



INFLUENCE OF WORKPLACE ON RESIDENTIAL LOCATION CHOICE: A STUDY ON NIRALA AND SONADANGA RESIDENTIAL AREAS OF KHULNA CITY, BANGLADESH

Md. Salauddin^{1*}, Papon Kumar Dev² and Md. Ashraful Alam¹

¹*Urban and Rural Planning Discipline, Khulna University, Khulna 9208, Bangladesh*

²*Monitoring and Evaluation Officer, Shushilan, Khulna, Bangladesh*

KUS: 10/05-090510

Manuscript received: May 09, 2010; Accepted: March 13, 2011

Abstract: The choice of residence of households generally involves trade-offs among several factors which offer the household the highest possible utility. This paper tried to explore the interaction between workplaces and residential locations in terms of flows on different workplaces, shortest possible routes to workplaces, travel costs, frequent travel modes, vehicle ownerships of the residents and impedance factors to reside the desired residential areas. Two residential areas have been selected and stratified random sampling technique was adopted to conduct household survey. It was observed that people preferred to stay near to workplace (1-3 km) whereas the distance can be more who has private vehicles. About 38% people choose their residence near to children's school. Flow of people is proportionate to distance. Employment center closer to CBD receives higher flow. Regarding residential location choice, five dominant factors have been identified by principal component analysis. The paper concluded with the fact that services and amenities are distributed unevenly and thus decreases the choice to live.

Keywords: Residential location factors, workplaces, flow analysis, shortest possible path, impedance factors

Introduction

Different literatures provide a wide range of relevant hypotheses about residential location choice. By and large in a city, several planned residential areas are positioned. When a household settle their residence in an area, at more or less extent workplace location is considered. Increases in job mobility, the prevalence of two-worker households, and the decentralization of urban areas suggest that accessibility to potential employment or activity centers may be a dominant determinant in explaining location choices, showed that individuals consider both current job sites and potential job sites when evaluating their residential location and commute length, and that uncertainty about potential future job sites increases commute length. Such, for location decision-making, actual work access may matter less than access to potential work locations. Additionally, the location of other urban functions that are frequently co-located with employment sites, such as retail stores, may contribute to the relevance of potential work sites for location decisions.

*Corresponding author: < ahmedsajal@gmail.com >

If the "workplace" model is rational, residence locations are chosen to maximize expected household earnings net of commute costs. Expected wage levels and employment probability in the chosen location relative to other locations, and distance to work, should be significant determinants of the choice (Schonfelder, 2003). In Bangladesh, it is really a burning question that which effect is stronger: do "jobs follow people" or do "people follow jobs". This dichotomy has frequently been the basis of the analysis of metropolitan population and employment growth. However, the evidence supports each hypothesis under alternative circumstances. Employment is always important. Since urban locations all don't offer same probabilities of employment, then policy makers really need to know what else determines the choice of a residence (Shen & Sanchez, 2005). This paper is an attempt to explore the interaction between the residents and their workplaces in the two planned residential zones (Sonadanga and Nirala) of Khulna city in terms of accessibility to manifest the rationality of location choices and the impedances and advantages to select such a location.

Materials and Methods

Study Area: Sonadanga 1st phase is located on a 30.69 acre site and has about 205 plots where as 2nd phase is on a 34.84 acre site and has 443 plots (KDA, 2008). 1st phase was initiated on 1967 and plots were distributed by 1981 and 2nd phase completed between 1987-1994. Structures are of permanent nature. Two- storied structures dominate and rest of the houses range between three and four-storied. Both the phase is well connected with its surrounding areas and most of the plots border on 30 feet wide streets (Kumar & Rao, 2003). Water supply network connects all the houses, besides hand pumps are also in use in all the houses. It has open space and is well accessed to neighboring markets, schools, playgrounds healthcare facilities, banking facilities etc.

Khulna Development Authority (KDA) has established Nirala residential area under its site and services scheme, built upon 67.31 acres of land and has 544 plots. Though it was started with Sonadanga (1st phase), its takes a long period to grow because of the long distance from CBD. This area was planned as a high class residential area but remain underused before the construction of Khulna-Satkhira highway. Establishment of Khulna University in 1991 within a very close distance made this area valuable and attractive for living.

Table 1. Study area (KDA, 2008)

Residential area	Project period	Area (acre)	No. of plots proposed	No. of plots Developed	Distance from the CBD (km)	Location (Ward id)
Sonadanga RA 1 st phase	1967-81	30.69	205	191	2	17
Sonadanga RA 2 nd phase	1987-94	34.84	443	91	2.2	18
Nirala RA	1967-81	67.31	544	261	3	24
Total		206.08	1963	543		

Methods: In view of examining the choice factors of the residents, special emphasis was given to the selection of variables relating to workplace-residence connection. The analysis was done mainly on the basis of primary data, collected from the field survey. Stratified Random Sampling technique has been used. Every planned residential zone is considered as a stratum. Total 284 respondents have been selected and the questionnaire survey has been done at household basis (Table 2).

Salauddin, M., Dev, P.K. and Alam, M.A. 2010. Influence of workplace on residential location choice: a study on Nirala and Sonadanga residential areas of Khulna City. *Khulna University Studies* 10 (1&2) : 341-348

Table 2. Study area, population and sample size

Study Area	Assumed total households	Sample Size
Nirala RA	522	522*(284/1086) = 136
Sonadanga RA 1st Phase	382	382*(284/1086)= 100
Sonadanga RA 2nd Phase	182	182*(284/1086) = 48

From the previous studies and using an employment-population size method, major workplaces have been identified and cross checked with the respondent's answer. To explore the actual influence of impedance factors, factor analysis has been done aided with SPSS package program by organizing the data of field survey. This study has used factor analysis to examine the nature of areal variation and the influence of its factors in determining residential location (except workplace location).

Results and Discussion

Profile of residents: Critical analysis of socio-economic variables are necessary while relating the workplaces and residential choices. A large number of people have completed their graduation (65%) and only 3% have completed secondary or post secondary study. About three fourth of the total population are service holder and businessmen. It was observed in the study area that near about 72% families are male headed with an average household size of 5 and 68% families have only one earning member. About 65% of the households earn more than TK 15000 a month. Their level of income depicts the condition of their housing. In the study areas, well designed houses and the quality of the surrounding environment fetch high rent. Regarding the vehicle ownership, 21.67% residents of the study areas have private vehicles of which 61% households own motor cycle, and the remaining 39% own a car.

Location choice factors and influence of workplace: Residents were asked to sign the most influential factor which had determined their residential locations. Among the respondents, 39% households preferred to stay closer to workplace while 28% of them have been emphasized on children's school proximity (Fig. 1).

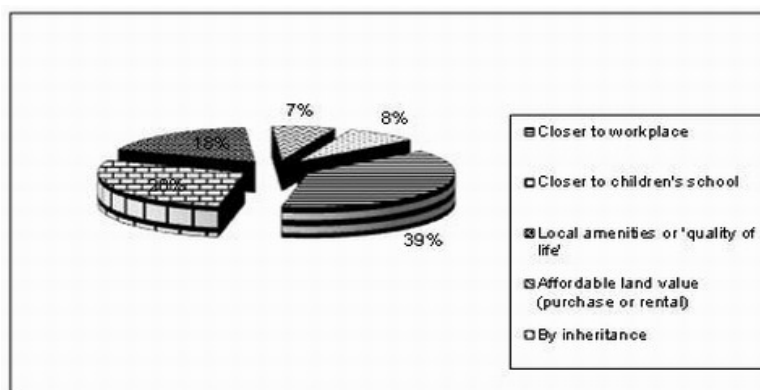


Fig 1. Reason of choosing residential location

Accessibility is an essential mean to evaluate the interrelationships between workplaces and residential locations. The difficulty is how to quantify this “ease and convenience,” which is particularly complex as it is a function of varying types of trips and activities and most likely varies across people according to their tastes and preferences (Angelo and Christopher, 2005).

The best route can be the quickest, shortest, or most scenic route, depending on the impedance chosen. Any valid network cost attribute can be used as the impedance when determining the best route. If the impedance is time, then the best route is the quickest route (Cho et al., 2008). Hence, the best route can be defined as the route that has the lowest impedance, where the impedance is chosen by the user. In this study the impedance is distance between residence and workplace, so the best route can be termed as Shortest Possible Path. Actual distances between workplaces and residence are explored and have been ranked in table 3. In case of Sonadanga, the distance is minimum in Sonadanga-Shibbari and maximum in Sonadanga-Daulatpur. Both from the Nirala and Sonadanga, areas are less accessible or less suitable which have longer distance.

Table 3. Distance and shortest possible path to workplace (Nirala and Sonadanga) (Adapted from project KCC using GIS tool)

Attributes of Routes				
Shape	Facility	Facility	Name	Total_Meter
Polyline	10	1	Nirala-Moilapota	1121.56
Polyline	2	2	Nirala-Khulna University	1484.21
Polyline	8	3	Nirala-Dakbangla	1979.42
Polyline	7	4	Nirala-Jalil Tower	2215.50
Polyline	6	5	Nirala-Shibbari	2402.96
Polyline	11	6	Nirala- Sonadanga	2926.35
Polyline	1	7	Nirala- Rupsha	3142.55
Polyline	3	8	Nirala- Boyra	5425.28
Polyline	9	9	Nirala- Baikali	5672.40
Polyline	4	10	Nirala- Khalishpur	7755.44
Polyline	5	11	Nirala- Daulatpur	8800.88
Polyline	50	1	Sonadanga- Shibbari	1278.39
Polyline	46	2	Sonadanga- Khulna University	1855.07
Polyline	54	3	Sonadanga-Moilapora	2081.36
Polyline	52	4	Sonadanga- Dakbangla	2493.46
Polyline	51	5	Sonadanga- Jalil Tower	2727.72
Polyline	55	6	Sonadanga- Nirala	2926.35
Polyline	47	7	Sonadanga-Boyra	3183.71
Polyline	53	8	Sonadanga-Baikali	3432.06
Polyline	45	9	Sonadanga- Rupsha	4626.49
Polyline	48	10	Sonadanga-Khalishpur	6481.27
Polyline	49	11	Sonadanga- Daulatpur	6982.60

Again, in case of Nirala residential area, a mint of routes offers the residents to access the workplaces. But the route which only proposes the minimum distance has been picked up in the map (Fig. 2). In case of Sonadanga residential area, a packet of routes offers the residents to access the workplaces. But the route which only proposes the minimum distance has been picked up in the map.

Salauddin, M., Dev, P.K. and Alam, M.A. 2010. Influence of workplace on residential location choice: a study on Nirala and Sonadanga residential areas of Khulna City. *Khulna University Studies* 10 (1&2) : 341-348

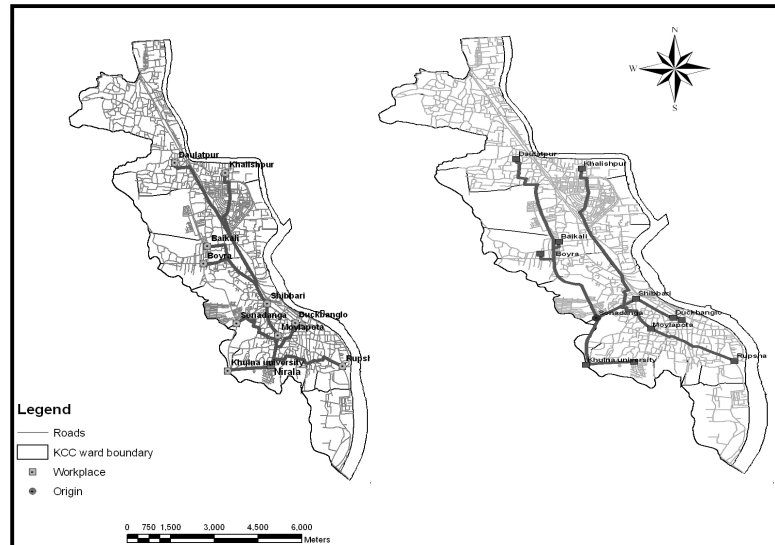


Fig. 2. Shortest possible route to workplaces (Nirala and Sonadanga)

Flow analysis: The effect of interdependence among workplaces and residence and their influences on one another depend on the pattern of employment center. Since the opportunities are higher in the Central Business District (CBD) Area, so flows are higher in that place from the whole city. But except CBD area, the degree of interdependence is likely to be found in smaller scale from near to distant workplaces (Dong et al., 2004). In this study, flow analysis is done to represent the influence of workplaces or to prove the hypothesis graphically. Figure 3 represents that the flows are higher in the nearest places (Khulna University, Duckbanglaw, Shibbari, Moylapota) than the distant places (Daulatpur, Khalishpur, Baikali etc.). Referred to Sonadanga, the scenario is almost same. Flows are larger in shortest places (Boyra, Moylapota, Shibbari, Khulna University) than the distant (Daulatpur, Khalishpur, Baikali, Rupsha).



Fig. 3. Residence to workplace flow (Nirala and Sonadanga)

Vehicle owners' workplace distance: Vehicle ownership of the respondent determines his accessibility and hence, it is a very strong influencing factor in modal choice behavior. It has been proved that flows are larger in the nearest workplaces from the residence. But for the vehicle owners, situation is fully reverse. They prefer another location factors such as amenity of life, services and facilities, children's school, access to shopping centers etc (Issam and Travis, n.d.).

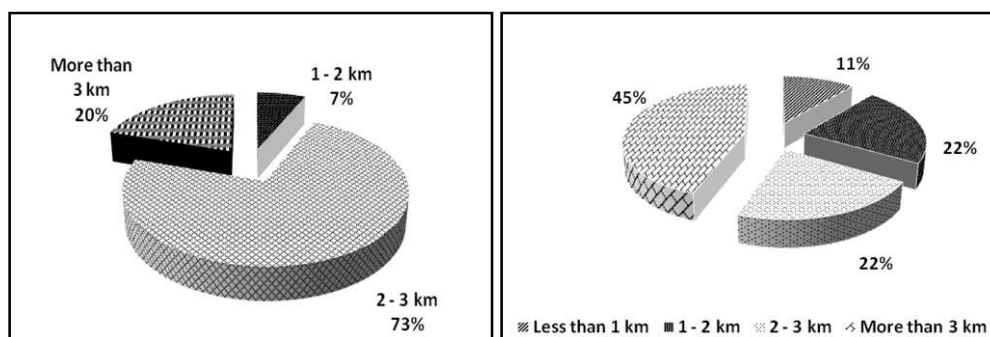


Fig. 4. Motor cycle and Family car owners' workplace distance

From the Figure 4, it can be easily represented that most of the motor cycle owners' (73%) reside from 2-3 km away from their workplace and figure 12 shows that the average workplace distance for family car owners' is 3 km or more than 3 km. So it can said that there are some other dominant factors for the private vehicle owners behind choosing their residential location.

Travel mode: Three main factors are responsible for the choice of mode for person trips. Firstly, characteristics of the journey that includes journey length and purposes; secondly, characteristics of traveler which includes income and car ownership; and thirdly the characteristics of the transport system which includes relative travel time, relative travel cost, relative level of service, and accessibility.

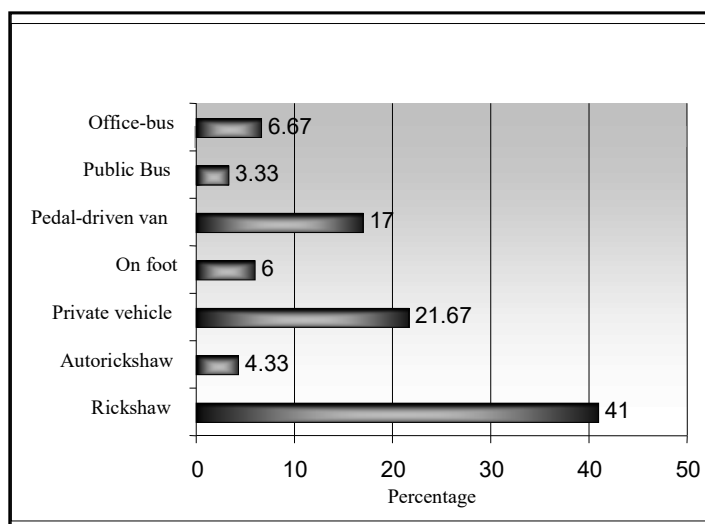


Fig. 5. Percentage of modal usage to interact between workplace and residence

Salauddin, M., Dev, P.K. and Alam, M.A. 2010. Influence of workplace on residential location choice: a study on Nirala and Sonadanga residential areas of Khulna City. *Khulna University Studies* 10 (1&2) : 341-348

The residents have been asked about their opinion regarding their used mode to workplace. Actually, Residents consider some travel attributes/factors (Convenience, Comfort, Privacy, Reliability, Safety, and Security) (Waddell and Ulfarsson, 2002). In convenient aspect rickshaw has a better position (41%) than others (Fig. 5). This is because rickshaw is easily available; it provides door to door services. Again some residents prefer auto-rickshaw and public bus as they save travel time.

Impedance factors: Dominance of several other factors hinders the residents to choose a residential location near workplace. Initially the correlation matrix of 10 variables was computed and the inverse correlation matrix was also used to identify the multicollinearity effect among the variables. To overcome this effect, finally the analysis was left on 8 observed variables. The correlation matrix was then subjected to Principal Component Analysis (PCA) along with the varimax rotation which extracted 5 dominant factors. The factor scores were also computed to show the spatial pattern of the factor's magnitude (Table 4). Children's school has got the highest percentage while local amenities and inheritant property placed second and third.

Table 4. Common variance explained (in percentage)

Factors	Common variance explained
Children's school	50.00
Local amenities	30.77
Inheritant property	9.23
Affordable land value	6.15
Too much crowd	3.85

The residents, whose workplaces are far from Nirala/Sonadanga, used the private vehicles, office bus or public bus to save the cost and time. Actually residents desire to live in the planned residential areas from where their workplaces can be nearest because planned residential zone facilitate existence of major infrastructure network- drainage, roads, public transportation etc, existence of utility services- drinking water, sewerage, electricity, gas, etc, prevention of waste of space, principles of land use zoning, clustering, accessibility etc. but in some cases, for inadequacy of different services and facilities (children's school, environmental amenity, municipal services etc.) and inheriting property, residents have to prefer other residential zones.

Conclusion

Accessibility has long been identified as the central influence in urban theory of residential location. When a household settle his/her resident in a residential area, at more or less extent workplace location is considered. The study summarized the reasons of residence location: 1) workplace location, (2) local amenities or "quality of life," (3) life-cycle and other personal characteristics (4) return to human capital accumulation, and, (5) real costs of living (access to children's school, daily shops, health clinics etc). In Khulna city workplaces and planned residential zones are situated dispersedly and for this reason there is a unique relationship between workplace location, residential mobility, housing tenure, and location choice. But to ensure more balance city, employment sub-centers should be expanded through such planning interventions that they can reduce the burden of CBD area in terms of employment and population growth.

References

- Angelo, M. and Christopher, N. 2005. Modeling residential location choice, workplace location choice and mode choice of two-worker households in metro Manila. *Journal of Transport Studies*: 6-10
- Cho E. J. 2008. The role of employment sub centers in residential location decisions. *Journal of Transport and Land Use* 1: 1-31
- Dong X., Ben-akiva M.E., Bowman, J.L. and Walker J. 2004. *Moving from trip-based to activity-based measures of accessibility*. Center for Transportation Studies, Boston
- Issam, M.S. and Travis, P.D. n.d. Accessibility indices: a connection to residential land prices and location choices. pp. 1-15. In: Kockelman, M.K. (ed.) *81st Annual Meeting of the Transportation Research Board Forthcoming in Transportation Research Record*
- KDA (Khulna Development Authority). 1998. *Draft Structure Plan for Khulna City, Vol. II*
- KDA (Khulna Development Authority), 2008. *Residential area development in Sonadanga (Phase 1 and 2)*. Report to the working group on executive committee, Khulna Development Authority, Khulna
- Kumar M. and Rao K.V.K. 2003. Location and Travel Choice Models for the Cities of Developing Countries. *Journal of Transport Studies* 5: 5-7
- Schonfelder, S. 2003. Between routines and variety seeking: the characteristics of locational choice in daily travel. pp 8-30. In: T.B. Research, (ed.) 10th International Conference, Lucerne
- Shen, Q. and Sanchez, T.W. 2005. Residential Location, Transportation, and Welfare-to-Work in the United States: A Case Study of Milwaukee. *Housing Policy Debate* 16: 22-26
- Waddell, P. and Ulfarsson, G.F. 2002. Accessibility and agglomeration: discrete-choice models of employment location by industry sector. pp 2-17 In: Evans, J.D. (ed.) *TRB 2003 Annual Meeting*. University of Washington