Understanding energy consumption pattern of households in different urban development forms: A comparative study in Bandung City, Indonesia

A.S. Permana *, R. Perera, S. Kumar

School of Environment, Resources and Development, Asian Institute of Technology, PO Box 4, Klong Luang, Pathumthani 12120, Thailand

ARTICLE INFO

Article history:
Received 10 February 2008
Accepted 11 August 2008
Available online 18 September 2008

Keywords:
Controlled residential cum commercial area
Unplanned peri-urban area
Satellite town

ABSTRACT

Urban development traditionally takes different physical and spatial forms. Taking development control and geographical location as common denominators, there are among others, three generic urban development forms in the cities of developing countries, namely controlled residential cum commercial areas, unplanned peri-urban areas, and planned satellite towns. This study attempts to analyze and compare the quantity of energy consumed for transport, non-cooking and cooking purposes at household level within those three forms of urban development, and for this purpose, Bandung City, Indonesia was selected as the study area. Data on present households' energy consumption were acquired through questionnaire. The results show two major findings in relation with household's energy consumption. Firstly, the unplanned area outweighs planned and controlled areas in terms of energy consumption per unit of income. Secondly, the lower income people spend a higher percentage of income on energy expenses than higher income people.

© 2008 Elsevier Ltd. All rights reserved.

1. Introduction

The process of urban development in a naturally growing city or in a city with loose development control generally results in three types of physical developments, which are collectively called urban development forms (UDF). This study defines urban development form as the manifestation of certain physical and spatial growth and development as a result of human activities in an urban area. In a similar way, Anderson et al. (1996) defines UDF as spatial patterns of human activities at a certain point in time. This implies that urban development forms are either planned or unplanned entities. This definition does not subscribe to land use as the primary determinant of urban form.

The planned, controlled or unplanned UDF can generally be manifested in a city by controlled residential cum commercial areas in the city center, unplanned peri-urban areas and planned satellite towns. For the purpose of energy consumption comparisons, development control and geographical location can perhaps be common denominators for these three types of UDF. However, as reflected in their names, location is too weak to be considered as the main denominator for comparing energy consumption purpose, since it is too obvious that residential locations are the main governing variable for transport energy, as found in some studies (Newman and Kenworthy, 1989; Hickman and Banister, 2007a, b).

In the cities of developing countries, the embryo of the city's center is grown organically from an originally uncontrolled residential area that later encourages commercial activities to form mixed land use. As the city grows, the local authority regulates this area to become a controlled residential cum commercial area. Patterson (1979) notes that planners are increasingly dealing with the problems of accommodating complex mixes of land uses at close quarters, especially in central cores and at satellite nodes. One of the benefits of mixed land use is its ability to reduce transport energy by creating biking or walking communities due to the proximity of origins and destinations. This is the first kind of UDF included in this study.

The second type of UDF is the unplanned peri-urban area. Indisputably, there are planned peri-urban areas, particularly in cities of developed countries. In spatial context, an unplanned peri-urban area forces people to become commuters and therefore more transport energy is required. This feature differentiates unplanned peri-urban areas from residential cum commercial areas. An unplanned peri-urban area, in this study, is defined as an unplanned urban expansion into peripheral areas. This state makes possible due to uncontrolled sprawling process, and therefore possesses the quality of low density, scattered developments, commercial strip developments, and leap-frog developments (Ewing, 1997). Unplanned and low-density features of peri-urban areas have possibly greater energy consumption.