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A Case Study on Parking Scenario in Shopping Centers at Dhaka

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Abstract

Unplanned car movements and the parking issues that accompany them are a typical occurrence in Dhaka. Number of shopping malls are increasing in a quick manner in Dhaka which have more capacities than the vehicles parked there, even considering the peak times. This paper focuses on the parking scenarios of some selected shopping malls in Dhaka city. Shyamoli Square, Tokyo Square, Rapa Plaza, DNCC Market, Pink City Complex, Eastern Mollika, Eastern Plaza, Motaleb Plaza, Mirpur Shopping Complex, Shah Ali Market, Mirpur New market are the shopping centers where an in and out survey has been performed. In terms of car parking most of the shopping centers have a parking index below 60% which symbolizes that even after having more capacity, cars are not parked inside the malls. Instead, those are parked outside in adjacent roads causing traffic congestion. Eastern Mollika shopping complex had maximum occupancy of cars even with 100% when there were no more spaces left for parking and Pink City complex had even lowest occupancy rate of 20%. The objective of the paper is to show the analysis of parking patrol survey data demonstrating parking accumulation, volume, load and index to understand about parking inventories and parking demands.

Keywords: *parking volume; accumulation; parking occupancy; capacity; parking load.*

1 Introduction

Parking facilities are an integral component of the roadway system because every vehicle requires parking at its destination. Convenient and economical parking is always a preferred way for every class of people. On site parking on roads can cause various problems from creating congestion to reduction of road width. Constructing places to park the vehicles can cost extra prices with clients, which can generate heavy costing price for parking vehicles afterwards. Unpriced parking tends to increase illegal parking and discourage use of alternate forms of transportation (Rome and Mukherjee, 2015). Efficient parking system needs some specific rules and marginal pricings, but people tend to not pay these fees and park vehicles on roads. Dhaka city has a population 23,210,000 people with a growth of 3.26% from 2022 (Dhaka, Bangladesh Metro Area Population 1950-2023, n.d.). Population growth influences a sharp increase in vehicular possessions. According to BRTA, from 2021 to 2022 the total number of registrations of passenger car has been increased by 4.36% in Dhaka (CEIC, n.d.). People are buying cars but do not know where to store and park them. In recent years Dhaka being the capital of Bangladesh, has seen tremendous amount of development in recreational and hospitality business. After 2000, the construction of retail marketplaces increased. Between 2001 and 2010, a large number of such markets were created throughout Dhaka. Specially, Dhanmondi, Gulshan areas have been replenished with markets which are often counted now as urban public places with all kinds of amenities. The market places contain large parking areas, which need to be studied thoroughly for parking analysis. The ratio of car ownership among mall visitors is relatively high in Dhaka these days, and most shopping malls offer very low-standard parking facilities when compared to demand (Parveen, 2008). Many parking studies have stated the importance of parking analysis in different shopping complexes or urban centers through investigation of lacks in parking facilities in market areas situated at Khulna, Pabna, Chittagong (Islam et al., 2022; Rahman et al., 2017; Chowdhury et al., 2014). Although in Dhaka, there are some low occupancy complexes where parking lots are not enough utilized. The objective of the paper is to analyze the present parking situation in different periods in eleven of these shopping centers. And to determine the total parking load, parking occupancy, parking index for detailed parking analysis.

2 Materials and Methods

2.1 Study area

Dhaka being the commercial center point of developments and trips attractions, has seen an increasing surge of shopping centers in every lane or alleys. Total eleven shopping centers have been selected for the parking volume survey. These are all medium types of shopping centers containing medium sized super shop, a medium restaurant, a medium office, a medium sized discount retail shop and numerous small stores (Mamun et al., 2017). Shyamoli Square and Tokyo Square are located in the Mohammadpur part, often attracting more crowd in the mentioned area. Shyamoli square also happens to own a cinema hall. DNCC Market (Dhaka North City Corporation Market) and Pink City Complex is located at Gulshan area. Out of these DNCC market has provisions of on-site parking. Eastern Mollika, Eastern Plaza and Motaleb Plaza are located at New market adjacent areas which often generates parking contributions from new market goers. Mirpur Shopping Complex, Shah Ali Market, Mirpur New market are situated in the Mirpur sides which do not see a lot of crowds. Out of these Mirpur New market has an automated parking system. The last study area Rapa-plaza is the only shopping complex selected from Dhanmondi.

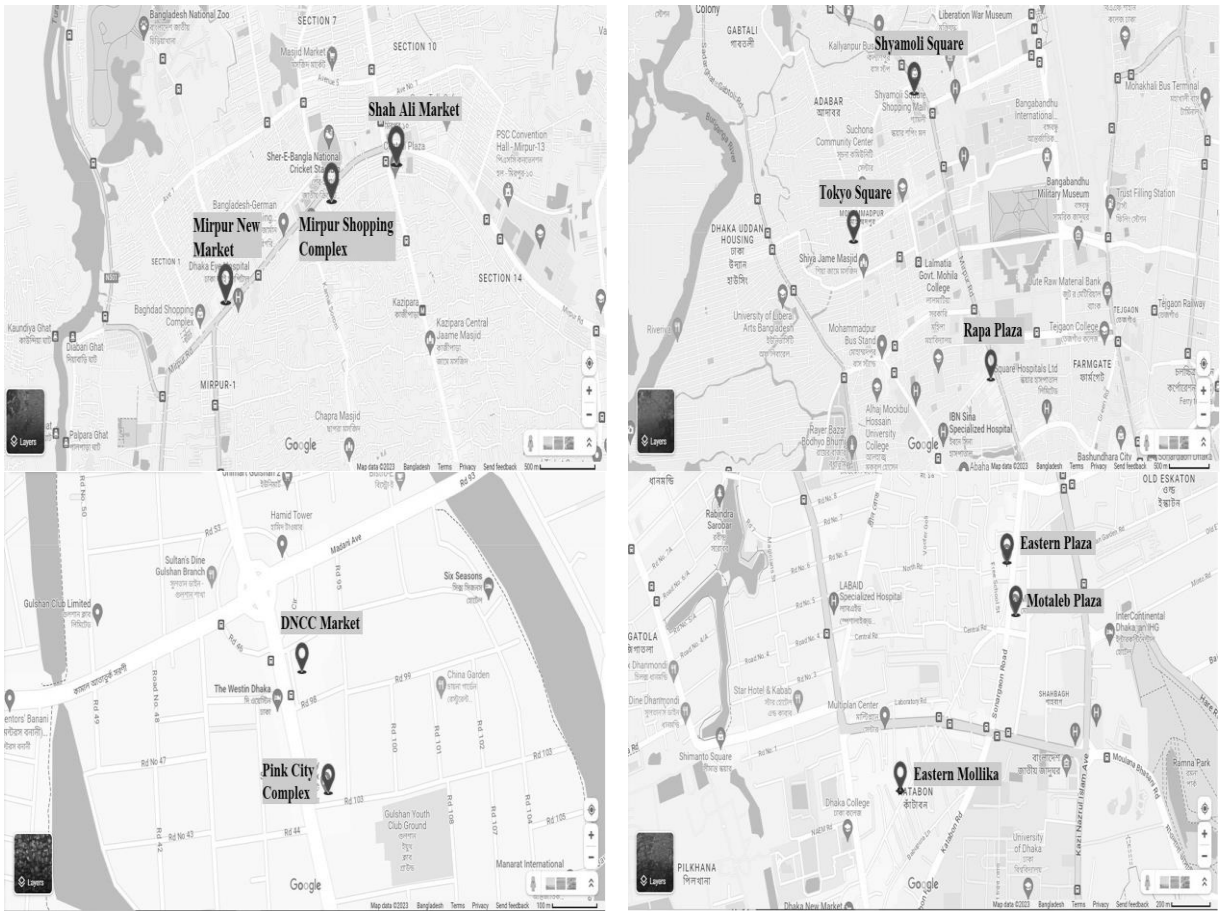

Figure 1. Shopping Mall area locations.

2.2 Data Collection

The eleven shopping centers were surveyed at 30-minute intervals from 10 a.m. to 7 p.m. in weekdays. In and out survey method was employed to count parking volumes. Only passenger cars were counted in the survey to calculate parking efficiency in this study. The car count in the selected parking lot is obtained first. The number of passenger cars entering the parking lot over a 30-minute period is then recorded. The number of vehicles exiting the parking lot has also been kept track of. In the parking lots, available parking bays were also measured. Later, parking accumulation, parking occupancy, parking load are calculated using this data.

2.3 Parking Terminologies

The total number of vehicles parked at any particular time is referred to as parking volume. Parking accumulation is often used to represent parking volume present in a specific time. Parking load gives the area under the accumulation curve. Another important factor is parking index which is defined as the ratio of number

of bays occupied in a time duration to the total space available. These terminologies would help to understand the utilization of the parking lots present in the shopping centers. Parking accumulation, parking occupancy, parking load are calculated in MS Excel.

3 Result and Discussion

Accumulation charts of the eleven shopping malls are presented in the following,

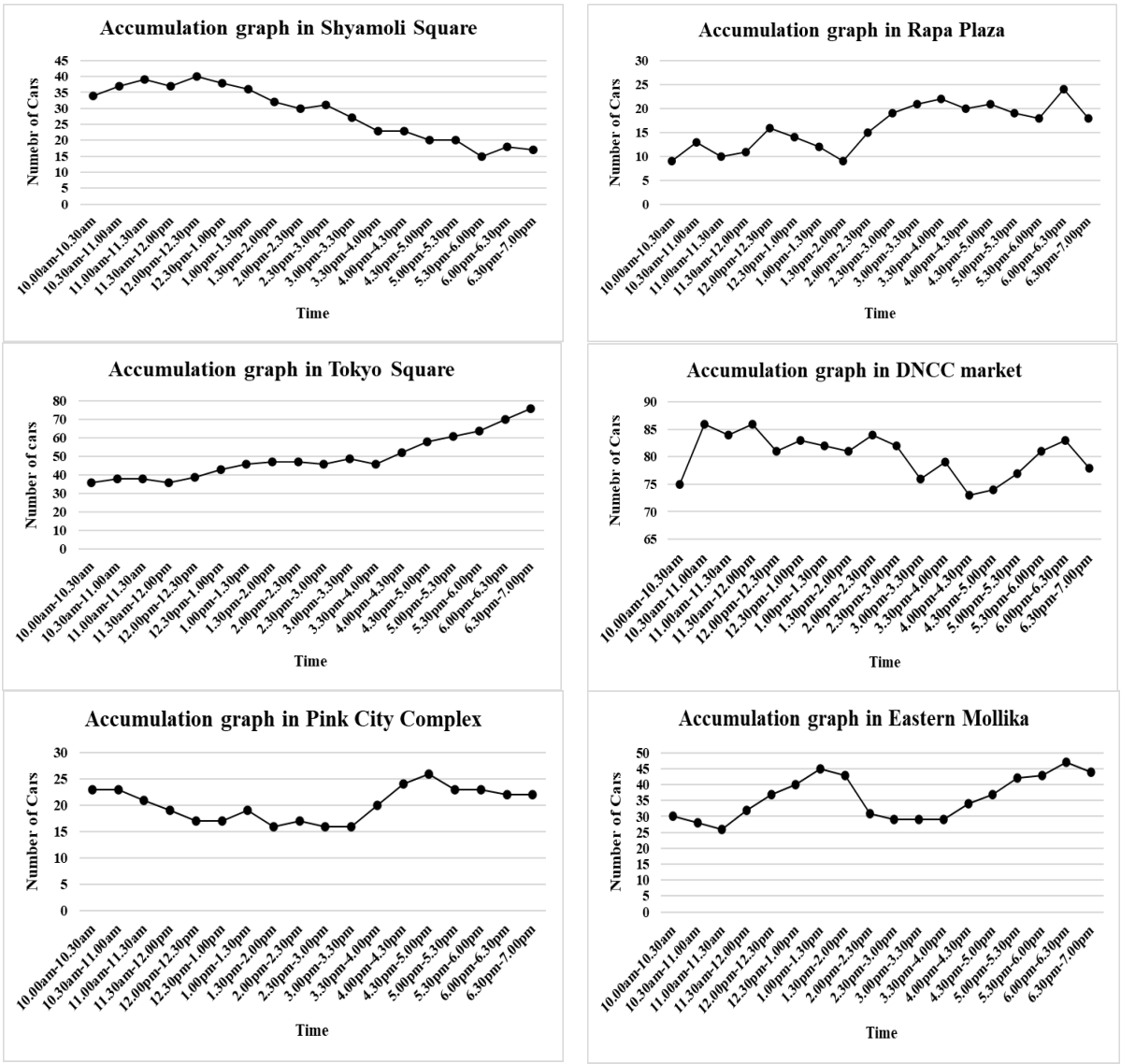

Figure 2. Parking accumulation graphs of Shyamoli Square, Rapa Plaza, Tokyo Square, DNCC Market, Pink City Complex, Eastern Mollika.

The accumulation chart patterns are different in different shopping malls. At Shyamoli square, in the duration of nine hours, the initial count of car was 33 and total accumulation were 517 cars. It can be seen that the parking volume does not fluctuate very much, reduces in the evening. As it has a small parking place the utilization rate is higher. Often rickshaw and legunas stay outside of the parking premises. Parking volumes are greater in the evening for both Rapa Plaza and Tokyo square. At Rapa Plaza, the initial count of car was 10 rounding up to 291cars. And in Tokyo square, the first count of cars was 37, which accumulated to 892 cars. In front of Tokyo Square, flock of different vehicles are often parked intensively which reduces the carriage way width of the roadway. People from Mohammadpur mostly come here with most vehicles parked in adjacent roads nearby instead of parking in the designated area. Highest accumulation of 24 and 76 cars were found respectively during 6 PM and 6.30 PM at Rapa Plaza and Tokyo square. At DNCC market, cars are parked on site and are provisioned to be parked perpendicular. During weekends people do not get space for parking here. If parking

accumulation chart is looked at, the curve is very fluctuating. Highest cars have been found 11 AM. Here, heavy crowd is seen during morning times as people park cars for early morning grocery shopping. There is no definite peak of parked cars at the DNCC shopping complex, as there can be seen constant flow of cars. At Pink City Complex, it can be seen there is a gradual increase in terms of accumulation from morning to time progressing. Highest peak has been found during 5 PM. Initial count of cars were 19. Compared to huge parking space availability, there lots of empty bays are found. From accumulation chart, Eastern Mollika has two definite spikes. There is highest increase of parking volume during two times; at 1 PM with 45 accumulated cars and at 6 PM with 47 cars. With initial 26 cars, at last total accumulation of 646 cars. Getting parking space at Eastern Mollika during weekends and rush hour is really difficult. People coming to New Market and other adjacent market for shopping, park cars in Eastern Mollika. Parked vehicles in front of the market cause traffic congestion and also cause reduction in carriageway width.

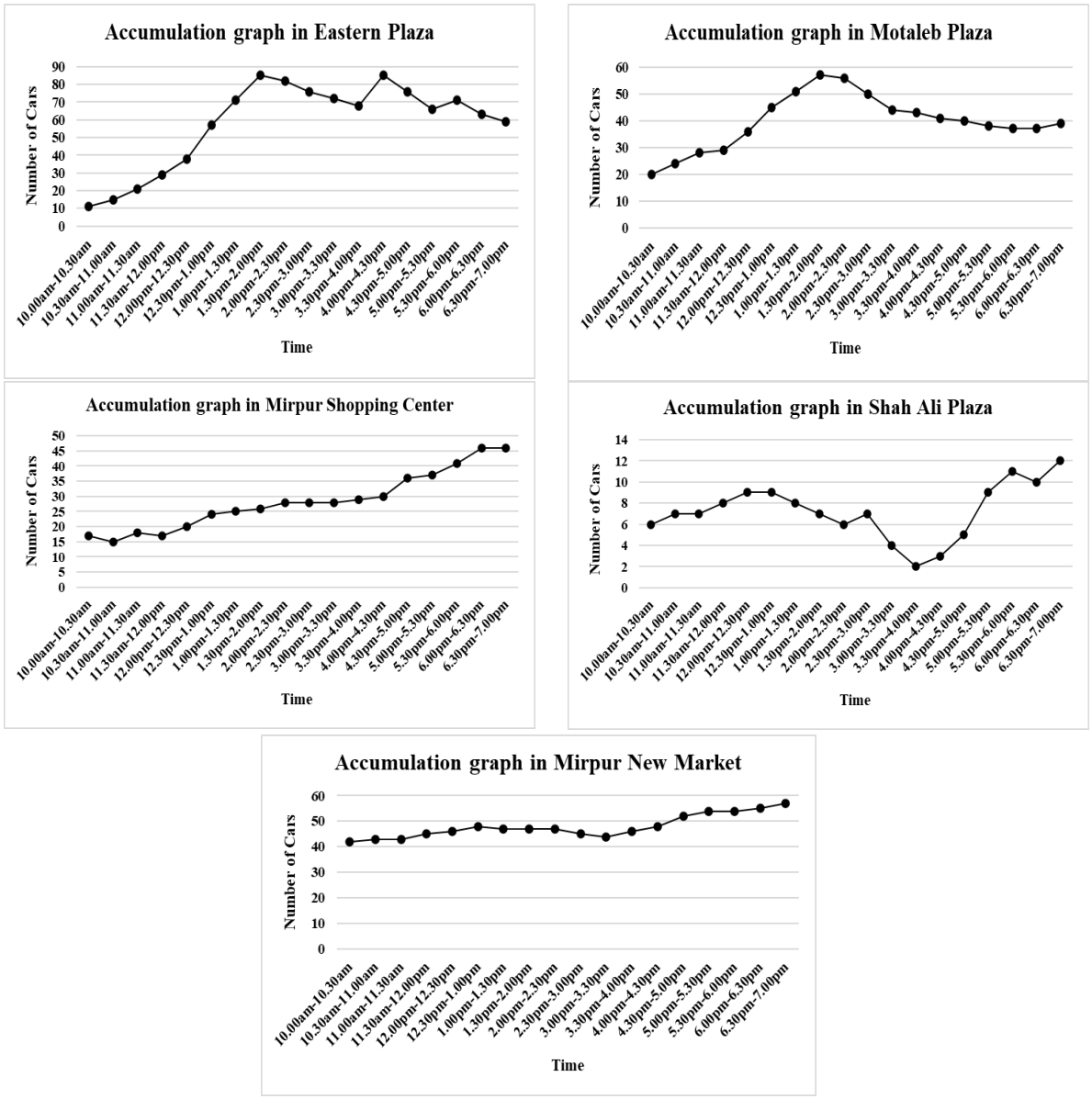

Figure 3. Parking accumulation graphs of Eastern Plaza, Motaleb Plaza, Mirpur Shopping Complex, Shah Ali Market, Mirpur New market.

From accumulation graphs, two peaks can be seen in the accumulations of cars in Eastern Plaza. During 1.30 PM and 4 PM, accumulation values have been found 85 which are the highest. Many vehicles are parked illegally in the nearest areas. Often traffic jam is seen in the outside areas of Eastern Plaza. The accumulation chart of Motaleb plaza indicates that parking volume is less in morning than evening. The highest peak of volume has been found during 1.30 PM. The initial count of car is 7 cars and ends with total accumulation of 715 cars.

Parked cars are found in less values during evening rather than morning. In case of Mirpur Shopping Center, accumulation gradually increases during evening. Highest number of cars are found during 6 to 7 PM. Accumulation graph of Shah Ali Plaza is rather different than other graphs. Very low occupancies are found here, cars are parked abundantly during morning dips into almost zero parked cars during 4 PM. Almost null parking volume has been found during after noon times when it is rushing hours in other shopping malls. From initial number cars of 6, it reaches up to total accumulation of 130 cars. Parking scenario is found rather very stable as seen from the accumulation graph of Mirpur New Market. Accumulation stays in the range of 40 to 60 cars. A slight dip in the values during 3.30 PM, evening parking volume is higher than other times because of recreational activities at Mirpur New market. With initial values of 41 cars at Mirpur new Market, total accumulation is found to be 863 cars. Even with more parking bays found to be not occupied, cars are parked in the outside areas in Mirpur. Especially of those people who attends the three shopping centers at Mirpur.

Table 1. Parking Characteristics of the shopping centers.

Location	Parking bays	Parking Load (Vehicle-hours)	Average Parking Occupancy (%)
Shyamoli Square	41	129.25	70.05
Rapa Plaza	30	72.75	53.89
Tokyo Square	117	223	42.36
DNCC Market	120	361.25	66.90
Pink City Complex	100	91	20.22
Eastern Mollika	50	161.5	71.78
Eastern Plaza	100	522.5	58.06
Motaleb Plaza	70	357.5	56.75
Mirpur Shopping Complex	50	127.75	56.78
Shah Ali Market	20	32.5	36.11
Mirpur New market	134	215.75	35.78

Comparing all the average parking occupancy values, highest has been found at Eastern Mollika. During after noon and evening times, occupancy values range between 84% to 90%. A higher occupancy rate indicates greater utilization of parking bays. But during times like Eid festivals, there can be shortage of parking places. Occupancy rate is high during 1-2 PM too. Security guards have reported that often they have to put a stop sign for not adequate parking spaces. In that case, illegally parked vehicles in the adjacent places create greater problems. The second highest parking occupancy has been found in Shyamoli square. But it is due to very low parking capacities. At Rapa Plaza parking occupancy of cars ranges between 30% to 80%. Whereas, at Tokyo Square it ranges from 30% to 65%. Pink City Complex has lowest average occupancy rate out of all study areas. At DNCC market, ranging from 61% to 71% occupancy values indicate constant parking volumes. Occupancy rates at Eastern Plaza and Motaleb plaza are around above 40% in working hours. Rather low percentages are seen at Shah Ali Market and Mirpur New market. Shah Ali Market has occupancies with 10% to 25 % during evening times in spite of illegal parking on roads. Highest parking load has been found at DNCC market implying that it generates most crowds for shopping.

Parking fees of most of the shopping centers start from 50 tk. It mostly ranges in between 40 tk to 70 tk. At Shyamoli Square and Rapa Plaza, parking fees for cars are charged 50 tk per hour. Whereas, Tokyo Square has off late increased their parking rates to 60 tk. Eastern Mollika, Eastern Plaza, Motaleb Plaza all charge 40 tk for cars. The shopping complexes situated at Mirpur, charge a little extra off late. Shah Ali Market charges 70 tk for car. Mirpur New Market and Mirpur shopping complex have also fees around 50 tk. The parking fee is also an important factor for determining the parking occupancies. Even if highest charge is taken at Shah Ali Market, it also registers one of the lowest occupancies.

4 Conclusion

Overall average parking occupancy of the eleven shopping centers is around 52% It implies on average, 50% parking spots out of all parking capacities are being utilized and other 50% parking spots are empty. But these places should be used. Many residential buildings around all shopping centers, should use the empty spaces in case of parking. But congestion around, new market, Mirpur is often common. Upon investigation one of the reasons for the congestion has been found parking of cars anywhere in the middle of busy roads. People often opine that parking fees are reason for abundant parking in narrow lanes. Parking fee of Pink city and DNCC market starts from 50 tk per hour as rate. The other lowest occupancy rates are found for Shah Ali market and Mirpur New market which have parking fees starting from 50 to 70 tk per hour. Public are not willing to pay the amount instead they are ready to park cars in the middle of roads. Overall, a correct fee should be charged in accordance with the public are willing to pay and who attend the individual shopping malls.

Acknowledgement

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