



International Congress on Economics, Management and Business Studies

Hosted Online from New York, USA

Date: 23rd April, 2026

Website: <https://econferencia.com>

PEDESTRIAN FLOW ANALYSIS BY AGE GROUP AND TIME INTERVAL DISTRIBUTION

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Abstract

This paper analyzes the hourly variation of pedestrian flows at a signalized pedestrian crossing that connects two commercial areas on Farobiy Street in the city of Kokand. During the study, pedestrian flows were examined by age groups and the main factors influencing the intensity of movement were identified. The results show that the majority of pedestrians belong to the economically active population, and the peak pedestrian volumes coincide with the busiest trading hours. The obtained findings are practically important for assessing the interaction between pedestrian movement and traffic flow within the urban transport system, as well as for developing management decisions aimed at improving road safety.

Keywords: Pedestrian flow, public transport, commercial area, traffic signal control, traffic flow, urban transport system, traffic safety.

Introduction

Pedestrian movement is an important component of the urban transport system, and the increase in pedestrian flow intensity, especially in commercial zones, has



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a significant impact on both traffic flow stability and road safety[1]. When planning public transport operations, it is essential to take into account the interaction between pedestrian flows and motor vehicles, since these factors largely determine service quality and system reliability[2].

Research findings indicate that increases in pedestrian density may lead to lower traffic speeds, delays, and reduced levels of service; therefore, improving pedestrian crossing control systems is of particular importance[3]. Moreover, reducing delays and interruptions to public transport at signalized intersections is considered one of the key means of improving the efficiency of the transport system as a whole[4].

From this perspective, studying the characteristics of pedestrian flow at crossings located in commercial areas is both a scientifically relevant and practically significant task, as it supports the development of effective transport planning and traffic safety measures[5].

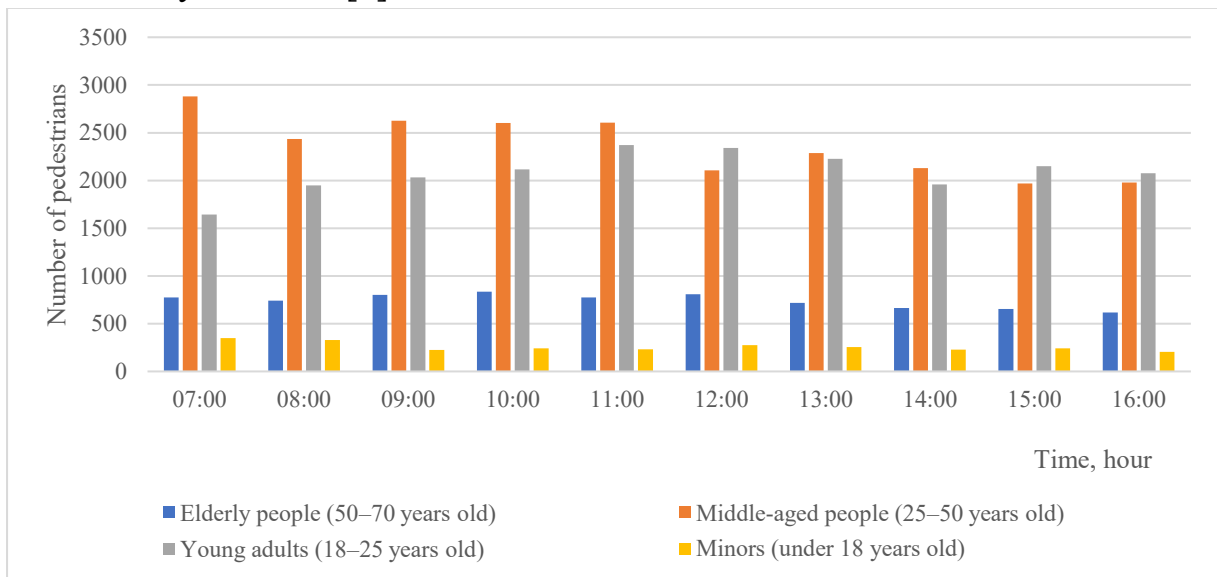


Figure 1. Variation of pedestrian flow by hour at the pedestrian crossing located on Farobiy Street (under commercial-corridor conditions)



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Figure 1 illustrates the pedestrian crossing intensity of citizens using the pedestrian crossing located on Farobiy Street in Kokand city. The graph is constructed based on data grouped by pedestrian age categories. This pedestrian crossing connects market areas located on both sides of the roadway. Therefore, it is natural that the number of pedestrians crossing at this point is relatively high. On both sides of the crossing, there are bus stops, and the majority of pedestrians generated at these stops pass through this crossing. Pedestrian movement is regulated by a traffic signal; however, in certain cases, violations of traffic rules result in unjustified interruptions of vehicle movement and the formation of traffic congestion.

The age composition and movement characteristics of pedestrians using this crossing are as follows.

People of middle age (25–50 years) constitute the dominant group in hourly terms. The highest pedestrian volume was recorded at 7:00 a.m., when 2,882 pedestrians crossed. This can be explained by the beginning of market activity, transportation of goods, preparation of trade stalls, and similar processes. Until 11:00 a.m., the flow fluctuates slightly, followed by a short-term decrease at 12:00. This group mainly includes traders, loaders, service workers, and customers moving for business purposes.

The adolescent and youth group (18–25 years) ranks second in terms of movement intensity. Their flow is especially high between 10:00 and 13:00, reaching approximately 2,100–2,400 pedestrians. The activity of this group is associated with visiting shopping centers, leisure areas, or employment in the service sector. Their peak hours coincide with the period of maximum commercial activity.

The elderly group (50–70 years) shows relatively stable movement characteristics, with the maximum flow recorded at 10:00 a.m., when 848



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pedestrians were observed. During this period, elderly citizens typically visit the area to meet daily needs, shop, or walk. Although their numbers are smaller than other groups, their presence remains continuous.

The movement of minors (under 18) is relatively low but stable. The highest volume was recorded between 7:00 and 8:00 a.m., which is explained by children accompanying their parents to the market. Most of their movement is associated with family shopping, while independent pedestrian activity among them is minimal.

In general, the analysis shows that the primary purpose of pedestrians using this crossing on Farobiy Street is related to commercial activity. The predominance of middle-aged and economically active individuals highlights the socio-economic significance of the market areas. The time-based activation of each age group reflects their functional role within market activities. This location therefore serves as an important strategic interchange point between pedestrian and transport flows linking major commercial centers.

Conclusion

The results of the study show that the majority of pedestrian flows at the signalized pedestrian crossing located within the commercial zone consist of working-age individuals and those engaged in trade activities. The peak intensity of pedestrian movement coincides with the busiest operating hours of the shopping centers. This situation has a direct impact on vehicle traffic and may lead to increased delays at the traffic signal. Therefore, coordinating pedestrian flows with traffic management in this area is of great importance for ensuring road safety and maintaining the stability of the urban transport system.



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