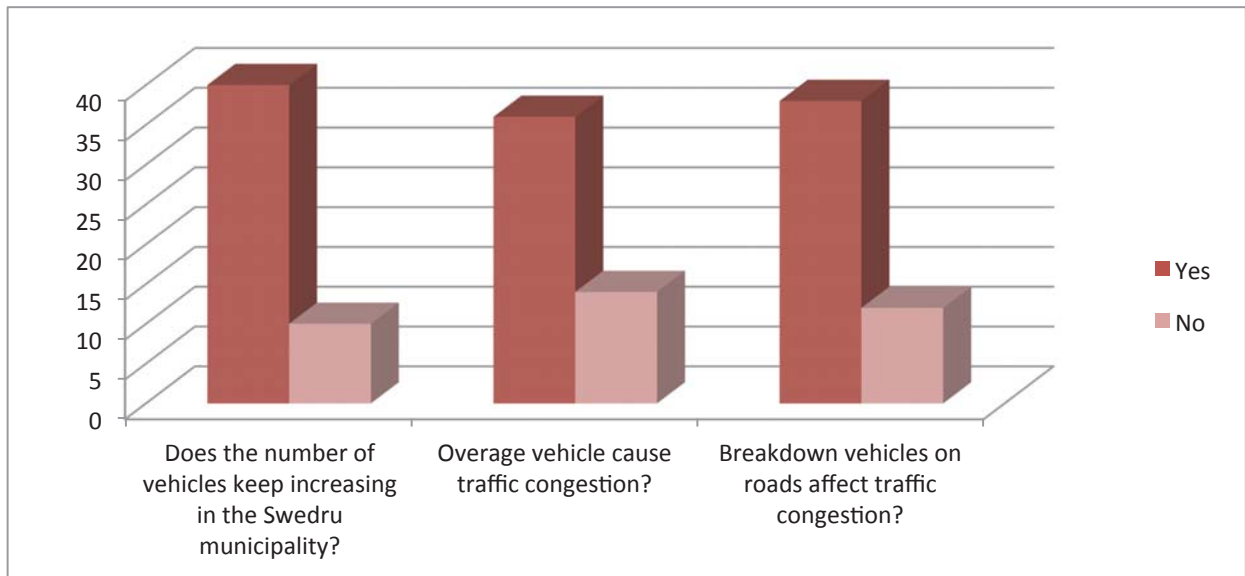


Figure 3: Effect of Vehicular Factor on traffic congestion

It was shown that 76% respondents accepted assertion that disable vehicles on road contribute to traffic congestion meanwhile 24% were against the assertion.

Effects of Pedestrians on Traffic Congestion

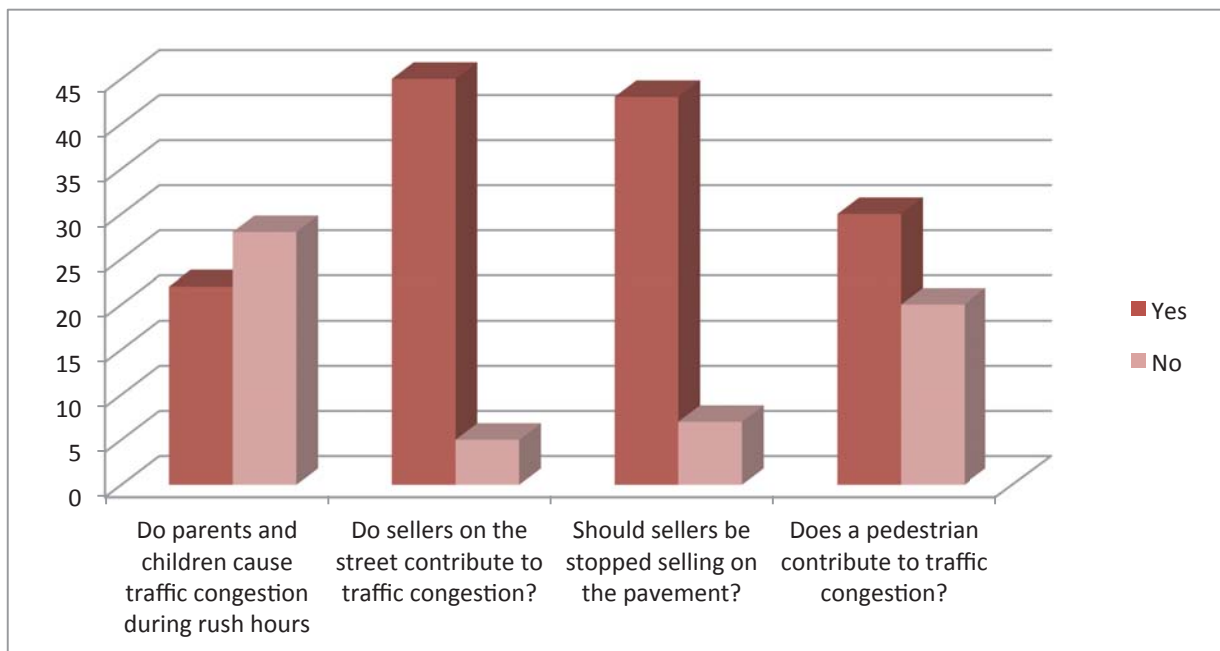


Figure 4: Effect of pedestrians on traffic congestion

It was noticed that 44% of the population was in support that parents and children cause traffic congestion during rush hours but majority were against the assertion. Also 90% of the respondents were in agreement that sellers on the street contribute to traffic congestion while a minority of 10% disagree the statement. 60% of other road users contribute to traffic congestion, but 40% of the respondent was not in support of the view.

Discussion

It was observed that careless driving and indiscipline attitude on roads during driving affects traffic congestion. This affirms by Wight (1976) that negative attitude such as drink to drive affects congestion.

It was noticed in the finding that faulty traffic lights and inadequate space for people with disability affects traffic congestion. This is in support by Nartey (1997) that faulty operation of traffic signals (green/red) lights and where the time allocation for a vehicle does not match the volume on that road result in traffic jam. According to Amegashie (2006), traffic congestion may occur when a volume of traffic or modal split generates demand for space greater than the available road capacity, which is in accord with the statement that increase number of vehicles in the municipality contributes to traffic congestion.

The study shows that geometry of road network contributes to traffic congestion in municipality.

Flahty (1977) affirms the contention that geometric design elements contribute to traffic congestion.

It was realized that wrong parking causes traffic congestion in the municipality. This affirms Wikipedia (n.d.) that crashed vehicles, stalled vehicles, debris cause about ¼ of congestion problems.

It was noticed that unexpected road closure contributes to traffic congestion. This was in agreement with the findings that closure of roads for social activities like funerals, parties and weddings cause traffic congestion (Wikipedia, n.d.).

It was observed that, the width of the pavement which is very small and mostly occupied by sellers attribute to traffic jam. This affirms Jedwab and Moradi (2011) and

Banks (1998) that the size of the pavement must be large enough to accommodate other road uses. It research also indicated that the climate change also has effect on the traffic congestion.

Conclusion

With critical analysis of data and result, the study pointed out that the traffic congestion in the Agona Swedru municipality delay so many activities.

It is concluded that provision of parking facilities, provision of spacious road shoulders, preventing sale on pavement, provision of by-passes, and one-way traffic should be put in place. Also preventing unexpected closure of roads for social activities will help reduce traffic congestion within the municipality. It is also concluded that the efficient flow of both vehicular traffic and other road users will improve productivity within the municipality.

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Sound Radiation from a Floating Runway due to an Airplane Taking off Affected by Mean Flow

Nitin Agarwala^{a,*} and E. M. Somashekharan Nair^b

^a*Department of Ship Technology, Cochin University of Science and Technology
Kochi, Kerala 682 022, India*

^b*Mechanical Engineering Department, SCMS School of Engineering and Technology,
Palissery, Karukutty, Kochi, India*

Abstract

Sound radiation caused by taking off of an airplane from a floating runway is an unexplored area which has a serious but unstudied impact on marine life. For such a study, conventional means of using a three dimensional runway with time varying loading during takeoff is extremely difficult and time consuming. The analysis is made simpler by assuming the VLFS to be a simple, infinitely long beam supported by buoyancy. Sound radiation using Timoshenko-Mindlin beam model subjected to varying take off speeds and presence of mean flow is investigated.

Keywords:

Moving Load; Timoshenko-Mindlin beam; Floating runway; Sound radiation; Mean flow.

Nomenclature

ξ	Wave number variable
ζ	Non-dimensional wave number variable
$\gamma (= \frac{K_0}{K_B})$	Wave number ratio
ν	Poisson's ratio
ω	Angular frequency
$j (= \sqrt{-1})$	Imaginary number
ρ_v	Mass density of the beam
ρ_0	Mass density of the acoustic medium
$\kappa^2 (= \frac{\pi^2}{12})$	Cross sectional shape factor or the shear correction factor
$\alpha_0 (= \frac{\rho_0 C_L}{\sqrt{12} \rho_v C_0})$	Fluid loading parameter
$\delta(x - Vt)$	Delta function
Π	Total acoustic power
h	Height of the beam
t	Time variable
x	Space variable in x direction
$p(x, y, t)_{y=0}$	Acoustic pressure acting on the surface of beam
$u(x, t)$	Transverse displacement of the beam
f_0	Strength of external force per unit width
$C_L (= \sqrt{\frac{E}{\rho_v}})$	Longitudinal wave speed

C_0	Speed of sound in acoustic medium
$D = \frac{Eh^3}{12(1-\nu^2)}$	Flexural rigidity of plate
E	Elastic modulus
$H(x)$	Heavyside step function
\bar{I}	The time averaged sound intensity
$I (= \frac{h^3}{12})$	Cross sectional moment of inertia per unit width
$K_0 (= \omega / C_0)$	The acoustic wave number
$\bar{M} (= [V - U] / C_0)$	The modified Mach number
P	The sound pressure on the beam surface
$\mathcal{U}_s^{\&}$	The beam surface velocity of conjugation
$\mathcal{U}_s^{\&} = \frac{dU_s(\xi)}{dt}$	The beam surface velocity
U	The speed of mean flow of the fluid
W	Power per unit width

1. Introduction

Because of their relatively simple construction and ease of maintenance, pontoon-type very large floating structures (VLFS) are considered to be one of the most promising designs for a floating airport or runway, particularly in sheltered areas. The typical dimensions are 5 km long, 1 km wide, and only a few meters deep. Due to their dimensions, even when no incoming waves exist, the structure responds flexurally to moving loads like those from an airplane during landing or take-off. Hence study of transient responses of a VLFS to impulsive and moving loads is a must. Only a few studies of transient problems for VLFS have been reported to date, however these are limited to flexural deflections and sound generated by moving loads on such structures has not been addressed to date even though sound radiation from floating platforms has a serious and unstudied impact on marine life. However to study acoustic effects, a dynamic analysis of a three-dimensional runway with time varying loading during take-off is exceeding difficult. This analysis can be made simpler by assuming that the runway behaves as a simple, infinitely long beam supported by buoyancy. The model is assumed to be a simple beam, described by a Timoshenko-Mindlin beam equation.

Sound radiation due to moving loads on beams has been investigated earlier (Keltie and Peng, 1988) wherein results show that for beams under light fluid loading, the coincidence sound radiation peak for a stationary force is split into two coincidence peaks due to the effects of the Doppler shift, while for beams under heavy fluid loading there are no pronounced sound radiation peaks. Subsequently vibration response of periodically simply supported beam on the whole structure in wavenumber domain through Fourier transform was analyzed (Cheng and Chui, 1999). The result was an advance on traditional substructure methods. For an air-loaded beam subjected to a stationary line force, they showed that the radiated sound power exhibited peaks at certain wavenumber ratios. The wavenumber ratios at which radiation peaks occur nearly coincide with the lower bounding wavenumber ratios of the odd number of propagation zones. Cheng's formulation did not include the presence of numerous wavenumber components induced from the elastic supports and is subject to the restriction that the external force is located on one of the elastic supports. To discuss vibro-

acoustic response of a fluid-loaded beam on periodic elastic supports subjected to a moving load “wavenumber harmonic series” was introduced (Cheng et al., 2000; 2001). Results show that the response of a beam on an elastic foundation can be approximated using a periodically, elastically supported beam when the support spacing is small compared with the flexural wavelength. For such beams when the force is stationary a single radiation peak occurs which splits into two peaks due to Doppler shift when the force becomes traveling. The authors undertook a number of studies to analyse the effect of moving loads on sound radiation from floating airports. These included effect on sound radiation by varying structural material, effect of damping factor on varying beam types and affect of inplane loading on sound radiation (Agarwala and Nair, 2012; 2013a; 2013b).

Acoustic analysis in the presence of a *mean flow* or *current* complicates the problem further by modifying the effect of the moving load. The available literature on study of acoustics in mean flow, however, is much smaller. The main reason for this is that the mean flow speed is often too low to have any real impact on acoustics that are of practical engineering relevance. Another reason is that the fluid-structure interaction problem usually becomes too complicated to be solved analytically when mean flow is considered. Consequently problems are often treated in the same way as those in a stationary fluid medium. The effect of mean flow on the response of a fluid-loaded structure thus remains mostly unexplored.

For short, sturdy beams the shear effect cannot be neglected as in conventional analysis using the Bernoulli-Euler’s beam theory. The situation occurs when the cross section of the beam is relatively large in comparison with the beam span. Although the correction for the shear effect may yield results only a few percent more accurate in frequency prediction than those from classical beam theory for a moderately thick beam, the accuracy improvement may be quite profound when performing dynamic response analysis. It is with this reasoning that a Timoshenko-Mindlin plate is utilized for the present study.

To the best of the knowledge of the authors, no study of acoustic radiation from VLFS subjected to either a moving load or mean flow has been reported in the literature other than efforts by the authors (Agarwala and Nair, 2012; 2013a; 2013b). The aim of this study is to develop an expression for calculating sound radiation from floating structures subjected to mean flow and moving loads such as airplanes. In developing the expression, Fourier transform methodology for a Timoshenko-Mindlin plate is utilized (Keltie and Peng, 1988). Structural damping is ignored while effect of mean flow is included.

2. Formulation

Floating airports which are nearly 5000 m long can be considered to be infinitely long. Accordingly we can assume them to behave as a simple, infinitely long beam in contact with water surface. Structural damping is ignored for the floating airport as since there is no apparent resonant mechanism in this problem. Water is assumed to be inviscid, and the flow resulting from the airplane take-off is assumed to be irrotational. The x -axis is aligned with the length of the runway and the y -axis is directed vertically upwards, as seen in Figure 1. Because the floating runway is very narrow compared with its length, as a simplification, we will assume that the deformation and loading assumed not to vary across the runway. The structure is assumed to behave like a beam, described by the Timoshenko-Mindlin beam equation. An excitation force of length $2L$ moving at a subsonic speed V is assumed to be acting on the runway. The space $y > 0$ is filled with an acoustic medium such as water. The

other side of the plate is assumed to be vacuum. A subsonic mean flow of speed U , moving in the positive x direction is considered to be present in the water.

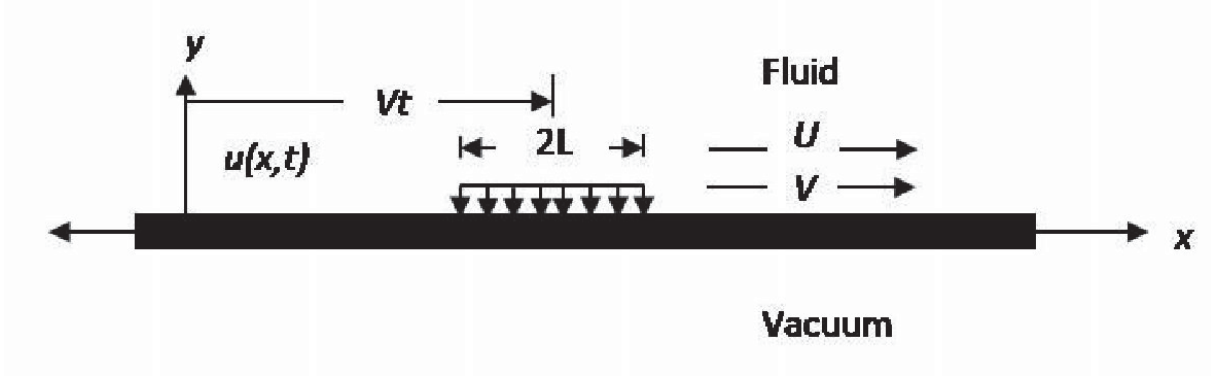


Fig. 1: Schematic representation of the problem geometry

We consider a uniformly distributed moving line force, given by

$$f(x,t) = \frac{f_0}{2L} [H(x-Vt+L) - H(x-Vt-L)]e^{j\omega t}$$

The vibration equation for an elastic plate, including rotational inertia and transverse shear effects, is given by the Timoshenko-Mindlin plate equation as

$$\left(\nabla^2 - \frac{\rho_v}{\kappa^2 G} \frac{\partial^2}{\partial t^2}\right) \left(D\nabla^2 - \frac{\rho_v h^3}{12} \frac{\partial^2}{\partial t^2}\right) u + \rho_v h \frac{\partial^2 u}{\partial t^2} = \left(1 - \frac{D}{\kappa^2 Gh} \nabla^2 + \frac{\rho_v h^2}{12\kappa^2 G} \frac{\partial^2}{\partial t^2}\right) [f(x,t) - p(x,y,t)_{y=0}] \quad (1)$$

Since a beam is considered as a one dimensional plate, $\nabla = \frac{\partial}{\partial x}$ making this substitution in Eq.

(1) gives the Timoshenko-Mindlin beam equation as

$$\begin{aligned} D \frac{\partial^4 u(x,t)}{\partial x^4} + \rho_v h \frac{\partial^2 u(x,t)}{\partial t^2} - \rho_v I \left(1 + \frac{D\rho_v}{\kappa^2 G}\right) \frac{\partial^4 u(x,t)}{\partial x^2 \partial t^2} + \rho_v I \frac{\rho_v}{\kappa^2 G} \frac{\partial^4 u(x,t)}{\partial t^4} \\ = \left(1 - \frac{D}{\kappa^2 Gh} \frac{\partial^2}{\partial x^2} + \frac{\rho_v h^2}{12\kappa^2 G} \frac{\partial^2}{\partial t^2}\right) [f(x,t) - p(x,y,t)_{y=0}] \end{aligned} \quad (2)$$

To account for the presence of current the operator, $\frac{\partial}{\partial t}$ is replaced by the operator $\frac{\partial}{\partial t} + U \frac{\partial}{\partial x}$ in the expressions of pressure distribution and the boundary condition at $y = 0$. The pressure distribution induced by the vibrating beam in the acoustic medium thus satisfies the wave equation in two-dimensional space, given by

$$\left[\frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial x^2} - \frac{1}{C_0^2} \left(\frac{\partial}{\partial t} + U \frac{\partial}{\partial x}\right)^2\right] p(x,y,t) = 0 \quad (3)$$

Hence the boundary condition at $y = 0$ is modified as

$$\rho_0 \left(\frac{\partial}{\partial t} + U \frac{\partial}{\partial x}\right)^2 u = -\frac{\partial p}{\partial y} \Big|_{y=0} \quad (4)$$

By applying the spatial Fourier transformation $FT(\cdot) = \int_{-\infty}^{\infty} (\cdot) e^{i\xi x} dx$, the force function for a harmonic line force in wave number domain may be written as

$$\mathcal{P}(\xi, t) = f_0 \frac{\sin(\xi L)}{\xi L} e^{j(\omega + \xi V)t} \quad (5a)$$

the transformed displacement as

$$\mathcal{U}_s(\xi, t) = U_s(\xi) e^{j(\omega + \xi V)t} \quad (5b)$$

and the transformed pressure as

$$\mathcal{P}(\xi, y, t) = P(\xi, y) e^{j(\omega + \xi V)t} \quad (5c)$$

Upon substitution of Eq. (5a), (5b) and (5c) in the Eq. (2) and a combined Eq. (3) and Eq. (4), we get

$$U_s(\xi) = \frac{Z_F F(\xi)}{Z_m + Z_F Z_a} \quad (6)$$

and

$$P(\xi, y=0) = \frac{j\rho_0(\omega + \xi[V-U])^2}{K_y} U_s(\xi) \quad (7)$$

where the acoustic impedance operator (Z_a) is given by

$$Z_a = \frac{j\rho_0(\omega + \xi[V-U])^2}{K_y} \quad (8)$$

the beam impedance operator (Z_m) as

$$Z_m = D\xi^4 - \rho_v h(\omega + \xi[V-U])^2 - \xi^2 \rho_v I \left(1 + \frac{D\rho_v}{\kappa^2 G}\right) (\omega + \xi[V-U])^2 + \rho_v I \frac{\rho_v}{\kappa^2 G} (\omega + \xi[V-U])^4 \quad (9)$$

the Z_F by

$$Z_F = 1 + \frac{D}{\kappa^2 Gh} \xi^2 - \frac{\rho_v h^2}{12\kappa^2 G} (\omega + \xi[V-U])^2 \quad (10)$$

and K_y is given by

$$K_y = \begin{cases} -j\sqrt{\xi^2 - (K_0 + \bar{M}\xi)^2} & \text{for } \xi^2 > (K_0 + \bar{M}\xi)^2 \\ \sqrt{(K_0 + \bar{M}\xi)^2 - \xi^2} & \text{for } \xi^2 < (K_0 + \bar{M}\xi)^2 \end{cases} \quad (11)$$

where \bar{M} ($= [V-U]/C_0$) is the Mach number and K_0 ($= \omega/C_0$) the acoustic wave number.

2.1 Total Acoustic Power

The time averaged sound intensity is given by (Morse and Ingrad, 1986) as

$$\bar{I} = \frac{1}{T} \int_0^T \overline{PV} dt \quad \text{or} \quad \bar{I} = \frac{1}{2} \text{Re}[P\mathcal{U}_s^*]$$

In order to find the total acoustic power (Π), the surface acoustic intensity distribution may be integrated over the infinite length of the beam as

$$\Pi = \int_{-\infty}^{\infty} \frac{1}{2} \text{Re}[P(x, y=0, t)\mathcal{U}_s^*(x, t)] dx$$

Upon substituting the sound pressure Eq. (7) and the surface velocity Eq. (6) of the beam in the total acoustic power and simplifying, the sound power radiated per unit width of the beam is given as

$$\Pi = \frac{\rho_0}{4\pi} \text{Re} \left[\int_{-\infty}^{\infty} \frac{(\omega + \xi[V - U])^3}{K_y} |U_s(\xi)|^2 d\xi \right] \quad (12)$$

Limiting the study to subsonic motion of the moving load, the limits within which K_y is real is given by

$$\xi_1 = \frac{-K_0}{1 + M} \leq \xi \leq \xi_2 = \frac{K_0}{1 - M}$$

This allows us to rewrite the expression for the total sound power as

$$\Pi = \frac{\rho_0}{4\pi} \text{Re} \left[\int_{\xi_1}^{\xi_2} \frac{(\omega + \xi[V - U])^3}{K_y} |U_s(\xi)|^2 d\xi \right] \quad (13)$$

Eq. (13) is the required expression for calculating the total sound power from a Timoshenko-Mindlin beam subjected to a moving load in the presence of a mean flow in the fluid.

2.2 Non-Dimensionalising

To be able to make the analysis of Eq. (13) simpler, the total sound power is expressed as a function of the wave number ratio, which is made dimensionless. Thus using the concept of non-dimensional parameters defined in [1] we get

$$\text{Wavenumber variable } (\zeta) = \frac{\text{Wavenumber variable } (\xi)}{\text{Acoustic wavenumber } (K_0)} \quad (14a)$$

$$K_B = \left[\frac{\rho_v h \omega^2}{D} \right]^{\frac{1}{4}} \quad (14b)$$

$$\gamma = \frac{K_0}{K_B} \quad (14c)$$

$$C_L = \sqrt{\frac{E}{\rho_v}} \quad (14d)$$

$$\alpha_0 = \frac{\rho_0 C_L}{\sqrt{12} \rho_v C_0} \quad (14e)$$

$$W = \frac{4\pi\omega(\rho_v h)^2}{\rho_0 f_0^2} \Pi \quad (14f)$$

Substituting Eq. (14) in Eq. (12) gives the dimensionless radiated sound power per unit width as

$$W = \int_{\xi_1}^{\xi_2} \alpha^3 \beta \left| Z_F \frac{\sin(\zeta K_0 L)}{\zeta K_0 L} \right|^2 |D_w|^{-2} d\zeta \quad (15)$$

$$\text{where } \xi_1 = \frac{-1}{1 + M} \leq \zeta \leq \xi_2 = \frac{1}{1 - M}$$

$$\alpha = 1 + M \zeta$$

$$\beta = \sqrt{\alpha^2 - \zeta^2}$$

$$\begin{aligned}
D_w &= \beta(D_1 - D_2 + D_3) + jD_4 \\
Z_F &= 1 + \frac{2(1+\nu)\gamma^4}{\kappa^2} \left(\frac{C_0}{C_L}\right)^2 \left[\xi^2 - \left(\frac{C_0}{C_L}\right)^2 \alpha^2 (1-\nu^2)\right] \\
D_1 &= \gamma^4 \xi^4 \\
D_2 &= \alpha^2 \left[1 + \left[1 + \frac{2(1+\nu)}{\kappa^2(1-\nu^2)}\right] \gamma^4 \xi^2 \left(\frac{C_0}{C_L}\right)^2 (1-\nu^2)\right] \\
D_3 &= \frac{2(1+\nu)}{\kappa^2} \alpha^4 \gamma^4 \left(\frac{C_0}{C_L}\right)^4 (1-\nu^2) \\
D_4 &= Z_F \frac{\alpha_0 \alpha^2}{\gamma^2}
\end{aligned}$$

3. Analysis and Discussion

We investigate the effect of mean flow of the fluid on the total radiated sound power. In order to undertake the required investigation, Eq. (15) needs to be numerically evaluated for the case of a beam floating on water. Properties of the steel beam model analysed are $E = 20 \times 10^{10} \text{ N/m}^2$, $\rho_v = 7800 \text{ kg/m}^3$ (i.e $D = 560 \text{ KNm}$), $h = 2.54 \times 10^{-2} \text{ m}$, $\nu = 0.3$, $\kappa^2 = 0.85$, $C_0 = 1481 \text{ m/s}$ and $\rho_0 = 1000 \text{ kg/m}$. The external force (f_0) is assumed to be of unit magnitude. By varying the values of parameters M and $K_0 L$, the sound power is computed and then plotted versus the wave number ratio (γ) or non-dimensional frequency. With the maximum surface current of Gulf Stream at 2.5 m/s and accounting for discharges into the lagoon, the mean flow velocity is taken as varying between -10 m/s to 10 m/s .

The sound power has been calculated for $K_0 L = 0.1$ and 2π in the frequency range $0.01 < \gamma < 2.2$. Figure 2 shows the sound power generated by the moving load in presence of a mean flow on a Timoshenko-Mindlin beam for $M = 0.7$ and $K_0 L = 0.1$ and 2π . All calculations have been undertaken using MATLAB.

With increased speed, the sound power generated increases, though marginally. However, it may be noted that the increased acoustic length $K_0 L$ reduces the sound power level over the entire range of the frequency range. This effect is expected since the total applied force strength is kept constant. No pronounced peak is noticed in the sound power curves. This is attributed to the fact that denser medium like water drain the energy faster from the structure disallowing the formation of the peak. One can see four distinct frequency ranges: the very low frequency region ($\gamma < 0.1$); the low frequency region ($0.1 < \gamma < 1.0$); the frequency region near coincidence ($\gamma \sim 1.0$); and the frequency region above coincidence ($\gamma > 1.0$). In the low frequency region and in the region above coincidence frequency, the sound powers radiated show no discernible difference. It is the low frequency region and the region near coincidence is significant.

Presence of current displays a proportional shift while nature of curves remains the same as that without current. The minus (-) current indicates direction of the current opposite to the direction of the subsonic moving force. The net effect is an increased Mach number and hence a shift of the curve upwards. The shift however is not very large. It may be noted that a high value of the current which makes the modified Mach number greater than 1 is not

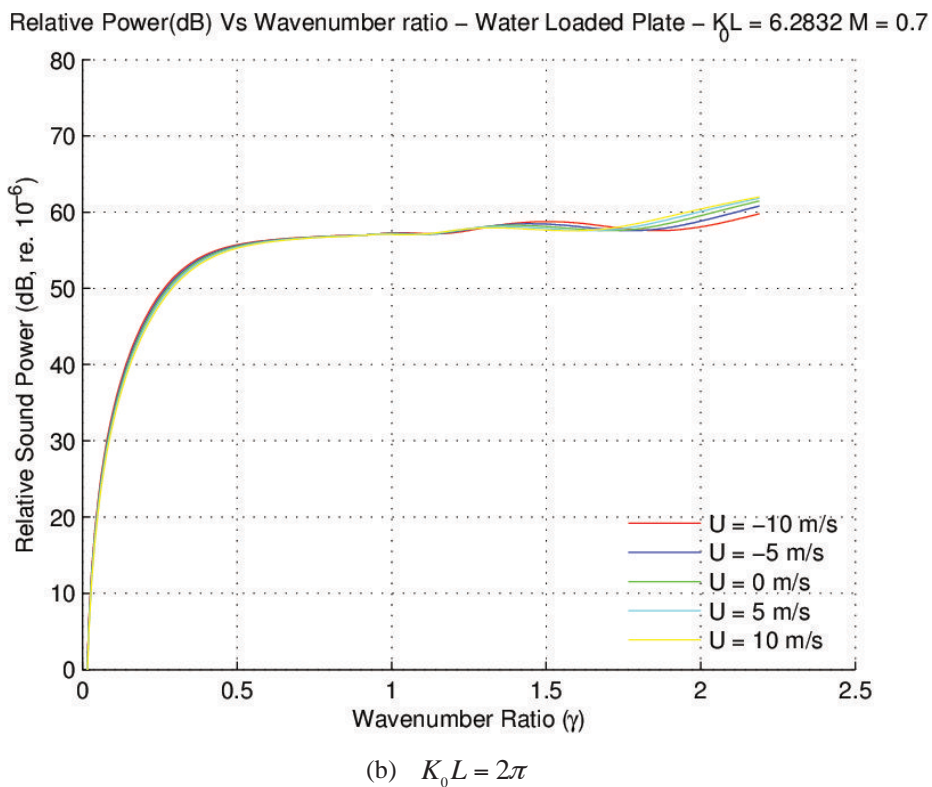
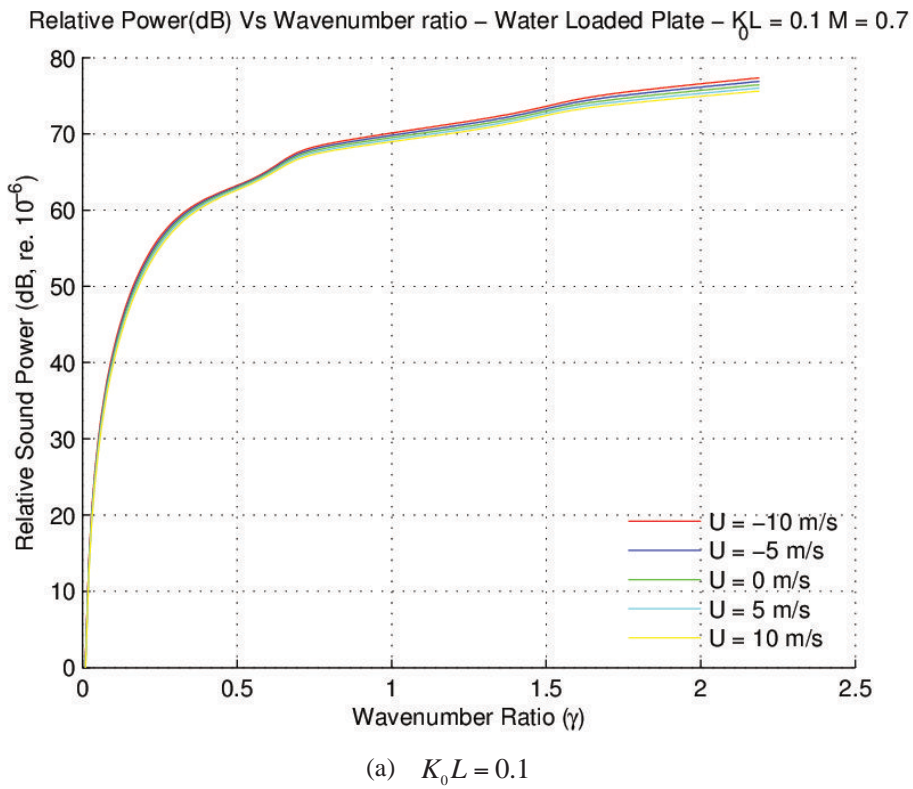
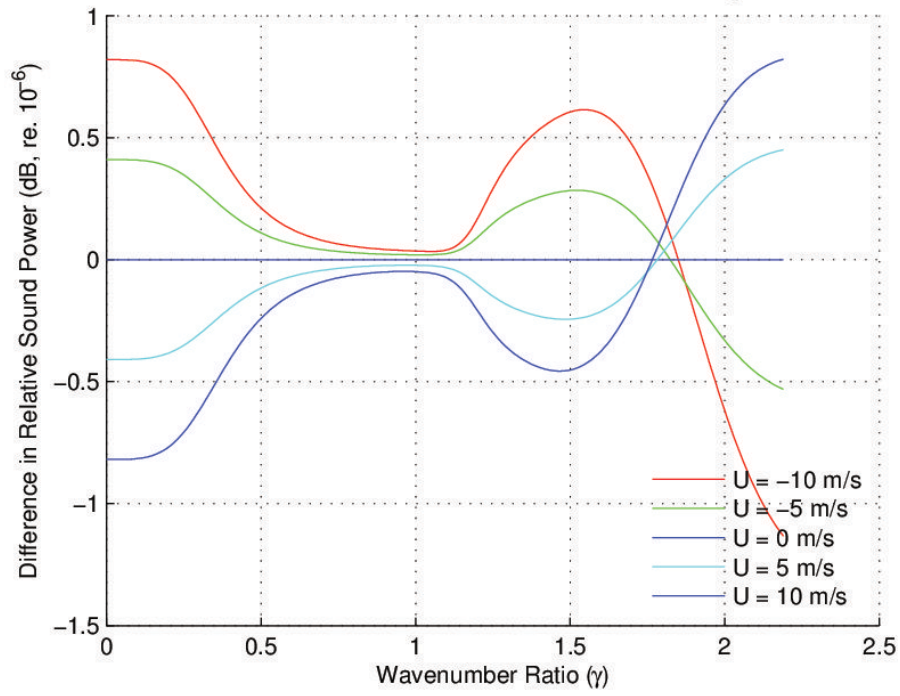


Fig. 2.: Relative sound power v/s wavenumber ratio **with current** for varying K_0L

Relative Power(dB) Vs Wavenumber ratio – Water Loaded Plate – $K_0L = 4.7124$ $M = 0.001$



Relative Power(dB) Vs Wavenumber ratio – Water Loaded Plate – $K_0L = 1.5708$ $M = 0.001$

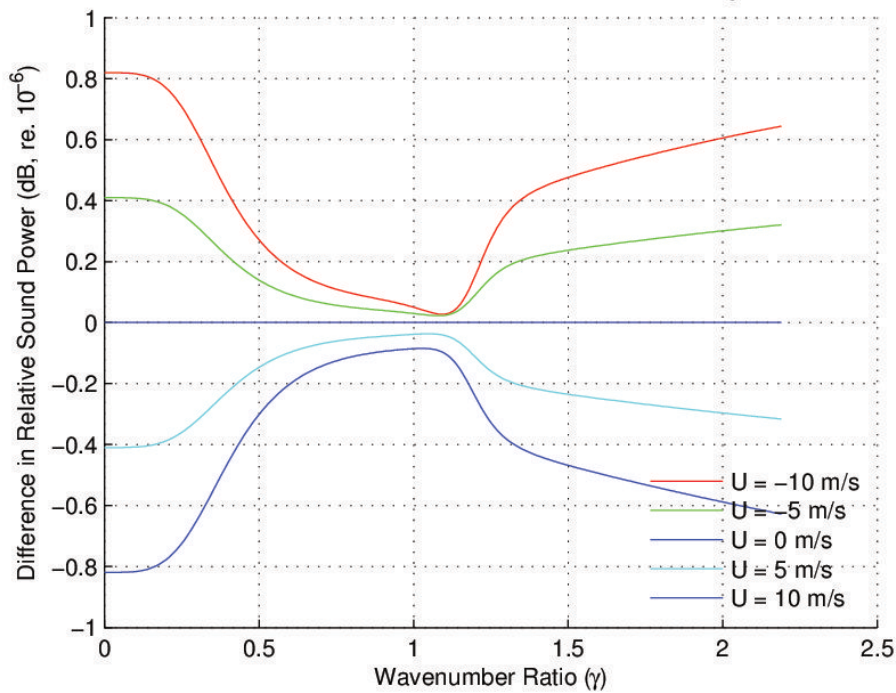
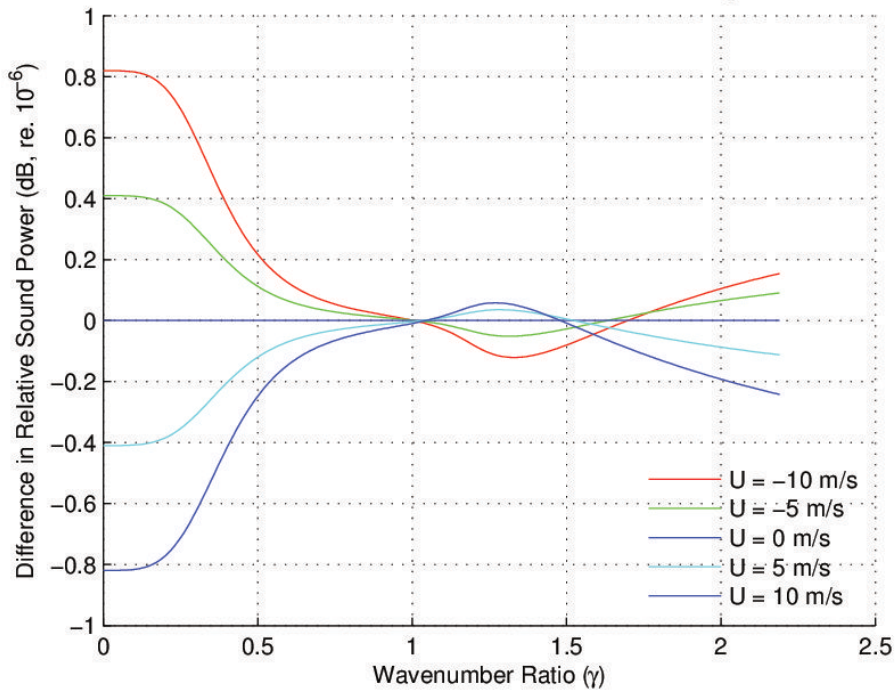


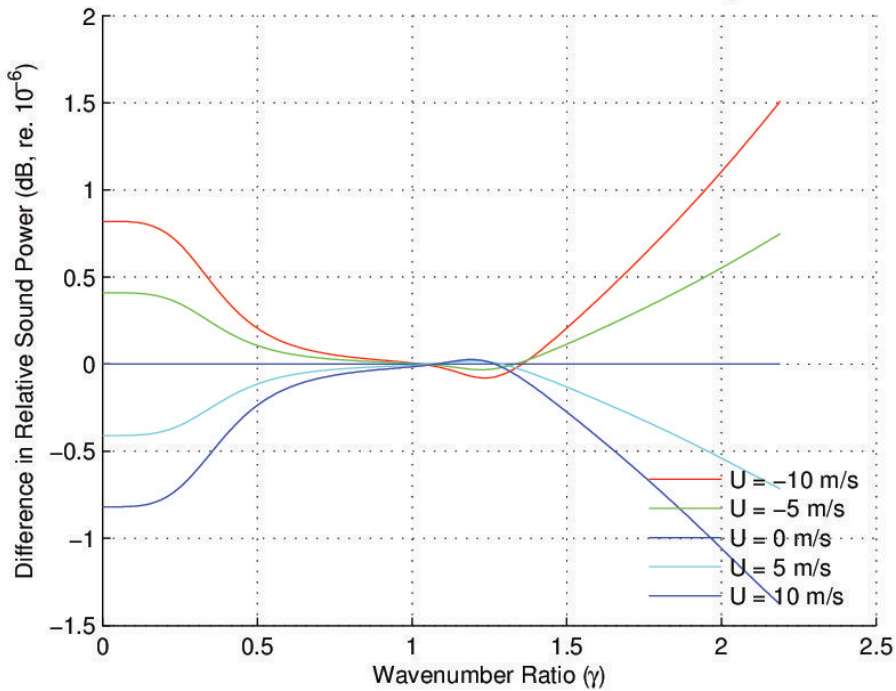
Fig. 3.: Difference in Relative sound power for non-integral multiples of π ; $M = 0.001$

Relative Power(dB) Vs Wavenumber ratio – Water Loaded Plate – $K_0L = 3.1416 M = 0.001$



(a) $K_0L = \pi$

Relative Power(dB) Vs Wavenumber ratio – Water Loaded Plate – $K_0L = 6.2832 M = 0.001$



(b) $K_0L = 2\pi$

Fig. 4.: Difference in Relative sound power for integral multiples of π ; $M = 0.001$

permissible since the calculations are valid only for the subsonic speed domain. Since the variations due to the presence of current are not predominantly visible in Figure 4, we replot the figure as a difference curve with $U = 0$ as the reference to get Figure 3 and 4. Figure 3 is

for fixed M with varying K_0L as non-integral multiples of π while Figure 4 is for integral multiples of π . It is interesting to note that the trend of curves of integral multiples and non-integral multiples is different, but consistent. The variation due to convective speed of loading is increased magnitudes for increased M while the curve trends remain to be the same. It is noted that for non-integral multiples of π , for every step increase of $\pi/2$, there is an added node with the magnitude of the previous nodes being reduced.

For integral multiples of π , for every step increase of π , there are two added nodes, again the previous nodes being reduced in magnitude. It may also be noted that the relative difference of sound power due to presence of mean flow is limited to 1 dB.

4. Conclusion

Sound produced by an airplane taking off from a floating runway in the presence of a mean flow has been analysed. The analysis is carried out for a one dimensional plate in lieu of a three dimensional runway with time varying loading. The sound generated at various speeds of convective loading has been calculated and as expected an increase in sound is observed with increasing Mach number. The overall sound generated reduces with an increased acoustic length K_0L over the entire frequency range. No pronounced peaks are observed in the sound power curves due to the denser medium of water wherein the energy drain is faster disallowing peak formation. The presence of current does not alter the sound produced prominently and the change is seen to be in the range of 1dB. Though the need to study effect of mean flow (current) may be considered irrelevant in light of the fact that such structures are set up in relatively calm waters behind islands or breakwater, however recent interests to have a floating airport in River Thames, UK and studies to widen range of potential setup sites for VLFS emphasizes this need. On analysing the difference of sound power with current a unique trend of curves is observed for acoustic lengths of integral and non-integral multiples of π . The *inter se* trend however remains consistent. It is thus concluded that the effect of sound produced by an aircraft takeoff on a floating runway needs to be catered for in the design of a VLFS for safer marine environment.

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