IMPACT: International Journal of Research in Applied, Natural and Social Sciences (IMPACT: IJRANSS)
ISSN (P): 2347-4580; ISSN (E): 2321-8851
Vol. 4, Issue 7, Jul 2016, 181-188

CORRELATION IMPRESSION OF MOBILITY MODE AND DISTANCE FACTOR TO SCHOOL

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ABSTRACT

City living and urban lift has been known to interpolate the existing road safety standards. Quantity of vehicle on the road multiplied as a result of urbanization process. Daily routine of the heavy volume traffic around the school vicinity makes parents and school children find it is not safe to either walk or cycle to school. The outcome indicates the amount of walking and cycling to school decreased throughout the years. In Malaysia, school siting parameter was established by the Department of Town and Country Planning (DTCP) yet safety aspect of the route involves from house to school was not thoroughly discussed. The concern of road safety and school children becomes the primary subject in this paper, where the relationship of transportation mode and house location was examined. This study uses Geographic Information System (GIS) and Statistical Package for the Social Sciences (SPSS) software in learning the behavioral pattern. The research will be based on interviews, site visits and questionnaire distribution in selected three primary schools in Johor Bahru, Malaysia. The data obtained from questionnaires used in figuring out the correlation between the mobility mode and distance factor. This will give some insight on the effect of school siting parameter to school children road safety.

KEYWORDS: Distance, Mobility Mode, Children, Primary School

INTRODUCTION

The expansion of urban area makes transportation is essential in daily life. As the technology of transportation increased parallel with the urban population the awareness of road safety is highly important. It is notable that traffic accidents contribute great percentage in accidents category throughout the world, especially in a place where traffic congestion is frequent. Traffic accident issue is highly debated in World Health Organization (WHO), 2013 and it is reported that about 1.24 million people die due to road accidents [1]. While in Malaysia, it is stated that an average 17 death by traffic accidents daily [2]. Research by [1], [2] and [3] found that there is a rising statistic of accidents among young people. [3] reported that road traffic injuries rank as no 1 leading cause of death for child ages 15-19 years old and followed with child ages 5-14 years old.

Road safety aspect plays an important role in reducing the case of accident and it has to start with school children. Children travel to school every day, by various mobility modes. Lately school safety aspect towards children is always in the discussion by the school authority, public and the government. In fact, school siting parameter was made to ensure that school safety aspect was practice by all. [4], [5] and [6] has found out that there are many components should be included in the safety matter and it must appear in the document. The road safety aspect is one of the important primary elements.

A study done by [7] suggests eight factors to influence school children to walk to school. Those factors are distance to school, school characteristic and policies, schedule constraints, values, weather, and parents' fear of traffic and crime. However, [8] reported that walking to school trend is decreasing and it is noticeable. Related finding [9], said that statistically 50% of school children walk and cycle to school every day in United States of America. However, the number drops to lesser than 15%. According to [10], the analyses of road crashes data in 2010 reported that approximately a staggering number of 70,000 pedestrians were injured, and 14,000 of those injured were in the age of below 14 years old.

This study is to investigate the relationship between mobility mode and the distance factor with supported by three objectives which are

- To discover the mobility mode pattern used by school children,
- To determine the coverage area by selected primary school
- Finding the correlation coefficient analysis between mobility mode and distance factor.

CASE STUDY

The study area was at Johor Bahru located at the southern side of Malaysia with the GPS coordinate is 2.3167° N, 111.5500° E. Eight districts of Johor Bahru (1°29′00″N 103°44′00″E) were discovered. Johor Bahru has a population of 1.73 million people and the figure keeps on growing [11]. The town is administrated by the Johor Bahru City Council (JBCC), where it covers up to fifteen areas. There are three schools selected for this study which located at the urban area. The selected schools are SK Kompleks Uda, SK Taman Bukit Mewah and SK Taman Daya 2.

METHODS

This study comprise of four main phases gradually. The main data for this study was obtained from a set of questionnaire constructed. The questionnaire was design in a simple structure to suit with the target respondent is which below age 12 years old. There are three main sections based on the mobility mode, where the school children will answer accordingly. The mobility mode and the house location are the main criteria for this study.

The data was then will be process using the SPSS software in order to find out the correlation between mobility mode and distance factor.

The Pearson correlation coefficient was used. Several assumptions were taken into account that are;

- The population distribution is normal.
- There is a linear relationship between the variables.
- The scored obtained from the population are randomly sampled.
- The variables are measured on an interval.

The formula for Pearson's correlation coefficient is as follows;

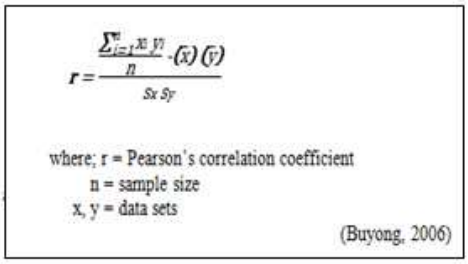


Figure 1: Pearson's Correlation Coefficient

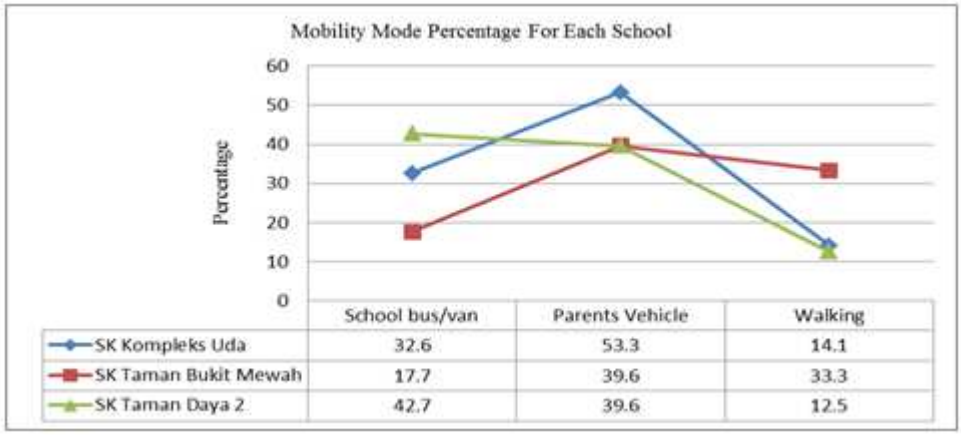
- If the 'r' value obtained is approaching 1, it means that the relationship between the variables is strong. The changes in one variable will affect the second variable.
- If the 'r' value obtained is approaching to 0, it means that the relationship between the variables is weak. The changes in one variable will not affect the second variable.
- If the 'r' value is positive, it implies that the increase value in one variable will increase the value of the second variable.
- If the 'r' value is negative, it implies that the increase value in one variable will decrease the value of the second variable

RESULTS

The purpose of this analysis is to examine whether there is a relationship between the choice of mobility mode and the distance factor to school. Data obtained were analyzed using Geographic Information System (GIS) and Statistical Package for the Social Sciences (SPSS) software. Results obtained are as follow;

RESEARCH FINDING 1

There were three mobility mode to school, namely by school bus/van, parents vehicle and walking. From the analysis it shows that all school show parent's vehicle is the preferred mobility while the least mode is walking. Majority of children chose to ride with parent's vehicle, where the percentage for SK Kompleks Uda is 53.3%, SK Taman Bukit Mewah and SK Taman Daya 2 both show 39.6%. Percentage for using school bus/van for SK Kompleks Uda is 32.6%, while SK Taman Bukit Mewah shows 17.7% and SK Taman Daya 2 shows 42.7%. While the percentage of school bus/van and parent's vehicle is encouraging, the walking percentage shows a different form. The result shows only 14.1% from SK Kompleks Uda, and 12.5% from SK Taman Daya 2. However, in SK Taman Bukit Mewah, 33.3% of the students have said to walk to school, that indicate walking is the second choice of mobility mode after parent's vehicle for the school.



	School bus/van	Parents Vehicle	Walking
SK Kompleks Uda	32.6	53.3	14.1
SK Taman Bukit Mewah	17.7	39.6	33.3
SK Taman Daya 2	42.7	39.6	12.5

Figure 2: Mobility Mode Percentage for Each School

RESEARCH FINDING 2

In finding out the coverage area, the students were asked to fill in their address in the questionnaire. The results were then processed in ArcGIS to map the house location from school. Figure 4 below is the maps of coverage area for each school.

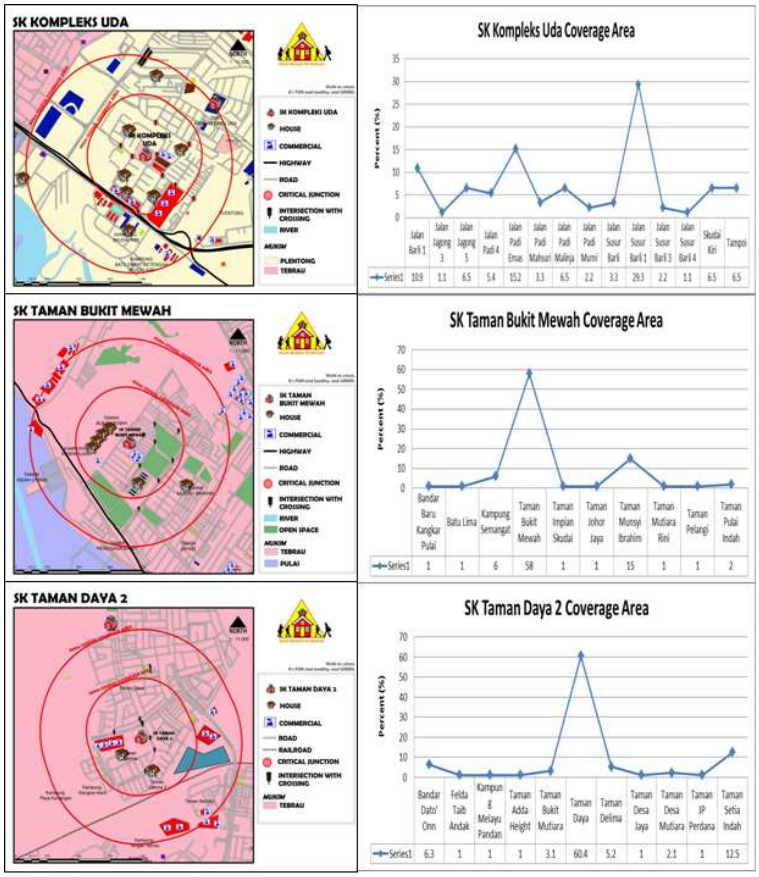


Figure 3: School Coverage Area within 400m to 800m

It can be concluded that majority of school children live in the school coverage area. The coverage area for primary school is 400m – 800m or 10 minutes' walk, as proposed by the Federal Department of Town and Country Planning Malaysia. SK Kompleks Uda showed that among 92 school children surveyed and 27% of them live at Jalan Susur Barli 1. This result is expected as they live in a low cost flat, namely Flat Fasa 13 where it is nearbt the school. The other 15% lives at Jalan Padi Emas, a residential area that is approximately 20 minutes' walk or 5 minutes' drive by car. However there are several students live far from the coverage area like Tampoi. In SK Taman Bukit Mewah, the pattern continues as 60% from the 96 school children live in Taman Bukit Mewah. The rest 15% lives in Taman Munsyi Ibrahim, a residential area in about 15 minute's walks or 5 minutes' drive. There are several school children claim they live far such as Taman Pulai Indah, Taman Mutiara Rini, Taman Johor Jaya and Taman Pelangi. Taman Pelangi is the farthest as it took approximately 20 minutes driving, in a normal traffic. SK Taman Daya 2 shows a slightly different pattern from SK Kompleks Uda and SK Taman Bukit Mewah. 96 students were surveyed, and 60% of them live just besides the school, which is Taman Daya. However, a big fraction of 12% lives at Taman Setia Indah that located out from the coverage area. While one student live at Felda Taib Andak, located outside of the district with 40 minutes' drive.

RESEARCH FINDING 3

The distance factor is the distance from house to school, which the data are collected from the "House Location" and "Distance from House to School" question in the questionnaire survey. All of the schools were analysed using Pearson's correlation analysis individually.

Table 1: Table of Correlation Result for Mobility Mode and Distance Factor

	Pearson's Correlations	Sig. (2-tailed)
SK Kompleks Uda	0.031	0.769
SK Taman Bukit Mewah	-0.094	0.389
SK Taman Daya 2	0.029	0.784

The results from all of the school show that there is a weak relationship between the two variables, which are transportation mode and distance shown on the Table 1 above. All of the school bears a result that is very small number and approaching to 0. Even though SK Kompleks Uda and SK Taman Daya 2 show positive number results, yet the value is still far from 1. In this analysis, it means that the choice of transportation mode was not affected by the distance of house from school.

RESEARCH FINDING 4

After finding out the school's coverage area and the correlation between distances with mobility mode, a route network analysis is done to establish the shortest path from school to house. From the previous results, all of the schools show that the majority of students live inside the coverage area. Using the road network analysis in ArcGIS, the shortest path from house to school was generated. The parameter involved was using the road that bears the least time of walking.

SK Kompleks Uda shows that there are a lot of route taken by children. Majority of the children lives at Flat Fasa 13, and the route taken was shown on the map. However, the route needs the children to go through a critical junction, which depicts a heavy volume of traffic. The junction nevertheless has a traffic light for vehicle and pedestrian crossing (zebra crossing). The route for the rest of the house location shows the same pattern, where although it is considered as a safe distance, they need to go through a critical junction.

The result for SK Taman Bukit Mewah shows no differ from SK Kompleks Uda, where children need to go through a critical junction. However, this junction located just outside of the school, where it is besides commercial lots. This junction is critical considering the fact that the commercial lots have a food chain restaurant where a lot of adults with motorized vehicle go there. What makes this problem more apparent is that a lot of them place their vehicle just at the pavement, where supposedly it is the place for children to walk safely on the road.

K Taman Daya 2 demonstrates the same pattern where the school children need to go through a critical junction on their route to school. This school shows only two residential a located inside the coverage area, which are Taman Delima 2 and Taman Delima. Both route shows that the children needs to go through one critical junction, and several junctions with crossing. However, from site observation it is shown that the road outside school is a major road, where heavy vehicle are allowed to use it. This makes the road is not safe for children to use without an adult supervision.

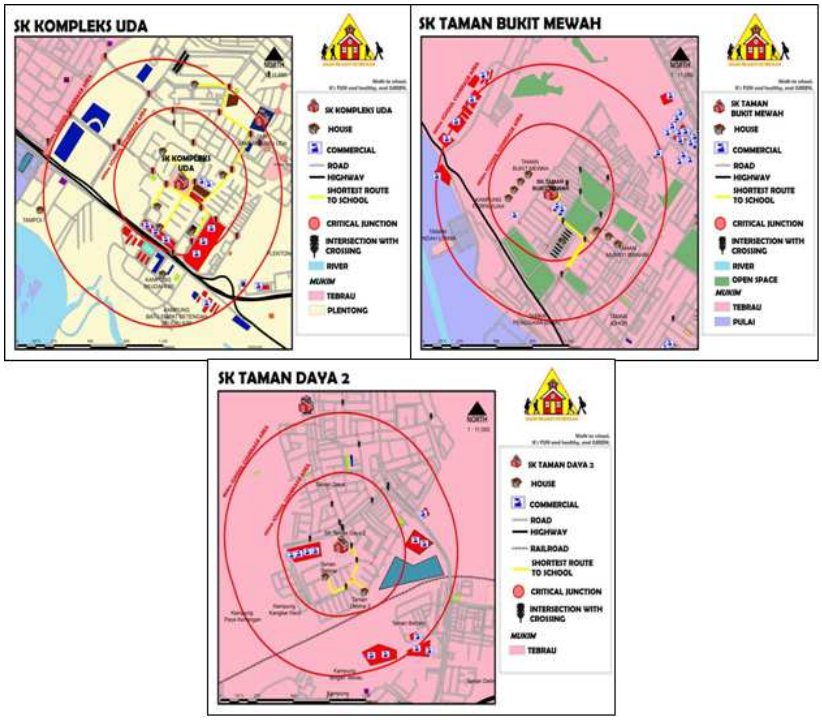


Figure 4: Shortest Route to School

CONCLUSIONS

From the perspective of the results obtained, current pattern suggest that distance from house to school does not affect the urge to choose mobility mode by school children. The finding from correlation coefficient analysis shows that all school bear a result that is adverse to the theory that only students who lived far from school take school bus/ van or parents vehicle. From the interview with school children and parents, the road condition has become the affective factor for not choosing to walk to school. In addition to the road condition, the heavy traffic volume has been known to alter the perception of walking to school amongst children and parents. This trend is predicted to remain if there is no effort to enhance road safety aspect in the school siting parameter.

ACKNOWLEDGEMENTS

This study is a part of main research that was funded by Ministry of Higher Education Malaysia (MOHE). It is an on-going Master by research. We would like to thank the Ministry of Science, Technology and Innovation Malaysia (MOSTI), University Technology MARA (UiTM), the Johor Bahru City Council (JBCC), school personnel and all individuals who have been involved in this research directly nor indirectly.

REFERENCES

1. WHO. (2013). *Supporting A Decade Of Action*.
2. *MIROS Crash Investigation and Reconstruction Annual Statistical Report 2007 – 2010*. (2012).
3. Peden, M., & Oyegbite, K. (n.d.). World report on child injury prevention World report on child injury prevention.
4. Khalil, R. F., & Ibrahim, H. G. A. (2012). *Optimizing School Siting in Doha, Qatar*.
5. Cooner, S. A. (2003). *Traffic Operations and Safety at Schools : Review of Existing Guidelines*.
6. Samad, a. M., Hifni, N. a., Ghazali, R., Hashim, K. a., Disa, N. M., & Mahmud, S. (2012). *A study on school location suitability using AHP in GIS approach*. 2012 IEEE 8th International Colloquium on Signal Processing and Its Applications, 393–399. doi:10.1109/CSPA.2012.6194756
7. Stewart, O., Vernez Moudon, A., & Claybrooke, C. (2012). *Common ground: Eight factors that influence walking and biking to school*. Transport Policy, 24, 240–248. doi:10.1016/j.tranpol.2012.06.016
8. McMillan, T. E. (2007). *The relative influence of urban form on a child's travel mode to school*. Transportation Research Part A: Policy and Practice, 41(1), 69–79. doi:10.1016/j.tra.2006.05.011
9. States, U. (2009). *SAFE ROUTES TO SCHOOL NATIONAL PARTNERSHIP WHAT IS SAFE ROUTES TO SCHOOL ?* Background and Statistics, 2009–2011.
10. States, U., Statistics, H., States, U., States, U., Fatalities, T., Children, A., & Group, A. (2012). 2010 Data, (July).
11. The Star