CELL-PHONE USAGE IN LAGOS, NIGERIA AND POTENTIAL IMPLICATIONS FOR PEAK-PERIOD TRAVEL

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Abstract

For a very long time, physical contact, using private and public transport system, dominated the mode of traveling in Lagos State. The introduction of the cell-phone in the state has changed this pattern to a limited extent as more and more people become patron of its usage. Hitherto, the cost of providing such services by Nigeria Telecommunication (NITEL) was regarded as one of the highest in the world. Apart from this, the tele-density in Nigeria was 4 per 1000 persons (OED, 2000) which is far below International Telecommunication Union (ITU) specification, of 1 telephone to 100 people. The situation is worse in the city of Lagos, where a large population of the industries, commercial activities, private and public services are located. The study, therefore, review the situation related to cell phone usage in Nigeria in the context of the world. It also examines cell phone usage patterns with a view to commenting on the potentials of phone usage as a means of substitution for peak period travel. Five hundred copies of a questionnaire were administered in five Local Government Areas (LGAs) that were randomly selected. The first analysis which examines whether the average number of incoming calls is different from the average number of outgoing calls in all the five zones, shows that in three zones, the differences are significant and not significant in the other two zones. This shows that 60% of those sampled make more calls than received which of course have implication on travel substitution or generation. For morning and evening peak-period travel, all zones rely on public/private vehicles to move. This is not the same in the afternoon peak, when majority rely on cell-phone usage to interact rather than embark on physical contact. The reasons given is that people still rely heavily on automobile to carry out movement of goods and passengers in the morning and evening peak periods because of long distance separating different land uses in the city of Lagos while most interaction in the afternoon which are in the form of message/information which had hitherto been accomplished by physical contact are gradually being taken over by cell phone especially by people in offices. Thus, since the majority of the low income earners who are resident in Lagos, have no handset and have to depend on automobiles, the issue of physical contact for now still continues to contribute to peak period travels especially during the morning and evening peaks. Hopefully, if cell-phone is made affordable to the low income earners, reduction in peak period travels in Lagos State may be extended to afternoon peak periods. .

Key words: Cell-phone usage; urban travel; Lagos/Nigeria

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Resumo

O uso de telefones celulares em Lagos, Nigéria e potenciais implicações para a circulação em períodos de pico de tráfego

Por um longo tempo, o contacto físico, usando o sistema de transporte público, foi dominante como modo de deslocamento no estado de Lagos. A introdução dos telefones celulares no estado mudou este padrão, limitando sua extensão, na medida em que cresce o número de pessoas que fazem uso regular do celular. Até então, o custo de provimento destes serviços pela Nigéria Telecommunication (NITEL) foi considerado um dos mais altos do mundo. Além disso, a tele-densidade na Nigéria era 4 telefones por 1000 pessoas (OED, 2000) o que é muito abaixo das especificações da International Telecommunication Union (ITU) que estabelece 1 telefone para 100 pessoas. A situação é pior na cidade de Lagos, onde está localizado grande número de indústrias, atividades comerciais e serviços públicos e privados. Este estudo, então, resenha a situação do uso de telefones celulares na Nigéria no contexto mundial. Ela também examina os padrões de uso de celulares no sentido de comentar seu de uso como um meio de substituição para de deslocamentos em períodos de pico de trânsito. Quinhentas cópias de um questionário foram aplicadas em cinco Local Government Áreas (LGAs) selecionadas aleatoriamente. A primeira análise, que examina o quanto o número médio de chamadas *para* é diferente do número médio de chamadas *a partir de* em todas as cinco zonas, mostra que, em três zonas, as diferenças são significantes e não significantes em outras duas zonas. Isto mostra que 60% dos amostrados faz mais chamadas do que recebe o que, com certeza, tem implicações na substituição ou geração de viagens. Para os períodos de pico de tráfego matutinos e noturnos, o movimento de todas as zonas depende de veículos públicos ou privados. Esta situação não é a mesma quando se considera o período de pico da tarde, quando a maioria se vale de celulares para interagir ao invés de optar por contacto físico. As razões dadas são de que as pessoas ainda dependem fortemente do automóvel para o transporte de passageiros e mercadorias nos períodos de pico de tráfego da manhã e da noite por causa da distância que separa os usos do solo na cidade de Lagos, enquanto que a maior parte da interação ocorrida à tarde, que se dá sob a forma de mensagens/informação e que ainda são acompanhadas de contacto físico, estão, gradualmente, sendo substituídas pelo celular, especialmente pelas pessoas que trabalham em escritórios. Então, uma vez que a maioria dos assalariados de baixa renda residentes em Lagos não tem celulares e dependem de automóveis, a questão do contacto físico, até agora, continua a contribuir para as viagens nos períodos de pico, especialmente de manhã e à noite. Como se pode esperar, se o acesso aos celulares se tornar possível para os assalariados de baixa renda, a redução dos deslocamentos em períodos de pico em Lagos pode ser estendida aos períodos de pico vespertinos.

Palavras-chave: Uso de celulares; deslocamentos urbanos; Lagos/Nigéria.

INTRODUCTION

For a very long time, the urban environment of the developing world depended on the use of automobile to commute within and between similar land uses. This dependency, is associated with a lot of transportation problems such as traffic congestions, accidents, pollution and degradation of the landscape. In advanced countries, the transportation situation is better because of improved road network, better means of transportation, improved transport services, better transportation policies, and the increasing use of telecommunication system among others. In a bid to improve the telecommunication system of the developing world, the Global System for Mobile (GSM) communication has been adopted. In terms of similarity, both offer a means of achieving interaction that keep social, cultural, economic and political activities going. The two terms, however, differ when transportation is considered as physical movement of persons, goods and information while telecommuting is seen as a means of sending information through electronic media (cell-phone, telephone, walkie-talkie and the likes).

Lagos State which is the most populous state in Nigeria, has no option than to contend with transportation problems because of its high level of automobile dependency. The introduction of the cell-phone into the Nigeria market was therefore a welcome relief to Lagosians. This is because a section of the public believed that it would help reduce the physical contact by causing a significant change in travel pattern and as such reduce traffic congestion on roads. Others believed that GSM communication would complement transport services without significant impact on travel pattern. The controversies surrounding cell-phone usage as a potential means of reducing travel by automobile were the motivation behind this research.

STATEMENT OF PROBLEMS

The rapid urbanization of society is becoming more pronounced all over the world. By the year 2000, it was estimated that more than half of the world population lived in urban areas, up from 38% in 1975 (ADENLE, 1995, p.47). From the world development indicator for the year 2000, urban population was put at 46.1% of the total world population. As a result urban areas of the world are daily increasing in population. According to Adenle (1995, p.47), by the year 2000, some 40 cities in developing countries were projected to have exceeded 5 million. This means that what we have now is real population explosion in major urban centers in less than one generation. Thus, the attendant problems such as traffic congestion, housing congestion and tension on infrastructure in urban areas would continue, as documented in past studies (ABUMERE, 1994; ONOKERHORAYE et al, 1986; ADENIJI, 1983; AJAYI, 2000; RICHARDSON, 1992; LITMAN, 2002; MILLER, 1991 and AWE, 2001).

Past studies also show that most cities all over the world, have been automobile dependent for a very long time. For example, in North America, transportation cost represents a larger portion of household expenditure than other parts of the world despite relative low prices for individual components, such as vehicles and fuel (HOOKS, 1995). Automobile dependency without considering alternatives to means of movement, is beset with a lot of problems, such as accidents, traffic congestion, pollution and degradation of landscape. According to Miller (1991) vehicle crashes are the leading cause of death among Americans 1 to 37 years old. In the developing Asian countries, road deaths tend to increase with automobile use and exceptionally high crash rates

are attributed to poor roads, traffic management and poor medical facilities (SITE 1). Similarly, automobile dependency tends to increase overall congestion rates in cities. While, higher density transit oriented areas tend to have more intense congestion, automobile dependent areas actually have greater total congestion. According to SITE 2, automobile dependent cities such as Los Angeles and Houston, have more traffic delays than cities with more balanced transportation, such as New York and Chicago. In America, according to SITE 3, vehicle travel on the national highway system increased by 80% while lane kilometers only increased by 2.4%. Similarly, an Oak Ridge National Laboratory Report also indicates that 24% of all non-recurring congestion is caused by work zones. From that report in year 2001, fatalities from work zones alone reached 1079, with 85% of the fatalities occurring by motorists. In a recent survey too, the American public, cited work zones, as second only to poor traffic flow, in causing traveler's dissatisfaction.

Similarly, high inflationary trends and the resultant increase in operational costs have led to illegal telephone connections which have not yet witnessed any serious reduction in the country. The above scenario of the communication system as witnessed in the country, also contributed to Nigerians being automobile dependent for a very long time. The situation is worse in Lagos State which is regarded as the most automobile attracting zone in the Federal Republic of Nigeria (FGN).

The extent to which cell-phones have altered travel peak hour pattern of commuters in cities of the developing world have not been given much attention in the literature. The reality in Lagos State is that most of the residents are automobile-dependent leading to traffic congestion on most of its roads. The **aim** of this study is therefore, to review the situation related to cell phone usage in Nigeria in the context of what obtains outside country. It is also directed at examining cell phone usage patterns with a view to commenting on the potential of phone usage as a substitute to peak period travel.

LITERATURE REVIEW

Past studies have concentrated efforts in the area of spatial and temporal distribution of telephone facilities in cities (ADENIJI – SOJI, 2000; HEPWORTH, 1992 and MOKHTARIAN, 1992 and 1991). Other studies have examined the relationship between telecommunications and transportation (NRP, 1998; ADENLE, 1995; SHLADOVER, 1991, MOKHTARIAN, 1991, SOLOMON, 1986 and DAVIES et al, 1991). Although, the potentials of modern communication gadgets in the area of substitution and stimulation of movements have not been given much attention in the developing world in the past. The situation as of today has changed as more people are becoming increasingly interested in these aspects.

Cell-phones, have great potential to reduce travel by moving information through electromagnetic waves instead of moving people and goods in vehicles. Thus, increasing the use of cell-phones could reduce problems associated with physical contacts. In advanced countries, the situation of rapid increase in urban population is better because of the advances in telecommunications and transportation. According to Ajayi (2000, p.7), the main forces behind globalization are not only the increasing ease of communication and transportation but also the falling cost of communication. Cellular telephones are owned by more than 50 million Americans and new technological breakthroughs have seen a change from analog to digital architectures along with the recent introduction of "Personal Communications Services" (PCS) as a competitor to

the cellular market (SITE 1). Encouraged by this development, new capabilities beyond voice communications are being made available at an accelerated rate, thus compelling the user to upgrade to palm-size devices that allow activities such as checking of E-mail, “surfing the net”, receiving stock quotes and the likes, possible.

The cost of telephone calls has dropped in advanced countries because the number and varieties of telephones have increased in all regions whereas, it was not so in Africa (AJAYI, 2000, p.7). For example, in 1996, there were only 2 lines for 100 Africans with the average expected waiting time of 3 years 6 months for obtaining a telephone in Africa. Apart from this obstacle, another problem to contend with is how to get a phone set to function satisfactorily when one eventually succeeds in acquiring one. Cell-phone usage is therefore, gaining popularity all over the world. This is because wireless system of communication has a lot of advantages compared to wire grids. According to Scourias (1997) telecommunications have a long history of evolution starting with personal communication networks to communication services anytime, anywhere and to anyone by a single identity number and a pocket able communication terminal. In an attempt to join the rest of the world, Nigeria recently joined the group of nations operating the GSM communication. Since the introduction of GSM communications into the country a year and half ago, the frequency of calls has increased tremendously. This is in spite of the fact that the communication industry in Nigeria operated as a parastatal of government for a very long time and the cost of providing communication services still remained one of the highest in the world. The situation becomes worse when one considers the services which Nigerian Telecommunication (NITEL) renders. Out of 1,195 local exchanges in existence in Nigeria in early 1999, only 55 were digital. Of the 400,000 existing telephone lines, only 50% were working and the tele-density was 4 per 1000 persons (OED, 2000, p.66). This tele-density is far below International Telecommunications Union (ITU) specification of 1 telephone to 100 people. It is also worthy of note that only 100 Local Government Headquarters had telephone services out of the 774 Local Government Areas in Nigeria (OED, 2000, p.66). This is serious, in a city like Lagos where a large proportion of the Nation’s industries, commercial activities, private and public services are located; it could therefore be argued that Nigeria’s telecommunication system is more cosmetic than functional. A number of problems confront NITEL in an attempt to make available, non-disrupted phone lines, accessible to all users. According to OED (2000, p.66), most of the telecommunication equipment in Nigeria is old and obsolete. For example, the external line plant at NITEL has not been modified or expanded despite the expansion in telephone lines. Telephone delivery in Nigeria as of today, therefore, is unreliable. To boost communication, NITEL established some telephone booths in some of the nation’s cities, so that people with phone cards would have access to its services. These telephone boots are fast disappearing on the streets, because of inadequate maintenance. Apart from this, communication facilities have continuously become the target of rioters and thieves in various parts of the country.

In an attempt to alleviate communication problems, the FGN introduced privatization of the telecommunications sub-sector. Part of the privatization efforts of the FGN, according to OED (2000, p.67), includes the revised National Telecommunication policy, initiating an on-going process of licensing NITEL as a non-monopoly enterprise, addition of 58,700 digital lines by NITEL and M – Tel and the reduction of charges for the installation of telephones and cellular phones. In addition to the above, improvements in communication sub-sector received a boost with the deregulation of the telecommunications sub-sector and the launching of GSM communication in the country. The NITEL, MTN and Econet were issued GSM licenses to operate the mobile cell telephony system as a way of improving the country’s low tele-density (CBN, 2001).

THEORECTICAL BACKGROUND

Past theoretical studies have revealed recognizable, regular and predictable temporal pattern of movement in towns and cities (DANIELS; WARNES, 1980; MRAKPOR, 1986; BELLO, 1994 and GALTIMA, 1998). The timing and duration of the peaks and the lulls of movement vary with the size of towns, their occupational and industrial characteristics. According to Daniels and Warnes (1980), the principal rhythms of travel are diurnal, weekly and seasonal. These observed patterns are applicable to the study area – Lagos. Diurnally, Daniels and Warnes discovered that 70% of the movement made during the whole 24 hours occurred during triple peak periods, which are between 7.00 – 9.00 hours (morning peak) when 19.5% of all movements occurred; an extended midday peak between 11.30 and 14.30 hours during which 32.1% of all movements took place and an evening peak between 16.00 and 18.30 hours containing 21.1% of all movement. On aweekly basis urban movements were divided into working and leisure days. Finally, on a seasonal basis, the peak of movements coincided with the festive periods.

Another concept that is relevant to this study is the growing interest in communication and transportation technology. Some researchers are of the opinion that communication enhances interaction (MOKHTARIAN, 1992), some believed that telecommuting acts as substitute, while others are of the opinion that it complements. According to Adenle (2000, p.12), the proponents of the substitution idea argued that a situation is created whereby telecommuting through the use of telephone facilities, usually computer-aided system in developing world results in either a positive or negative change in peoples' travel behavior.

THE STUDY AREA

Lagos State is the study area (Figure 1). It occupies an area of 3,577 km^2 with 20 Local Government Areas (LGAs), In land area, Lagos State remains the smallest state; yet, it accommodates over 5% of the estimated population of Nigeria (LSIRP, 1980-2000, p.1). The state shares boundaries with the Republic of Benin to the West, Ogun State to the North and East and the Atlantic Ocean to the south. Lagos State was the Federal Capital of Nigeria till 1990 when the Administrative Capital was officially relocated to Abuja. The reasons behind the relocation of the capital of the country, among others, include, the heightened intolerable conditions of living and working in Lagos as a result of high population, heavy migration into Lagos, which led to serious environmental degradation and intolerable housing and traffic congestion. According to LSIRP (1980 2000, p.1), the consequences of rapid urban growth in Lagos Metropolitan Area are well known and documented in local, national and international press. The phenomenon of rapid urbanization in Nigeria is therefore more pronounced in Lagos State than in any other city in the country. As noted in earlier studies, the pattern of urban growth during the pre-colonial, colonial and post-colonial periods favored the growth of Lagos (MABOGUNJE; ABUMERE, 1981; ABUMERE, 1978).

The multifarious activities performed by Lagos State as the commercial nerve center and former capital of the country attracted a lot of people from within and outside the country in the past and even now, in spite of the relocation of the federal Capital to Abuja. Prior to this present democratic dispensation, the economic recession in the country made people patronize public transport services as they were unable to maintain their private vehicles. The recent improvement in the salary structure of

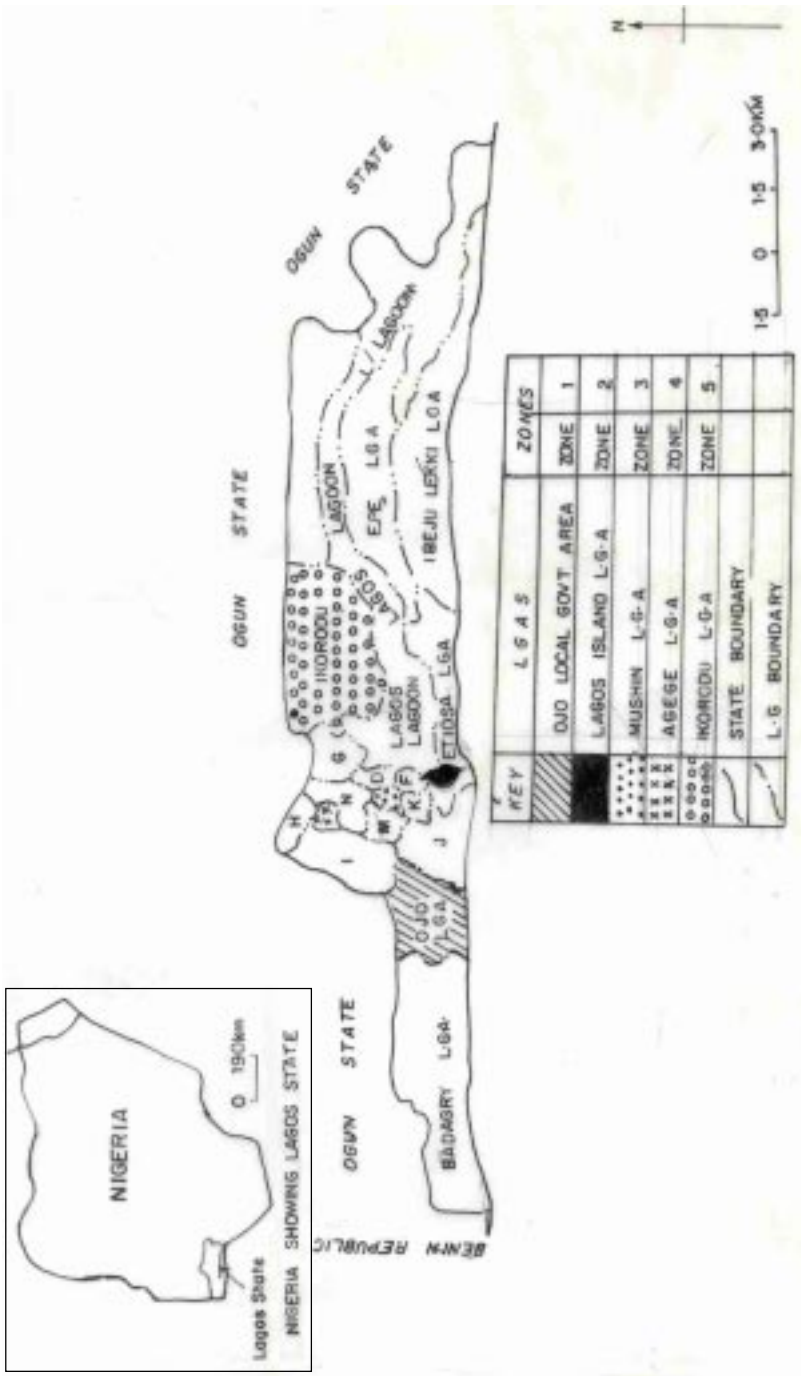

Figure 1 - Map of Lagos State showing the sampled local governments for questionaire administration (Nigeria inset)

Nigerian workers between 1999 and 2002 by the present democratic Government of Obasanjo-led administration has increased the rate at which people acquire private vehicles. Unfortunately the improved salary situation was not matched with improved infrastructure facilities. Thus, majority of the residents in the city of Lagos are automobile dependent for their daily activities; hence, traffic congestion has remained a permanent feature on its road network.

The introduction of GSM through the privatization efforts of the FGN, is a welcome relief to Nigerians and Lagosians in particular. Thus, MTN, Econet, Globacom and NITEL have introduced their GSM into Lagos market. People have availed themselves of this opportunity by possessing cell-phones because of the failure of NITEL to meet up with people's expectations and also because of the belief that it would influence the interaction level of Lagosians. The extent to which the GSM has been able to satisfy its users is the focus of the rest of this discussion.

METHODOLOGY

The twenty LGAs of Lagos State were divided into five Zones based on their location. The sampling frames and the Local Government in each frame are stated below: (figure 1).

*Zone 1: Badagry, Ojo, Amuwo Odofin and Alimosho.

*Zone 2:Ajeromi, Lagos Island, Apapa and Eti-Osa.

*Zone 3: Mushin, Somolu, Surulere and Lagos Mainland.

*Zone 4: Oshodi-Isolo, Ikeja, Agege and Ifako-Ijaye.

*Zone 5: Kosofe, Ikorodu, Epe and Ibeju.

From these five zones, one Local Government Area in each zone was randomly selected for the purpose of carrying out this study. Thus, the five LGAs randomly selected are Ojo (zone 1), Lagos Island (zone 2), Mushin (zone 3), Agege (zone 4) and Ikorodu (zone 5). The five LGAs sampled represented 25% of the total LGAs of Lagos State.

A structured questionnaire was designed to elicit information from only those who use cell-phones. Random sampling technique was therefore adopted in selecting those that filled the questionnaire. Five hundred copies of the questionnaire were administered in all the zones (that is, 100 copies of the questionnaire per zone). Data collected with the questionnaire include number of hand-sets per family, average number of calls per handset holder in a day, average number of calls received by the respondent in a day, the extent to which cell-phone influences travel pattern, impact of cell-phone on physical contacts and suggestions on ways of reducing automobile dependency. Similarly, the study relied on secondary data collected from daily and weekly magazines in the country. This was because, since the introduction of GSM in November 2001, controversies surrounding its use, accessibility and maintenance have attracted the attention of the media in Nigeria in recent times. T-test wasused to analyse and examine whether the average number of incoming calls was different from the average number of outgoing calls in the study area. This analysis was done separately for each of the five zones under study. Similarly, chi-square test was used to analyse and determine if there are zonal differences in the proportion of people who rely on a vehicle to move compared to those who do not rely on a vehicle to move.

RESULTS AND DISCUSSION

As stated earlier, 500 people who owned GSMs were interviewed in this study. 59.6% were males while 40.4% are females. When their occupational groupings were identified, 52.4% of them worked in the private sector (companies, industries business, etc) while 47.6% were in the public sectors (Ministries, teaching, Government parastatals, etc.) Types of GSM owned included MTN, Econet, Globacom and NITEL. The number of handsets owned by people in public and private sectors of the economy ranged from one to four (Table 1)

Table 1 - Average Number of Handsets owned per each household

	1 - 2		3 - 4		5 - 6		7 - 8	
Zones	Private	Public	Private	Public	Private	Public	Private	Public
1	5	18	11	27	23	11	05	-
2	9	12	15	36	19	6	3	-
3	11	12	31	23	12	2	7	-
4	11	22	26	23	5	4	7	1
5	15	10	32	29	13	1	-	-
Total	51	74	115	138	72	24	22	1

It was observed that people in the public sector owned more handsets than those in the private sector. Similarly, it was also discovered that husbands and wives also possess their own different handset irrespective of whether they were in the private or public sector. However, those in private organizations owned more handset than people in public sector probably because of the nature of their businesses which required a lot of economic benefits. Questions relating to the approximate number of calls made and received with their cell-phones were asked. The calls made and received ranged between one and above eight on a daily basis. An attempt was made to determine whether there is significant difference between calls made and received. Thus, data collected in this respect were compared for significance of difference using paired t-test. The summary of the results is as presented in table 2.

Table 2 - Summary of paired t-test (a= 0.05) by zones

		95% confidence interval of the difference				
		Lower	Upper	T	D/F	SIG
Zones						
1	Pair var. 00001-00002	-1.3757	.3757	-1.168	29	.252 NS
	Pair var. 00003-00004	-3.4732	-.7768	-3.215	31	.003 Sig
3	Pair var. 00005-00006	-.5667	2.4001	1.254	35	.218 NS
4	Pair var. 00007-00008	-2.3053	-.5771	-3.393	33	.002 Sig
5	Pair var. 00009-000010	.2588	1.6199	2.812	32	.008 Sig

00001, 00003, 00005 & 00009 = calls made
00002, 00004, 00006 & 000010 = calls received
NS =Not significant Sig. = Significant

Table 2, shows the summary of the paired t-test values for zones 1 to 5. All odd numbers represent calls made while the even numbers are calls received. The analysis of paired t-test is done separately for each of the five study zones . In two zones, the differences between calls made and received were not significant. In three zones, the differences are significant. Even though, this result does not provide insight into the travel substitution debate of the city of Lagos. It however shows that 60% of the sampled people in Lagos make more calls than received. This infers that if the cost of cell phone is relatively made cheaper than what exist now, more people will patronise its usage. This may, however influence its increasing use either as a substitute or stimulant to travel (See MOKHTARIAN, 1999 and SOLOMON, 1986). As at now, because of the exorbitant cost of cell phone usage, many people (residents of Lagos) cannot afford the cell-phone. Since these people constitute the majority of the low income group, that make physical contact, the cell phone usage as at now (as expected) has neither reduce peak period travel nor act as a substitute.

Table 3 shows the daily patterns of cell phone usage interaction of the respondents in the sampled zones. The diurnal pattern using the morning peak (7-9am), afternoon peak (12-2pm) and evening peak (5-7pm); and the reliance on public /private vehicles to move from one place to another were examined. It was observed that 85.4% of the respondents relied mostly on public and private vehicles to interact during the morning peak period while 14.6% did not rely on these modes to interact during the same period. In the evening peak period, 82.8% relied on public or private vehicle while 17.2% did not rely on these modes. However, the patterns observed in the morning and evening peak periods was a reversal of what was experienced during the afternoon peak. In the afternoon, 35.2% of the respondents relied on vehicles to interact while as much as 64.8% did not rely on vehicles to interact. Reasons given for the observed pattern was that the increasing use of GSM handset during the afternoon peak periods as an alternate to physical contact, enabled them not to be trapped in the congestions and delays that characterized afternoon peak period. Apart from this, respondents were of the opinion that most interaction during the afternoon once you get to your work place , could be substituted the usage of cell phones. However, people still relied on the automobiles to carry out movement of goods and passengers in the morning and evening peak periods because of long distances separating residential areas from work places, markets, schools and the likes. Thus, respondents were of the opinion that physical contacts, using automobiles have no serious substitute when movement as mentioned above are considered.

Table 3 - Reliance on public/Private Vehicles to move during peak periods after the Introduction of GSM

Zone	Morning peak		Afternoon peak		Evening peak	
	People still rely on pub/pte vehicle to move	People don´t rely on pub/pte vehicle to move	People still rely on pub/pte vehicle to move	People don´t rely on pub/pte vehicle to move	People still rely on pub/pte vehicle to move	People don´t rely on pub/pte vehicle to move
1	88	12	18	82	90	10
2	82	18	29	71	91	9
3	86	14	47	53	84	16
4	82	18	34	66	72	28
5	89	11	48	52	77	23
Total	427	73	176	324	414	86
%	85.4	14.6	35.2	64.8	82.8	17.2

An attempt was also made to determine if there are differences in the proportion of people who rely on a vehicle to move compared to those who do not rely on a vehicle to move during peak periods since the introduction of the GSM. Thus, questions, relating to whether journeys which would have been accomplished by automobiles are now being accomplished, using cell-phones or not were asked. The responses were subjected to chi-square analytical techniques. The summary of the results is presented in table 4.

Table 4 - Summary of Chi-square Test (a = 0.05) showing level of reliance on automobiles for movement during peak periods

	Morning peak	Afternoon peak	Evening peak
Cauculated	3.476	30.823	19.02
Tabulated	9.49	9.49	9.49
D/f = (r-1)(c-1)	-	-	-

For morning peak period travel, all zones have similar pattern in the use of automobile for movement during the morning peak period, however for the other two time periods, there are differences across the zones since phones influence reliance on automobiles during afternoon and evening peak periods.

Similarly, there was a general consensus that cell-phone complements transport services in the afternoon and evening peak periods whereas it is not so in the morning. From the response made by sampled handset holders, 100% of the respondents were of the opinion that cell-phone enhances information or message transmission within and outside the state. However, SITE 3 raised critical key questions on the size of substitution effect compared to the size of stimulation effect of the use of cell-phones on movement which also lend credence to the findings of this study. Thus, if trip simulation, using cell-phones is greater than trip substitution, the net effect on movement is increase in physical movement.

Some problems confronting the acquisition of cell-phones by would be subscribers include the cost of obtaining a handset which is about #15,000 ($125) while the cost of purchasing Subscribers Identity Module (SIM) cards also varies. At the time of this research work, the price was #15000 ($125) while the least cost of maintaining a handset in a month was put at about #4000 ($33.33). The cost of purchasing a handset in addition to its maintenance in a month, as revealed by this study, is too costly for an average Nigerian University graduate whose monthly salary is below #20000 ($166.67) a month (conversion is done at an exchange rate of #120 to $1) Thus, the acceptability of cell-phone usage as a substitute to automobile movement needs to be reviewed because of the cost of its maintenance which is beyond the reach of average Nigerians. Thus, at this cost, which is considered by an average Nigerian as being too high, influenced the low rate at which people possessed handsets, in spite of its importance as a means of communication outside Lagos. The situation was a little bit different in Lagos state where almost every household owns at least a handset.

The introduction of the GSM, though a welcome relief, is beset with a lot of problems. According to Egwuatu (2002, p.15), MTN has a problem of expanding its network services to the nooks and crannies of Nigeria, in its efforts to expand its base. The cost of maintenance is another problem to contend with according to Ogunwale et al, (2001, p.1). Apart from this, there are legal battles over the operation and management of the MTN Global system for mobile communications dealership by two

Lagos based companies, Rowdon Nigeria Limited and F $ F Group (FAMORITI, 2002, p.53). The proliferation of the use of GSM in all places without caution is another problem. To this end, a member of the National Assembly has sponsored a bill to curtail the use of GSM in sensitive places. According to Oseghale (2002, p.59), a bill for the Act regarding usage of mobile phones in Nigeria seeks to prohibit the use of cell phones in military formations, financial institutions, petrol stations, police formations, hospitals, aboard aircraft and airport tarmacs. The bill also seeks to make it an offence for motorcycle and tricycle riders to use mobile phones and other hand held telecommunication devices while riding because of the rate at which accident occurred while using them.. All these bottle-necks, notwithstanding, the clamor for the use of cell-phone by average Nigerians, especially in the city of Lagos, is on the increase.

CONCLUSION AND RECOMMENDATION

The majority of the people resident in the city of Lagos were automobile dependent for a long time before the introduction of GSM communication. However the situation on ground shows that the introduction of GSM in Lagos State has not succeeded in changing the normal traffic during the morning peak but has made its impacts relatively in the afternoon and evening peak periods. This was based on the chi-square test which reveals that no significant difference exist on the reliance of vehicles during the morning peak but exist in the afternoon and evening peak periods. Similarly, t-test was used to examine whether there is significant difference between calls made and received in each of the zones sampled as well as all the zones put together. Results show that no significant difference exist in the calls made and received in all the zones. Similar remark (see SITE 1) revealed that at macro-level, calls received and made were difficult to discern whereas it was not so at the micro-level. In Lagos State, the use of cell-phone may not have reduced physical contact drastically (i.e using public transport), because for now, the number of cell-phone owners represents only a small proportion of the residents of Lagos.

The paper also reveals that the use of GSM has a number of advantages over the use of physical contact by automobiles. Some of the identified advantages are reduction in travel time, reduction in traffic hold up, employment opportunities, making business easier for people and making emergence calls at distressed periods. For the above advantages, cell-phone usage should further be encouraged in Lagos State.

This paper therefore makes the following suggestions as a means of improving the level of services rendered by GSM communication, so as to reduce the current level of automobile dependence in the city of Lagos.

* More private organizations should be encouraged to install efficient and effective GSM

that is affordable to many people in Lagos State, so that more people will avail themselves of the use of the cell phones.

* Government should adopt supervisory roles that will drive down the cost of telecommunication services so as to make handset accessible to majority of Nigerians.
* Symposia, rallies, public lectures, seminars, should be organized to create awareness and educate people on how to use cell-phone to reduce physical contact.

* For now, Mass Transit should be encouraged in accomplishing morning journeys so as to take care of morning peak periods which have not been influenced by the introduction of cell-phone in Lagos State.

GSM should further be encouraged in Lagos state because it may assist in providing the magic wand that may eventually reduce the traffic hold-up associated with the morning, afternoons and evening peak periods which had hitherto defied smooth traffic flow in Lagos Metropolitan Area as revealed by studies conducted in the past

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Recebido em dezembro de 2004
Aceito em junho de 2005