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Lessons Learnt from Crowding at Two Railway Stations in China during the Spring Festival

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The Incidence

January 14, 2006

Zhengzhou & Beijing



Railway System



Topics covered:

- ★ Introduction
- ★ The Incidence 2006
- ★ Details
- ★ Response of the Authority in Emergency
- ★ Causes of the Incident Emergency
- ★ Experience Gained
- ★ Conclusions



1. Introduction

- ★ Spring Festival is the most important traditionally festival in China.
- ★ There are at least 7 days of holidays for all organizations. Family members prefer to meet and have celebrations.
- ★ Over 140 million ‘peasant labours’ and 20 million college students staying outside would return to their hometowns.



★ **Traveling during the Spring Festival holidays will give heavy traffic loadings.**

★ **Passengers used to travel around different cities within 40 days, 15 days before and 25 days after the Lunar New Year.**



★ **In the past ten years, the total number of passengers during this period was recorded to be over 1.3 billion each year, about the total population of the Mainland.**



★ The total passenger load (International Finance, 2004) during the spring travel period in the past 13 years is shown in the table.

Year	Total passenger load (in 100 million)
1994	12.2
1995	14.28
1996	16.2
1997	17.4
1998	18.2
1999	14.4
2000	16.16
2001	16.6
2002	17.4
2003	18.19
2004	18.9
2005	19.5
2006	20.54



Total passenger load (Economic Operation Bureau, 2006; International Finance, 2004; Wikipedia, 2007) during the spring travel period in the past 13 years



Past records showed that:

- ★ Highway traffic took about 91% of the total passenger load.
- ★ Railways 7%.
- ★ Water transport and airlines less than 2%.



Year	Passenger load (in 100 million)				
	Total	Railways	Highways	Water transport	Airlines
2003	18.19	1.3	16.65	0.24	0.09
2004	18.9	1.37	17.17	0.26	0.11
2005	19.5	1.4	17.7	0.28	0.12
2006	20.54	1.49	18.77	0.28	0.18



Passenger load (Economic Operation Bureau, 2006; Wikipedia, 2007) of different means of transportation during the spring travel period in the last 5 years



- ★ Although only 7% of the passengers used railway during the spring travel period, it plays a unique role.
- ★ In terms of price, speed and safety, railway is the first choice of transportation for peasant labours and college students with a long trip.
- ★ The total length of the operating railways in the Mainland is only 75,000 km.
- ★ The averaged value is 5.6 cm per person, about the length of a cigarette, lying outside the list of the world top 100.



- ★ The total passenger load of railways in 2005 in Mainland China was 603.456 billion person-kilometer, being at the top of the world.
- ★ Having 149 million passengers traveling in 40 days means that the railway system would have double or even triple the normal loading.
- ★ In addition, the railway also has to transport consumables and goods such as coal, oil and food for the country.
- ★ The transportation capacity of railways is inadequate for such a huge loading of passengers.



2. The Incidence 2006

- ★ At the start of the spring travel peak on 19 January 2006, a key station, Zhengzhou Railway Station, had heavy snowfall as reported.
- ★ Railway traffic suspended.
- ★ Passengers jammed.
- ★ Jamming effect spreading to other stations.
- ★ Several other major railway stations in China were then affected.
- ★ Affected another large station: Beijing West Station.





Passengers outside the Zhengzhou Station







■ 上海火車站的農民工潮：交通樞紐一直是經濟發展的瓶頸



至一 取 場 十
國 零 二 旅 二 增
■ 幫父母提行李的小
孩：我要回家
標 惡
昨夕前後中國
不過，中央氣



■ 車站廣場旅
客被擠掉的鞋，
失序的證明

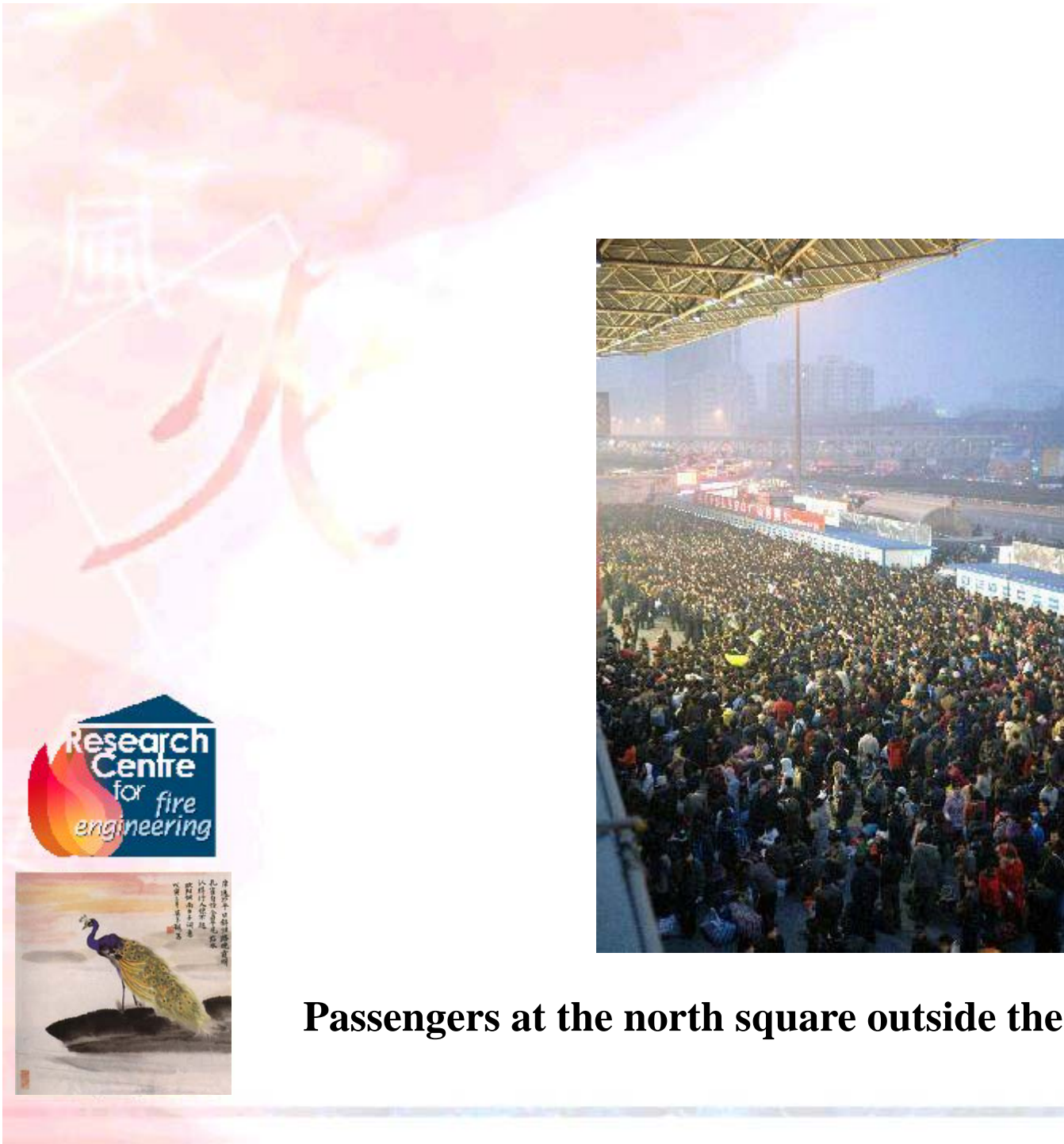


的時不載鐵資



- ★ **The Beijing West Station was also affected.**
- ★ **Over 100,000 passengers crowded inside in the evening on 19 January.**
- ★ **Such crowded stations have potential safety problems.**





Passengers at the north square outside the Beijing West Station

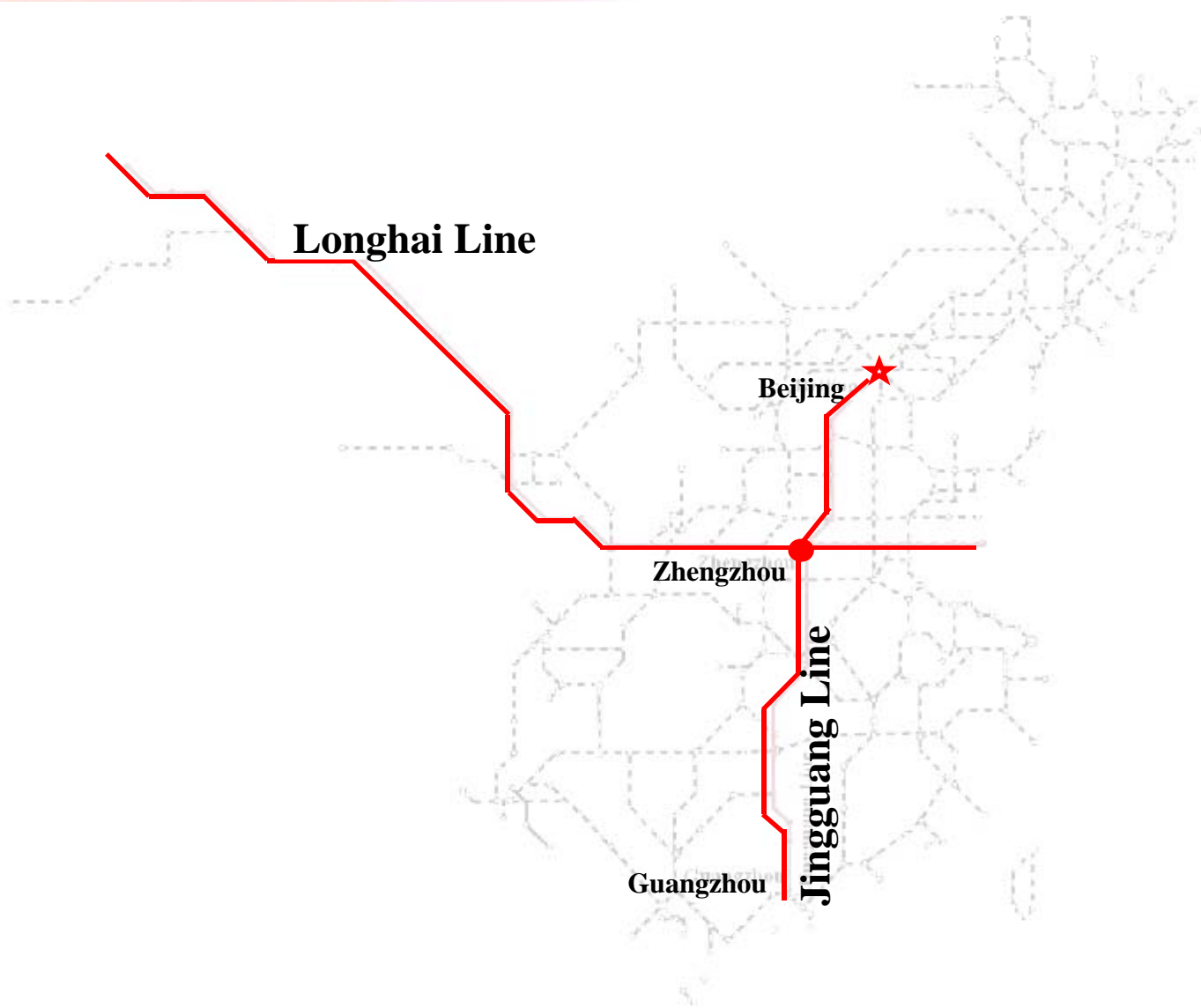


- ★ **There are 8 key railway lines operating at the moment.**
- ★ **5 running north-south and 3 east-west.**
- ★ **Jing-Guang Line is the central axis of the railway, connecting through Huabei, Huazhong and Huanan. It is the largest north-south trunk line with the highest carrying capacity.**
- ★ **The Longhai Line is the most important east-west line (Huang).**



Railway System





Railway system in China



- ★ Cities such as Beijing, Zhengzhou, Shanghai, Guangzhou, Wuhan, Chengdu, Xi'an, Harbin, Shenyang and Lanzhou with 2 or more lines become the railway hubs.
- ★ Beijing is the terminal station for 3 north-south lines (Jing-Guang, Jing-Hu, Jing-Jiu) and 1 east-west line (Jing-Bao).
- ★ Zhengzhou, located at the intersection of Jing-Guang Line and Longhai Line, is the heart of the railway network.
- ★ These lines and hub cities are the key parts during the spring travel period.
- ★ Their operation would directly affect the smooth transportation of passengers.



★ Jamming effect spreading to other stations

In the evening on 19 January, all the trains of the Jing-Guang Line passing through Wuhan were delayed.

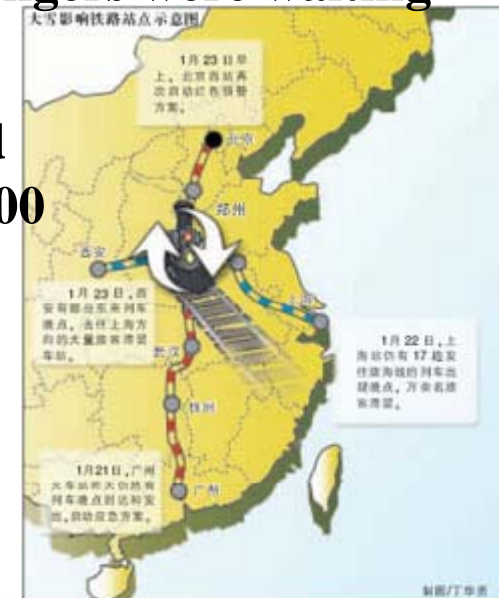
Trains arrived late at stations of Zhuzhou and Hengyang in Hunan province.

On 19 January, over 4000 passengers were held up at the Xi'an Station of the Longhai Line.

In the afternoon on 20 January, over 10,000 passengers were waiting at Chengdu Station.

In Shanghai, over 15,000 passengers were held up on 19 January. The peak amount was 35,000 passengers

In Guangzhou, 11 trains were delayed and about 10,000 passengers were held up on 19 January.



3. Details

- ★ The spring travel season in 2006 started on 14 January.
- ★ The first travel peak was estimated by the railway authority to be on 20 January.
- ★ Starting from about 6:00 am on 18 January, snow began to fall in large areas of China.
- ★ Medium to heavy snow was reported in Zhengzhou and Wuhan.
- ★ Small snow or rain with snow in Shanghai, Xi'an, Ji'nan, Lanzhou, Guangzhou and Urumqi.
- ★ Heavy snow kept on falling in Zhengzhou until nighttime on 19 January, resulting in over 15 cm snow on ground.



- ★ All the main highways were closed due to heavy snow on 18 January.
- ★ Traffic at the north-south trunk roads passing through Zhengzhou was heavily congested.
- ★ All the flights scheduled to take off at the Zhengzhou Xinzheng Airport between 17:30 on 18 January to 21:00 on 19 January (28 hours) were cancelled.
- ★ As a result, many passengers turned to railways.



- ★ **Railway switches were frozen due to the heavy snowfall.**
- ★ **Almost all the trains departing from or passing through Zhengzhou Station were delayed.**
- ★ **Many trains were delayed for more than 8 hours and some were even stopped.**
- ★ **As reported (CCTV-2, 2006), passengers accumulated quickly at the Zhengzhou Railway Station from 5:00 pm to 7:00 pm on 19 January.**
- ★ **Over 60,000 passengers were held up at the station at 6:00 pm.**



- ★ Although all the 11 waiting halls in the station were opened, spaces were still inadequate.
- ★ After clearing up the tracks through great effort by the railway authority, all delayed trains finally began to arrive at Zhengzhou Station since midnight on 19 January.
- ★ Those trains then departed accordingly.
- ★ Longhai Line and Jing-Guang Line were under snow on 19 January.
- ★ As Zhengzhou Station was at the intersection point of these two lines, the jamming effect spread out quickly to other stations.



- ★ In the evening on 19 January, all the trains of the Jing-Guang Line passing through Wuhan were delayed.
- ★ Trains arrived late at stations of Zhuzhou and Hengyang in Hunan province.
- ★ Passengers crowded at the stations of the Jing-Guang Line and Longhai Line due to train delays.
- ★ On 19 January, over 4000 passengers were held up at the Xi'an Station of the Longhai Line.
- ★ There, part of the station terminal such as the fast food restaurants were changed to temporary waiting areas.



- ★ In the afternoon on 20 January, over 10,000 passengers were waiting at Chengdu Station.
- ★ That station had to transfer money from the bank for ticket refunding.
- ★ Up to 7 refund counters were opened, note that there was only one such counter in normal days.
- ★ In Shanghai, over 15,000 passengers were held up on 19 January.
- ★ The peak value was 35,000 passengers; ticket selling was stopped.
- ★ In Guangzhou, 11 trains were delayed and about 10,000 passengers held up on 19 January.



- ★ **Beijing West Station, the terminal station of the Jing-Guang Line, was seriously affected.**
- ★ **It was predicted that the first travel peak day would be on 19 January 2006, with about 130,000 passengers departing.**
- ★ **At 10:30 am on 19 January, information from Zhengzhou, Henan and the weather observatory confirmed that trains on the Jing-Guang Line were disrupted.**
- ★ **Snow fell heavily in Henan and so trains at the Beijing Station could not leave as scheduled.**



- ★ At noon, over 10 trains were delayed, with some delayed for more than 10 hours.
- ★ All the 13 waiting halls at Beijing West Station were opened, being the first time happened in recent years.
- ★ There were only 500 seats at each waiting hall, but observed to have over 1,500 passengers.
- ★ Many passengers were crowded at the corridors, the south and north squares outside the station and the footbridges nearby.



- ★ At about 12:00 pm on 19 January, passengers accumulated at the waiting hall on the 2nd floor of the station.
- ★ As more trains were delayed, more passengers were crowded at the station area.
- ★ The peak crowd loading reached 140,000, including about 30,000 passengers waiting to board.
- ★ At 11:00 pm on 19 January, 12 trains arrived late and the departure of 20 trains were delayed.
- ★ At about 0:00 am on 20 January, Zhengzhou Section of the Jing-Guang Line resumed train service.



- ★ At 0:40 am, the first south-bound train of Jing-Guang Line on that day departed from Beijing West Station, the crowd was gradually relieved.
- ★ From 0:00 am to 6:00 am, nine more trains were put into service to carry the 20,000 passengers stayed at the station.
- ★ A total of 20 passenger trains had departed from the station in that six hours.



- ★ At 10:40 am, the train from Beijing to Chongqing departed.
- ★ At that time, train service basically resumed normal with all delayed trains due to heavy snowfall departed.
- ★ After taking emergency actions for two days on 20 and 21 January, the railway traffic in Mainland China basically resumed normal on 22 January.



4. Response of the Authority in Emergency

3 levels of emergency warning signals dealing with peak passenger flow were planned at the Beijing West Station:

- ★ Yellow warning with over 120,000 passengers to be departed on a single day;
- ★ Only those passengers holding valid tickets for trains departing on that day are allowed to enter the station;
- ★ Orange warning with over 130,000 passengers to be departed on a single day;



- ★ **Only those passengers holding valid tickets for trains departing within 6 hours are allowed to enter the station;**
- ★ **Red warning with over 140,000 passengers to be departed on a single day or under other special situations;**
- ★ **Selling of tickets would be stopped and only those passengers holding valid tickets for trains departing within 6 hours are allowed to enter the station.**



- ★ At 11:00 am on 19 January, red warning scheme was launched at the Beijing West Station.
- ★ The information was immediately broadcast through the traffic radio to the public.
- ★ The following actions were taken afterward:



- Directing the waiting passengers
- Increasing the traffic flow
- Clearing up the tracks



Directing the waiting passengers

★ Beijing West Station

- Red warning scheme was launched at 11:00 am on 19 January.
- Joint command centre among the Ministry of Railway, Beijing Municipal Government and Beijing Bureau of Railways.
- 1100 policemen and 300 soldiers from other cities arrived to help keep order.
- More waiting space was utilized.
- Platforms were opened one to two hours before the arrival of the trains.



★ Zhengzhou Station

- Two vice-governors of Henan Province arrived to take the charge.
- More waiting space was utilized.
- Over 1000 from other cities arrived to help keep order.



Increasing the traffic flow

★ Beijing West Station

- Inspection and maintenance works of all the arrived trains at the platform within 25 minutes.
- Nine more trains were operated in the evening on 19 January.
- Tickets were sold earlier.
- More buses and taxis were called to the station to pick up the passengers just arrived.
- Tickets of the delayed trains could be fully refunded.

★ Zhengzhou Station

- Mobile message was utilized to inform the citizens of the conditions of the railway station and provide advices.
- More trains were operated to carry the short-distance passengers.
- Passengers with valid railway ticket could take long-distance bus free.
- Tickets of the delayed trains could be fully refunded.



Clearing up the tracks

- ★ On 19 January 2006, several thousand railway staff were organized by the Zhengzhou Bureau of Railways to clear up the snow on the tracks and 'defrost' the frozen railway switches.
- ★ Zhengzhou Section of the Jing-Guang Line resumed service at 0:00 am on 20 January 2006.



5. Causes of the Incident Emergency

★ Location of Zhengzhou and Beijing West Station in the national railway network

- Over 315 trains would be departing, arriving or passing through this station everyday during the spring travel period (The shortest interval is less than 3 minutes at the daily peak hours).
- During the spring travel period, 104 of the 258 trains departing, arriving or passing through Beijing West Station would travel through Zhengzhou everyday. Any disturbance at the Zhengzhou Station would affect the Beijing West Station as demonstrated.

★ High passenger load

- Beijing West Station used to be a key station in the past spring travel seasons. On the days around 19 January, the daily crowd flow at the Beijing West Station was over 300,000.



★ Bad weather

- If only the railway system was suspended, passengers could still be diverted to expressways and airlines. For this case, the entire traffic system in Zhengzhou was suspended due to the heavy snowfall.

★ Passengers' insistence to travel

- During the spring travel season, most of the tickets would be sold up. The waiting passengers were unlikely to cancel their travel plans. They kept on waiting all the time at the stations until the Jing-Guang Line operated.



★ **Slow information flow during response**

- **Among the weather departments and the railway system.**
- **Among different departments in the railway system (e.g. Zhengzhou and Beijing).**
- **Among the railway system, local government and the public.**



6. Experience Gained

- ★ However, experience was gained in handling this incident.
- ★ Another heavy snowfall occurred about two weeks later from 2 to 6 February 2006, also within the same spring travel season.
- ★ Since the railway authority had experience and watched the rapid changes in weather conditions with well-planned preventive measures, transportation was not seriously affected.
- ★ Therefore, safety awareness and adequate planning are the key points to avoid adverse effects.



Another case in early 2008



More severe, affected more areas



★ However, incidence as Zhengzhou no more occurred.



7. Conclusion

- ★ In the incident of holding up 160,000 people at the Beijing and Zhengzhou Railway Stations due to heavy snowfall, the government had demonstrated its capability in crisis management and crowd control.
- ★ The problems were eventually solved successfully.
- ★ It was difficult for the Authority to work out emergency plan before this issue happened in Zhenzhou.
- ★ Such bad weather was not reported since there was railway system in China.
- ★ Obviously, the incident would be prevented if there was planning.



- ★ **Requesting too much would get more criticisms, and using too many resources.**
- ★ **Information exchange between different parties and the public is another point.**
- ★ **The incident would be easier to handle if there is better information exchange.**



★ Fortunately, the government has recognized the limitations of the passive emergency warning scheme for handling emergency incidents.

★ Therefore, much effort was put to promote the rationale of emergency management.

★ If the relevant authorities can conduct comprehensive risk assessment in advance, similar incidents would not happen again.



★ This incident had identified a major problem on communication.

★ The government is now fully aware of the importance of disseminating information in handling similar events.

★ Through analyzing the above incident, two key factors to prevent similar incidents are:

- enhancing information flow;
- cooperation among different departments; and effective crowd control.



★ **Good practice**

- **On-the-spot management of large-scale crowd.**

★ **Bad practice**

- **Lack of good emergency plan.**
- **Lack of beforehand and dynamic risk identification and assessment.**
- **Lack of communication among different parties.**

★ **Critical factors identified to prevent similar incidents**

- **Timely, enough and efficient communication among different parties.**
- **Practical and efficient on-the-spot management of large-scale crowd.**

