

Impact and Strategies for Slow Moving Vehicles: Case Study of Azadpur Mandi, Delhi

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Abstract - India is developing with a rapid urbanization from the last few decades. With the passage of time the urbanization leads to the high utilization of goods and services developing the centers for trade and commerce and influencing economic growth. Marketing of goods and services is possible with effective transport network maintaining a customer buyer relationship. Slow moving vehicle (SMV) is one of the crucial factor responsible for the traffic problems and congestion affecting transport network. The research paper experiments to examine the impact of SMV's in informal sectors. The current practices in different urban centers include traffic-regulation and increasing number of parking area. The paper attempts to review the current practices and minimize the congestion due to SMV's through traffic-regulation techniques, street vendors policies and parking management.

Key Words: Traffic-regulation, parking, street-vendors policies, parking management etc.

1. INTRODUCTION

SMV are the vehicles which cannot be operated beyond the specific speed of 20-30 km in Indian Context and which are unable to reaching the maximum speed of 60-70km an hour are to be carried out by the law to show a special reflective emblem sign at the rear of the vehicle in the caravan. SMV's emblem consist of florescent yellow-orange triangle with a dark red reflective border, as specified in American Society of Agricultural Engineers R276 or Society of Automotive Engineers J943 standards. These are the major causes of prominent mandis by creating congestion at rotaries, encroachment along with the street vendors in the markets. It may be animal-drawn vehicles, maintenance vehicles and farm machinery and any other modes of transit except bicycles, capable of a rate of speed not greater than 25 miles/ hr. It also warns the other road users to restrict your vehicle at speed of 40 km/ hr or less. The major concern for SMV in this paper to examine that SMV must not be parked in any sidewalks or lanes, where they will acting as the reason of creating block access of different road users for purchasing the goods and services, import and export of fruits and vegetables all over the states, building and shop entrances or exits, flower beds etc that may ad hoc the hazards. Some of the major mandis in Delhi are Khoya market, Keshorpur mandi, Shahdara mandi, Fish poultry and egg market, Gazipur, Najafgarh mandi, Narela mandi and Azadpur mandi, where these mandis are majorly impacted

by SMV's in terms of time, life, investment and expenditure of the whole market.

1.1 Causes of SMV's in Mandis

Improperly parked SMV may be ticketed, towed or otherwise disabled by Agriculture and Mandi Committee (AMC). Parking congestion and encroachment near sidewalks and loading-unloading areas due to IPT modes also in the peak hours for buying fruits and vegetables. There should be no provision for parking spaces for SMV's which is travelling 24 x 7 in and outside the Delhi to the retailer's shops for delivering the goods and services. No provisions of spaces for the street vendors to sell their goods at a designated place by avoiding the chaos of travelling the SMV's in the market. SMV may not drive on narrow sidewalks. Fatalities in mandis with SMV's with some lacking recommended equipment's which should not be available sometimes i.e Windshield, seat belts, Audible- back up alarms, doors-steering wheel locks etc, Improper towing Implementation with trucks leads to long queue if breakdowns of the trailers should be happen in the mandis. Overhanging loads carrying the maximum capacity of loads from the mandis to supplying more than 10,000 retailers in the Delhi is also expected to follow the standards of the carrying capacity of SMV's. Widen Roads in the mandis converted due to the waste disposal by the committee and shop members will lead to more narrower and it will cause SMV in the obstruction with other vehicles and creating congesting at turning points.

2. CASE STUDY – AZADPUR MANDI, DELHI

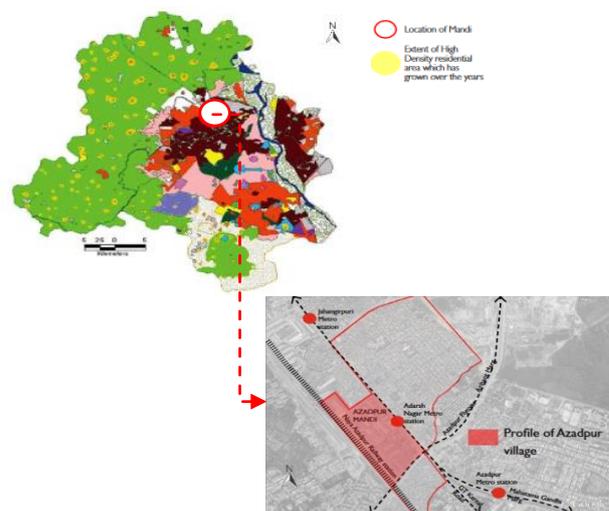


Fig -1: Location of Azadpur Mandi with key plan

Azadpur Mandi is Asia's largest mandi of fruits and vegetables with the daily supply of goods and services also to the more than 10,000 retailers shop in and outside the Delhi. Thousands of trucks will be loaded every hour for imports and exports of fruits and vegetables all over the nation. Azadpur Mandi is the prime mandi with the location of neighborhood with Azadpur village and Adarsh Nagar colony, the major characteristics of this mandi is to be surrounded by historical structures, gardens from the Mughal period. The Azadpur mandi is also line in ward no-14 of Delhi and with the zone of posh residential colonies around there, rehabilitation colonies and pre-1962 residential colonies.

The Major connectivity of Azadpur mandi is accessed by two roads namely - GT Road and Ring Road. GT road is mostly congested due to presence of heavy freight vehicles coming to Azadpur Mandi for transferring the goods and sometimes also act as a Sub-arterial road with the road users i.e IPT, NMT's etc. Ring road is the major road for supplying the goods and services to the retailers within the Delhi that is to be carried out or loading by SMV's and departed through the freight vehicles to the small scale mandis located in Delhi.

2.1 Need for Selection of Azadpur Mandi, Delhi

According to UN, Azadpur Mandi is one of the Asia's largest mandi for importing and exporting of goods and services throughout the nation with their increment from the last few decades in their investment, expenditure, gross capital revenue, processing unit etc. Azadpur mandi experiences a huge footfall (approximately 1 lakh visitors everyday) with a heavy traffic (goods carrier) movement, thus causing pressure on the neighborhood areas. The mandi has become a burden to the city and road infrastructure due to its prime location. The transferring of goods and services is accessible till now only the two major roads i.e GT Road and Ring Road. Thus, to avoid the carrying capacity of various modes that is to be accessed daily at peak hour and will be the reason for fatalities on these roads and delay in the time, quality and quantity of the product. Factors influencing the impact of SMV's or freight vehicles in Azadpur Mandi.

- Delay in time, carrying quantity and stabilizes the quality of the goods to be transferred in time.
- Volume of SMV's or freight vehicles are to be found maximum in Azadpur Mandi as compared to other throughout the nation.
- Traffic Congestion and Parking lots issues.
- Improper Traffic Regulations for Market or Mandis.
- Disability Infrastructure
- Pressure of Street vendors on the mandis vis-à-vis SMV's on their carrying capacity of the goods and lacking to their designated lane.

- Practice of Congestion and parking pricing is to be implemented to avoid congestion in the mandis.
- Hawker zone and street vendor policy is to be applicable in the mandis for separated area from loading the goods and services to the SMV's, so that auction, street vending and loading of goods to be working simultaneously with the time to reducing the congestion.

2.2 Road Typology and Transportation

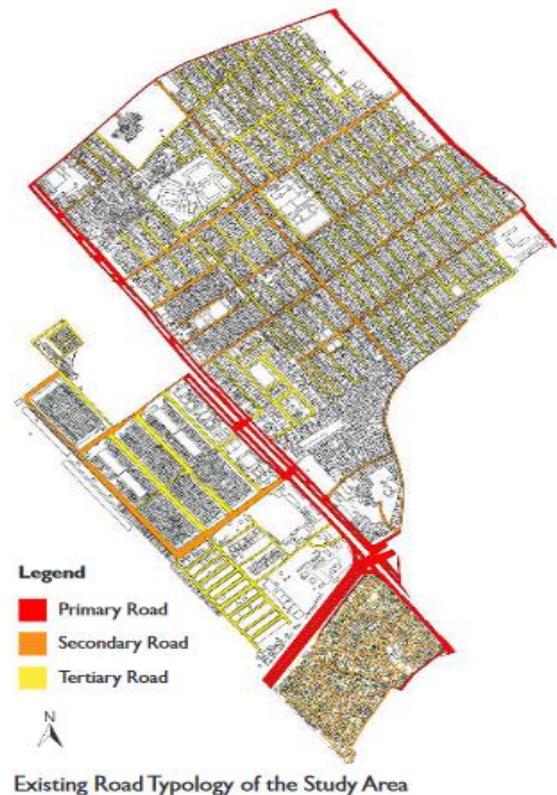


Fig -2: Road Typology and Transportation

2.3 Issues associated with the Road Typology of Study Area

- No Provisions of Vehicular and Pedestrian Traffic - Secondary Roads in Azadpur mandi are chaotic and congested at peak hours due to the departure time of SMV's for supplying of goods as there are no segregated lanes for pedestrian/SMV's, cyclist, IPT and NMT.
- Encroachment- Due to unsignalized junction for SMV's and the ROW is mostly encroached upon by on-street parking and encroachments by shops to about +2m on the road in form of raised plinths, staircase etc.
- Typical streets in Azadpur mandi is to be found approximately of 3.5m-4m.

- The existing ROW of secondary roads in Azadpur mandi is 7.5 m with no segregation for pedestrians and SMV's.
- Narrow Organic streets often from dark alleys with the little light and ventilation, thus making the unsafe for SMV's to passing the streets.

3. PARKING ISSUES AND MANAGEMENT

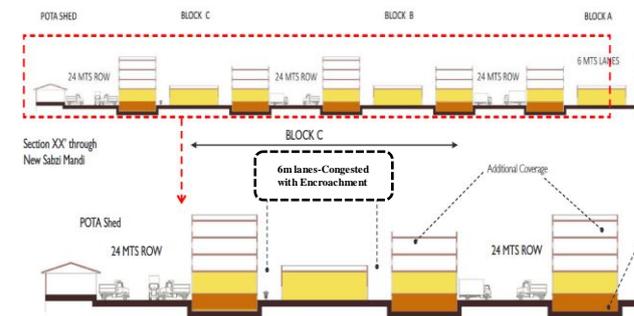
Parking issue is a mystery, collusive and critical all over the world. The Mandi is served with two major roads to connect and ease from the traffic delay time to supplying the goods and services from the mandi, but there will be not adequate parking space allotted for the SMV's or freight vehicles and other para-transit modes in the market. The narrow streets of mandi's are served with the SMV's or general public at the peak time by parking their vehicle in front of the shops, rickshaws, two-wheelers and trailers are to be act as on-street parking in the mandi which is the major problem for all the road users, SMV's to carry out and transfer their goods on time due to the long queue acting in the mandi. Available plots of buildings, dilapidated buildings, open spaces all are to be encroached by on-street parking at peak hours and demarcating the zone of congestion and developing the problems for street vendors also.

| Description | Area | ECS/100 sq. | |
|---------------------------------|-----------|--|-----------|
| Area of New Sabzi Mandi (Sq. m) | 174150.00 | Per car area requirements for surface parking (sq. m) | 23 |
| Total GC (sq. m) | 72250.00 | Current floor area (/100 sq. m) | 2093.75 |
| Total built-up on all floors | 206875.00 | No. of parking required (No.) | 6281.25 |
| Extra- built up (sq. m) | 2500.00 | Area requirement for parking (sq. m) | 144468.75 |
| Total built-up on-site (sq. m) | 209375.00 | % of area required for parking (surface parking as per MPD 2021 norms) | 82.96 |
| Existing Ground Coverage | 41.49 | | |
| FAR | 1.20 | | |

Chart -1: Name of the chart

MPD-2021 suggests 30% Ground Coverage & 0.8 FAR and Parking Requirements: 3 ECS for 100 sq. m of floor area. [2]

3.1 NEW SABZI MANDI



4. TRAFFIC REGULATIONS ISSUES

Traffic regulation at local, city and national level initiated by the Traffic Regulation Act of India is not fully implemented and working properly to cater the road users on the particular interval of time by the Intelligent Transport Management System (ITMS) and the mandis in the cities also needed proper plans and management traffic due to their traffic congestion, encroachment by the Vendors and SMV's on the busy roads at peak time, because the volume of vehicles are more in mandis than the roads. There are many cases of fatalities that are to be reported monthly, annually caused by the improper management and traffic regulation of traffic. Concerned agencies or departments for traffic regulations and management are not responsible or aware and taking lightly the matter of mandis in the context of traffic regulations and management. Improper and lack of signalized traffic regulations will develop the rates of fatalities, loss of time, money, fuel and producing congestion in the markets between the road users, vendors and majorly the SMV's those carrying the load of goods at every minutes needed to follow the proper traffic management regulations to reduce the congestion and fatal rates come out with the mandis and there will be lack of traffic cones, CCTV's, speed bumps, bollards and color coding types of device to control the traffic on the busy roads. Improper and lack of Signages are also simultaneously the major causes of traffic hold-up, accidents and disobedience.

5. ISSUES OF SMV ASSOCIATED WITH STREET VENDORS AND HAWKING ZONES

Street Vendors are the capital investors and job seekers in the Mandis with the opportunities of convenient locations, self-employment of large number of peoples residing in Adarsh Nagar and Azadpur village, links formal sectors with clients etc and on the other hand, the major problems of street vendors are lack of street furniture, no designated space for street vendors, lack of bio-swale facilities near the mandis to store the rainwaters in the ground, there will no parking and walking space for vendors, so that they gather anywhere in the mandis where they all can find a space and start selling the items without following any traffic regulations, encroaching the walkways, street, sidewalks and spoil that place also. With the heavy volume of street

vendors at the peak hours they may also affect the movement of SMV's to enter and carry out their goods from the markets, because they are unaware of the regulations, tools and mechanisms that to be applied in the mandis through concerned departments and committees. The sections of streets used for vending along with the road users and pavement width of 2.0m-2.5m allow people to pass but how the SMV's will obstruct with the broad and narrow pavement lanes of lesser width to commute from one place to another. [3] Azadpur mandi also acts as city market, neighborhood market, street market and hub markets (e.g. transport hubs). Absence of hawker zone or street vendors place will lead a massive congestion in the mandis at peak hours by relying upon the various activities and compacted chaos will produce from the road users, so that MSV's will take a risk to cross over the hawker zones from the mandi to avoid fatalities, parking issues and congestion. [4]

5.1 Road Space – SMV's with Pedestrian

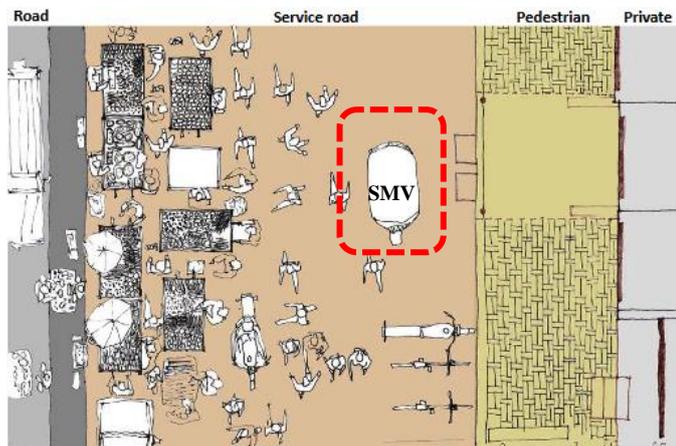


Figure 4- Detailed Vending Activity and Space use in Azadpur Mandi, Delhi.

With the different activities of vendors going in the market may cause the disability of infrastructure, lack of signages, bollards etc. the roads should be acted like a mixed user with IPT, para-transit and SMV's in a huge amount, no proper spaces for vendors to their vending zones, tress pits and flower beds to be encroached by SMV's and vendors at peak hours. In addition to widening the roads and demarcate the hawker zones by applying the street vendors policy in the mandis through the concerned Mandi committees and departments, it becomes necessary to contribute the innovative design issues for the SMV's in the mandi to reduce noise, air pollution and chaos of congestion in the mandis.

6. INTERVENTIONS AND RECOMMENDATIONS

With the existing scenario of Azadpur Mandi, the SMV's are the major concerns in every parameter related to environment, social issues, physical structures, transportation demand and supply of goods and services, travel pattern of the road users etc. The mechanisms which

will be influencing the mandis in terms of making more attractive, congestion and parking free, applying the National Urban Street Vendors policy, demarcating the zones for vendors or hawkers, follow and organize the traffic regulations for mandis separately with high security, creating the convenient bays for IPT's or SMV's, construct a robotic parking garage system so that the SMV's or different road users comes from their private vehicles can park in the multi garage robotic parking system with ITS management with the pricing for parking the vehicles at every hours to be paid, set price based on location, parking duration, vehicle size and time of day, price parking to manage the demands, segregate the area of street vendors from the mandis with their respective times, so that the chaos will be avoided and the mandis will relief from congestion and space available for SMV's and reach their destination with goods and services in an efficient and cost-effective manner and also use the parking revenue generated from the robotic garage parking and on-street will help to build people and road users friendly streets, demarcating the parking zones and parking slots for ease in the parking of SMV's or freight vehicles in the large amount only the designated spaces or dilapidated buildings should be converted into the parking system.

6.1 Effective parking Strategies

To overcome from the congestion, it is first to identify the supply and demand of vehicles to the network of supply of goods by the SMVs.

- With the Successful reforms of US and European countries – Provisions of parking technologies that offers policy makers and customers the maximum flexibility. [5][6]
- Design parking facilities that are well integrated with the surroundings and walking environments in which SMV's will move smoothly without causing any obstruction. [5]
- Price and supply of the curbside and off-street parking influence each other. [6]
- Developing the parking charges less through ITS, the maximum road-users will use the parking at peak hours on paid basis.
- Promote shared parking strategies in the mandis on the basis of their PCU and ECS to cater huge number of vehicles on a single built up area of land.
- Provision of Multi-level or robotic parking garage system should be available for the road users like IPT, SMV's, para-transits who commute on the daily basis at peak hours and no road users wanted to pass through the narrow lanes and disposable waste land near or in the mandis.

- Economic mechanism has to be applied by the departments to vary parking charges based on the CO₂ emission level of the vehicles of the vehicle, cleaner vehicles get discounted on parking charges rather than the high rate polluted vehicles. [5]
- Segregation of parking lots should be made based on the standards of the vehicle, so that the equal space should be allocated for different vehicles. Robotic or Multi-Level Parking Garage System – This is an amazing concept, It will allows a greater development on a piece of land and more parking on a smaller area, the robotic garages are much smaller than conventional parking areas. They do not need ramps or stairs or extra space for opening car doors or waiting in a long queue which is also the reason for saving time of SMV's during their processing of goods and services, they are safe because no one has to walk through a dark deserted garage to get their cars. Robotic parking system has improved upon the mechanical model and achieved the automated parking process with its Modular Automated Parking System (MAPS). The implementation of these robotic parking garage will have a major positive impact for reducing the congestion and parking issues from the mandis or commercial areas in the cities. It is a perfect solution to lack of parking in all cities particularly in mandis where people want to park close where they want to go, nobody wants to walk.

6.2 Traffic Regulation Mechanism

The traffic regulation has its own characteristics and based on different areas. Traffic Intersection controls, Traffic signs, Uncontrolled Intersections, Channelization, Road markings, Grade separated Intersection and Traffic rotaries are the universal salient features of traffic regulation and management. To avoid accidents and congestions at rotaries, Traffic regulations acts of India suggests some parameters to implement based on the need of the area.

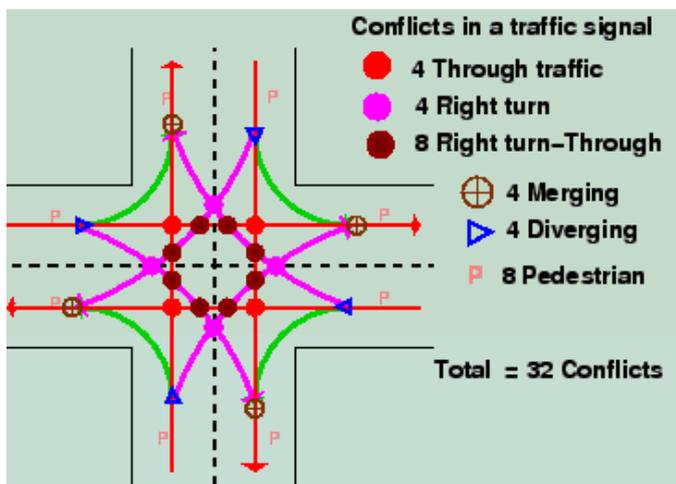


Figure 1- Conflicts at an Intersection

The model of 4 arm intersection in mandis is to resolve these conflicts for the ease of traffic flow with safety and efficient movement of both SMV's and pedestrian. Time sharing and space sharing will be the most important traffic regulations to promote safety, desirable movement and equal distribution of spaces between the two vehicles to avoid accidents. Authorities or committed of Mandis has to provide signages at every intersection of rotaries and dead-end corner of the road collector to highways that connects mandis to the different nodes of the surrounding areas.

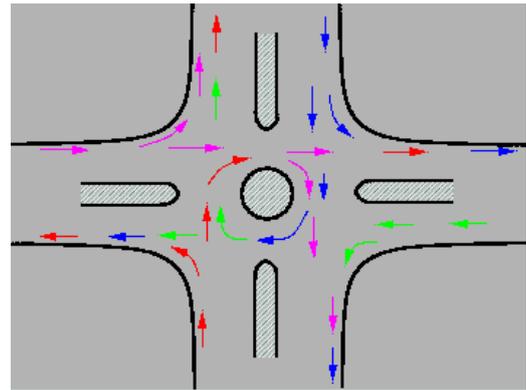


Figure 6- Channelization of Traffic through a four-leg of intersection.

Four-arm channelization intersection will provide more efficient and safety to the road users. Channelization is to be done to reduce the rate of speed of the vehicles while entering the intersections from the carriageway. Channelization will also act as a safety parameter for pedestrians and vehicle owners to understanding the guidelines of traffic regulations first and serve their best to avoid the accidents happened in the Mandis and also makes pedestrian crossing safe.

6.3 Regulatory Mechanism of Street Vending Policy

Streets Vendors are the backbone of the urban society and the market-oriented habitants of the cities. Street-vending is a day-to-day activity in the local, neighborhood or city level markets. They are forced to holdup their live stocks and move out for the works for the whole day. The national urban street vendor policy 2009 will frame out some mechanisms in relation with the SMV's. The scheme allocates space to the registered vendors those who getting licensed through bio-metric advanced system for the registered vendors for selling the products at designated place by laying out three vending zones as green, amber and red. These zones restrict vending activities according to road widths and timings and hence overlook the concept of formation of natural markets in the city. Vending activities should be acted on the basis of selected time of peak hours at designated vending zones. It provides facilities for appropriate use of identified space including the creation of hawking zones in the urban development/zoning plans. It ensures the demarcation of 'Restricting-free Vending Zones',

'Restricted Vending Zones', 'No-Vending zones' and 'Mobile Vending Areas' taking account the natural prosperity of street vendors to locate in certain times in response to patterns of demand for their goods/services carried out by SMV's, traffic congestion and parking factors in view. With the help of demarcating the vending zones in the mandis, the licensed vendors are reliable and active to work in the mandi with their full efforts because the authorities or committees will demarcate the zone on the basis of demand-supply, pressure of SMV's on infrastructure and counter-lacking relationship between the street vendors and SMVs. So, simultaneously the movement of SMV's will act smoothly and decreasing the pressure on urban infrastructure and chaos with the street vendors. In case of Bhuvneshwar, (planned hub of vending zones) the licensed vendors are to be listed above 2,000, 52 vending zones benefitting the 11,000 family members, this will also help in case of Azadpur mandi if the creation of vending zones through collaborations of SEWA, NASVI's policies will help the residents of Adarsh Nagar and Azadpur village in terms of job employment and opportunities.

7. CONCLUSION

With the pace of marketing goods and services and the relation of customer-buyer relations is developing strong with the help of innovative ideas on congestion pricing, parking pricing, demarcating the zones for street vendors and enhancing the traffic regulation policies to work efficiently so that SMV will move efficiently and lead to decrease in fatality rates too. Proper provision of signalized junction/rotaries, channelization of vehicular movement in mandi is one of the best initiative taken by the authorities to resolve design and parking issues in mandis. Construction of robotic garage parking system will help thousands of freight vehicles and SMV to be parked continuously on the elevated design model of Modular Automated Parking System MAPS at peak hours, which helps in reducing the congestion on narrow lanes of mandis. If the widening of carriage way, construction of Multi-level parking system near outside the mandi and proper traffic regulation and four arm channelization with signages at every dead-end road of the mandis to highways will be really helpful for all the SMV's for the movement in roads of mandis and ease in carrying the goods and services to import and export easily on time to the various states of the nation.

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BIOGRAPHIES



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