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The Frontier of the Expanding Industrial Agglomeration in the National Capital Region of Delhi: Industrial Development in Alwar District, Rajasthan, especially Focusing on the Japanese-Exclusive Industrial Estate of Neemrana

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Abstract The National Capital Region of Delhi (Delhi NCR), one of the largest metropolitan areas in India, has experienced dramatic industrial development since the 1980s. In the initial stage, industrial estates were developed in some districts abutted on Delhi, especially in Gurgaon, Haryana and Gautam Buddha Nagar, Uttar Pradesh. In recent years, industrialization has occurred in remote areas situated around 100 km from Delhi.

This study picked Alwar District, Rajasthan as a research field for discussing the actual situation at the frontier of the expanding Delhi industrial agglomeration. While Rajasthan State consists of thirty-three districts, only Alwar is included in Delhi NCR. The northern part of the district can be reached in about two hours from Delhi through National Highway 8 (NH8), which has been renovated as a main artery linking Delhi to Mumbai. The industrial development corporation (RIICO) of Rajasthan State Government accelerated the development of industrial estates along with NH8 in the 2000s. Alwar is thought to have the following competitive advantages in terms of industrial location. First, land is much cheaper to acquire for industrial uses than in Haryana. Second, the cost of manpower is also lowest according to the minimum wages of four states constituting Delhi NCR. The author has checked these two points through his survey on companies that are located the Neemrana Industrial Estate developed by RIICO.

The Neemrana Industrial Estate consists of three parts, namely Phases I to III. Phase III is exclusively used by Japanese companies and its land cost has been 2,000 Rs. per square meter in 2011/12. All the surveyed companies cited this cheaper land cost as the most important factor in locating themselves at the industrial estate. On the other hand, they have paid salaries to their staff that are higher than those in Haryana. As Neemrana was a rural, agricultural area just until recently, the supply of both engineers and managers is quite poor. The companies in this industrial area have hired staff mostly from Haryana, paying salaries 10 to 20% higher than those in Haryana. Even the production workers the companies have taken on have been paid wages the same level as those in Haryana. Therefore, the author concluded that labor cost will not be a location factor that triggers the expansion of Delhi's industrial agglomeration.

Key words the National Capital Region of Delhi, Rajasthan, Alwar District, Neemrana Industrial Estate, location factors, National Highway 8

Introduction

In India there is a close relationship between industrial locations and the development of industrial estates. Up to the 1980s, prior to economic liberalization, state governments built industrial estates and provided incentives to attract businesses as a policy in order to develop 'backward regions' and 'no industrial districts.' The implementation of fair regional development was considered important factors when establishing industrial estates. As a result, it is said that in the 1980s India's industrial estates were largely decentralized. However, their sites were not dispersed across backward regions with absolutely no industrial foundations; instead there was a definite tendency to disperse the sites in suburban areas located within a certain distance from established cities. Some of the industrial estates developed in these non-prime locations have suboptimal conditions of occupancy.[1]

With the advent of liberalization in the 1990s, industrial estates were developed on a large scale in locations that were expected to show real demand, rather than being promoted as a means to achieve regional development. For example, there are reports that in Uttarakhand State (a newly established state after ceding from the state of Uttar Pradesh (hereafter referred to as UP) in the year 2000 and is largely composed of hilly areas and mountains of the Himalayas), the development of industrial estates was specially set up on the few plains that existed in the

state, and has achieved great success in attracting industry to the area (Tomozawa, 2008, 2014). This case is a typical example of a location chosen for development in consideration for the convenience of incoming businesses, under the government's special preferential program to promote "Special Category States." With the exception of regions privy to such national benefit schemes, an overview of trends in the 1990s for the country as a whole shows that the main locations for development of large-scale industrial estates were the suburbs of big cities. Initially many of the estates were established in the vicinity of major cities, but in recent years there has been an on-going trend to develop them in more remote areas, in line with the construction of major arterial roads.

In Delhi, a major city typical of India, there has been a consistent increase in the number of industrial workers per se, but this has been almost exclusively due to an increase in small and micro scale factories. Since 1990, the suburbs have become the main area for deployment of industrial sites in Delhi NCR (National Capital Region), following the Delhi Master Plan of the same year which denied permission for new factories employing 50 or more workers to be established in the city and ordered the closure or transfer of plants emitting contaminants and those producing hazardous materials (Sharma, 2010). From the 1980s to the 1990s, extensive industrial estates were developed in municipalities adjacent to Delhi such as Gurgaon city in Haryana State and Gautam Buddh Nagar district in UP State (Tomozawa, 1999, 2007). In recent years there have been cases where the establishment of industrial complexes has led to industrialization in municipalities even further afield, in some cases even at sites 100 km away from the city. This paper reports the current situation on the frontiers of industrialization in the Delhi metropolitan area, using Alwar district in Rajasthan as a typical example.

The chapters of this paper are arranged as follows. In Chapter II, we look at the development of arterial highways in India and then the trend of industrial construction along the NH8 (National Highway 8) corridor in the NCR, taking the automobile industry as our example. We describe the spatiotemporal characteristics of the industrial estates development in Alwar district, Rajasthan State, in Chapter III. In Chapter IV, we examine the Neemrana Industrial Complex, developed in Alwar and dedicated to Japanese businesses, and we look at the trading conditions and human resource structure of companies based there. Chapter V summarizes the above and shows the dynamism at work in the broad expansion of NCR industry. Note that the fieldwork for this paper was conducted in India in September 2011, with supplementary materials collected locally in February and September 2012.

Extended Industrialization along the NH8 Corridor

The formation of an "axis of development" between Delhi and Mumbai

If we divide India into four regions, there is no doubt that Delhi, Chennai, Kolkata and Mumbai are the main regional cities of the north, south, east and west, respectively. An almost perfect diamond-shape can be drawn using the vertices of these four cities, meaning that they are relatively conveniently positioned to divide and conquer the great Indian sub-continent. Consequently, these four cities were granted higher administrative functions, not only in the colonial period of the British, but also after independence, and they play important roles as centres of business activity (Hino, 2004), leading them to become the major representative cities of India today. However, the fact that they lie 1,000 km or further away from each other, with poor transport infrastructure, meant that there were not necessarily strong links joining the 4 cities.

In current day India, the development of various forms of infrastructure is underway. And the construction of highways, which aims to improve the smooth flow of people and goods and strengthen connections between the big cities, best represents the effort. In particular, construction of a highway linking the 4 cities (the Golden Quadrilateral) started in 1999 under the Vajpayee administration of the time; spanning a total length of 5,846 km. This is a national project of huge scale[2] and also passes through important cities such as Jaipur, Ahmedabad, Pune and Bangalore (Figure 1). The specification norm is two lanes in either direction, with three at critical sections. In terms of basic and supplementary facilities, it far exceeds the standard of existing roads in India. It was mostly complete in 2012, with on-going works to widen it and add elevations etc.

Further, in 2006 the Delhi-Mumbai Industrial Corridor (DMIC) was announced; an initiative proposed by Japan's Ministry of Economy, Trade and Industry, to run between Delhi and Mumbai. While constructing and laying a dedicated freight rail line in the approximately 1,500 km distance between Delhi and Mumbai, this initiative also aims to create an industrial zone, with industrial complexes and logistics bases sprawled alongside the railway. The DMIC Development Corporation was established in 2008 as the main promotional body for the project. Looking at the

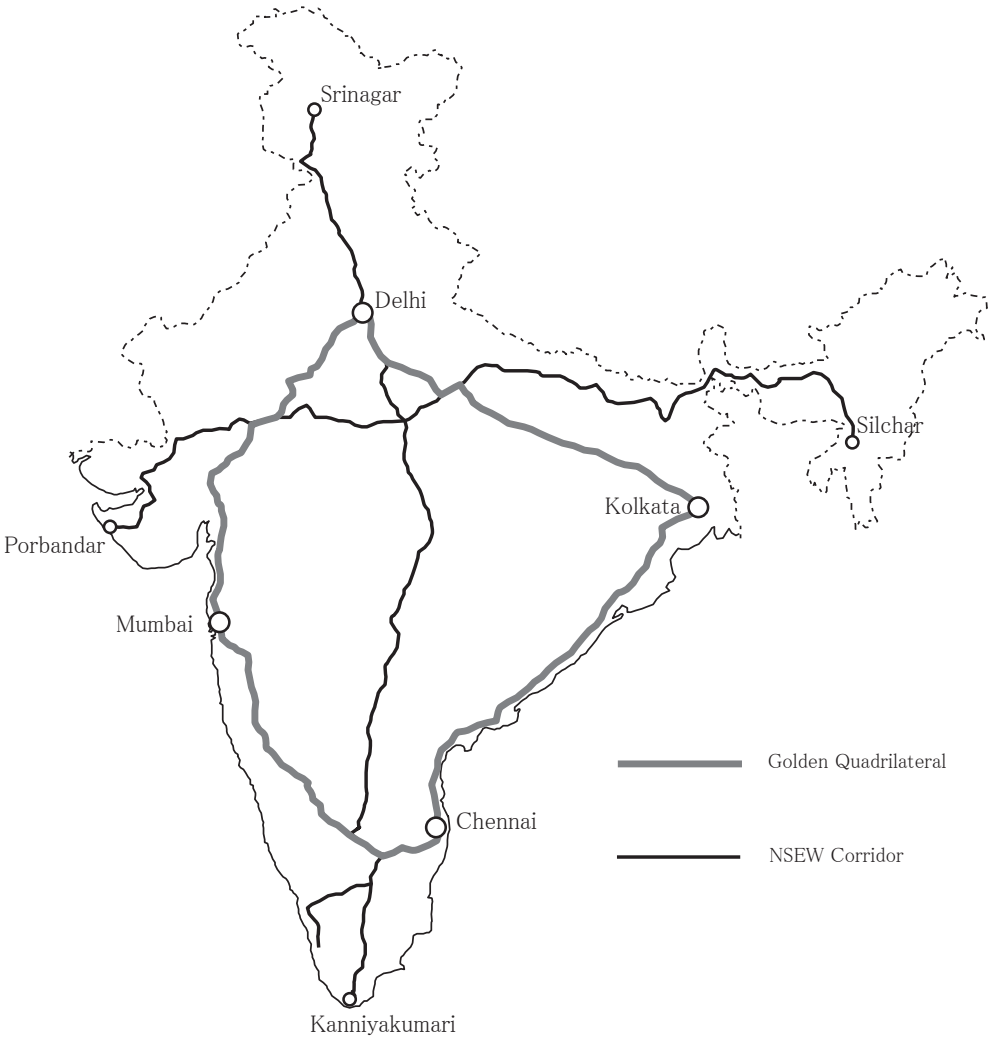


Figure 1. National Highway Network in India
Source: Ministry of Road Transport and Highways, India

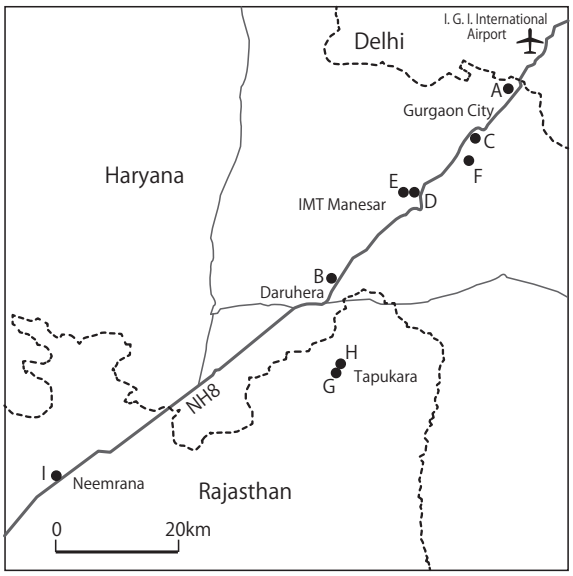
financing for the initiative, the dedicated freight rail is to be developed using an ODA yen loan, but uniquely, individual projects will be funded by private investment and for this reason, Japan and India have jointly contributed 15 billion USD as a reserve fund, placed in the Development Corporation. Moreover, with several leading projects underway, the Development Company has become the hub of development for a transport/logistics network.

With the implementation of projects such as the above, road conditions are being rapidly improved in major cities such as Delhi and the surrounding suburbs. This leads to a widening of sites along the route for use by industry, universities, and housing etc. to form urban spread.

Industrial sites along National Highway 8

In the NRC, the NH8, which forms one side of the afore-mentioned Golden Quadrilateral, has provided an important platform for industrial development. The NH8 passes through Gurgaon and Rewari districts in Haryana State and Alwar district in Rajasthan State, all in the NCR. In these districts, the state governments have built industrial complexes along this axis of development. In India, states are the principal players in the development of industrial complexes, with development companies playing the direct role; in Haryana State this is the HSIIDC (Haryana State Industrial and Infrastructural Development Corporation), and in Rajasthan State it is RIICO (Rajasthan State Industrial Development & Investment Corporation).

We focus our overview on the automotive industry as representing those areas along the NH8 corridor (Figure 2). Of the earliest was Maruti Udyog (currently Maruti Suzuki). It was founded by Sanjay Gandhi, the second son of the then prime minister, Indira Gandhi, and was established as a state-owned car company in 1981. It was located in Gurgaon district, near the border with Delhi and was the first example of a factory this size being built in the vicinity of a major city. Note that this company subsequently became a joint venture, with Suzuki later taking a share of equity, and production began in 1983.



	Company	Plant	Year of Starting Production	Products
A	Maruti Suzuki	Gurgaon	1983	Cars
B	Hero Motocorp	Dharuhera	1985	Two Wheelers
C	Hero Motocorp	Gurgaon	1997	Two Wheelers
D	Honda Motorcycle & Scooter	Manesar	2001	Two Wheelers
E	Maruti Suzuki	Manesar	2006	Cars
F	Suzuki Motorcycle	Gurgaon	2006	Two Wheelers
G	Honda Cars	Tapukara	2008	Cars
H	Honda Motorcycle & Scooter	Tapukara	2011	Two Wheelers
I	Hero Motocorp	Neemrana	2014	Two Wheelers

Figure 2. Location of the automobile assembly plants along with NH8

In 1985 a joint venture between local capital Hero Group and Honda Motors, the Hero Honda Company (currently Hero Motocorp Ltd.), started production at Dharuhera plant in Rewari district. This was a "backward area" some 50 km from the Delhi state border, where government incentives were applied. At the time, road conditions of the NH8 were poor: it took two hours or so from Delhi.

The year 1991 saw the start of the New Economic Policy, and location incentives from the government ceased. Companies began to look for suitable plant sites in line with their own strategies and decided where to locate by themselves. From 1997 Hero Honda deployed a second plant (the Gurgaon factory) to a site close to the urban area of Gurgaon about 10 km from the Delhi state line. It is of note that their choice of location was due to its closer proximity to Delhi than the Dharuhera plant. With HSIIDC's development of IMT Manesar[3] in the latter half of the 1990s, Honda's 100% owned subsidiary, Honda Motorcycle & Scooter India (HMSI) established a factory which began operations in 2001; and Maruti Suzuki also opened up a second plant there, starting production in 2006. Also, in 2004 the local incorporate of Suzuki's two-wheeler division (Suzuki Motorcycle India Corp.) was set up at Gurgaon urban area, rather than IMT Manesar, with production beginning in 2006. From the latter half of the 2000s automobile factories began to be located beyond the Haryana state line, into Alwar district, Rajasthan. Honda Siel Cars India and HMSI both opened their second plants[4] in RIICO's Tapukara industrial complex, with the former starting operations in 2008, and the latter in 2011. Hero Honda purchased land at Neemrana industrial complex in the first half of the 2000s and although nothing was done with it for a while, a new plant is being constructed there, with production due to start from 2014.[5]

Looking at how automobile plants are located along the NH8 corridor in this manner, it is clear that (with the exception of Hero Honda's Dharuhera plant, which was motivated by incentives to locate in underdeveloped areas) their location has gradually spread outwards from the Delhi state line. In conjunction with these trends by automobile plants, component suppliers have also expanded their location outward from Delhi to Gurgaon and Rewari districts (Tomozawa, 2012).

This tendency for industrial sites in the NCR to be located further afield is thought to be motivated by various factors, but initially we focus on land prices. Figure 3 shows the cost of industrial land[6] along the NH8 corridor in 2011. This shows a maximum cost per 1 m^2 of 30,000 rupees for Maruti Suzuki's Gurgaon plant, in the Delhi state borderlands, and these costs become lower as the distance from Delhi become greater. At IMT Manesar the cost is 10,000 rupees and at Bawal, where HSIIDC is currently extending the existing industrial complex, it is 5,000 rupees. When we reach Rajasthan State, the price falls further; 100 km from the Delhi state line, at Neemrana in Alwar district it is possible to acquire land at 2,000 rupees, which is less than half the cost at Bawal. Furthermore, in terms of the ease with which land for factory construction can be acquired, there is no longer any space available in Gurgaon district, leaving no choice but to look for land in Rewari district and beyond.

Next, we review labor costs. In India, the minimum wage is set by the individual states, with reviews usually occurring once every six months. Table 1 details

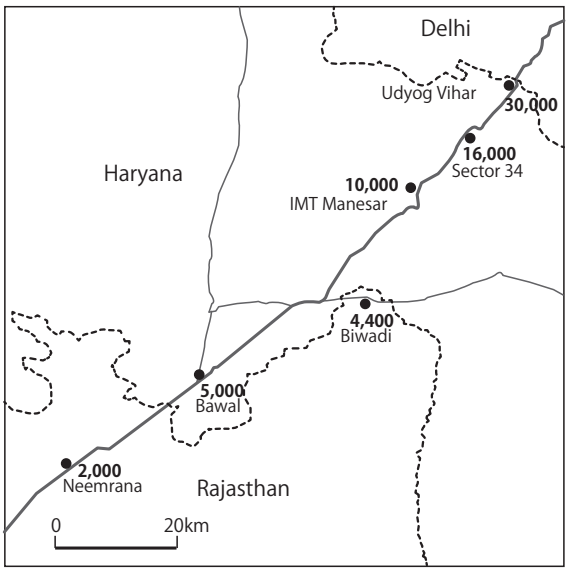


Figure 3. Rate of industrial land along with NH 8 (2011)
Note: Rate per square meter (in Rs.)
Source: HSIIDC and RICCO

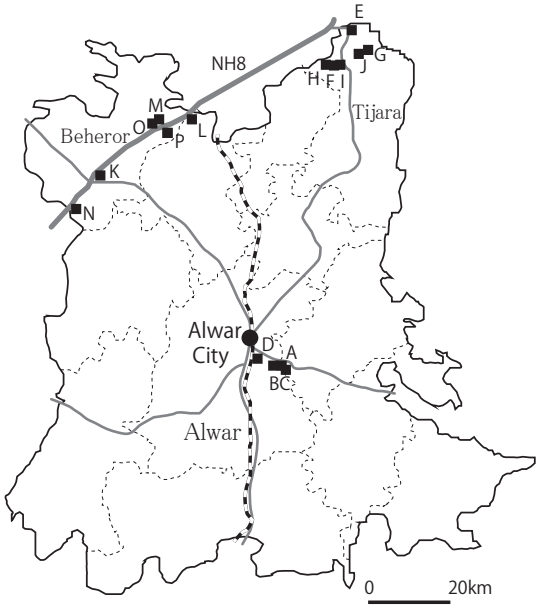


Figure 4. Location of industrial estates in Alwar district
Note: A to P accord with Table 3

Table 1. Minimum wage rates (unskilled) in the NCR of Delhi

State	Monthly Wage (in Rs.)	Reviewed
Delhi	6,422	2011.04
Haryana	4,644	2011.07
Uttar Pradesh	4,303	2011.10
Rajasthan	3,510	2011.01

Source: Labor Bureau of each states

minimum wage rates (2011 monthly figures) for unskilled labor in the four states within the NCR. This shows that, as was the case with the cost of industrial land, wage rates fall further along the NH8; it is 6,422 rupees a month in Delhi which compares to 4,644 rupees in Haryana state, and 3,510 rupees in Rajasthan. Consequently, Alwar district also has an advantage in terms of labor costs.

Note that from a company's perspective, land acquisition costs are initial costs, while labor expenses are operating costs. Both are location factors that vary according to where the site is located, and are thought to have a significant impact on a factory's location. In Chapter IV, we analyze how the companies located in Alwar district consider these two factors.

Industrialization in Alwar District and Neemrana Industrial Complex

An outline of Alwar district

Alwar (Figure 4) is the only district in the state of Rajasthan that is located in the NCR; it is located approximately 100 km from Delhi in the southwest of the metropolitan zone. The district has an area of 8,380 km^2, with the population of 3,672,000 (as of 2011), and comprises 12 sub-districts (Tehsil). The population growth rate since 2001 has been 22.7%, surpassing that of India's average which stands at 17.8%. Alwar city, the district's administrative headquarters, has the largest population (315,000) in the district. Its size can hardly be said to be particularly large, however, there is no other noticeable urban areas, with the bulk of the population (82.1%) widely dispersed across rural villages.

In terms of climate, it lies in the arid zone, with the average annual rainfall for Alwar city at 724 mm (2011).[7] However, there are differences in the degree of aridity within the district and also significant fluctuations in precipitation from year to year. Agriculture is an important industry with an abundant production of pearl millet etc. in the Kharif season and wheat and mustard crops in the Rabi season. The south of the district is rich in forestry resources. Stone such as marble is an important underground resource.

Industry started early in the district, with processing plants for local agricultural produce and non-mineral underground resources, and there have been remarkable advances in modern industry in recent years, as described hereafter. In addition, the old fort which dates back to the former principality once located in and around Alwar city, and the national park & wild-life reserve in the south of the district have become valuable tourist resources. As for transport, the NH8 runs through Behror sub-district in the north-west of the county, with on-going development along the corridor. Also, the section of India's national

railway that links Delhi and the area around the state capital Jaipur cuts through the district from north to south, with the main trains stopping at Alwar station. Alwar city is in an advantageous location for rail transport, but in terms of road transportation, it is located some 70 km from NH8 and is in a difficult position to directly benefit from the route's high standard.

The process of industrialization in Alwar district

As of 2010, there were 25,465 factories in Alwar district that employ 121,000 people.[8] The majority of these were of small and micro scale, with a mere 8,100 people employed in the 87 medium/large scale industries. Looking at the locations of these medium/large scale factories (Table 2), they are restricted to the three sub-districts of Alwar, Tijara and Behror, with none at all in the other nine sub-districts. The actual factory sites were located on industrial estates, which implies that the spatial bias of medium/large factory sites is closely linked with the development of industrial estates.

Table 2. Location of large and medium scale industries in Alwar district (2010)

	Alwar	Tijara	Behror	Total
Large	6	1		7
Medium	12	52	16	80
Total	18	53	16	87

Source: Brief Industrial Profile of Alwar District

Table 3 shows industrial estates in Alwar district with an area of 100 acres or more.[9] In total the table identifies 16 estates, each of them developed by RIICO. It is of note that these development locations are limited to the three sub-districts of Alwar, Tijara and Behror. As described above, there is no doubt that this has dictated the location of medium/large scale industries; however, it should also be noted that RIICO has focused on areas with high potential for industrialization when promoting the development of industrial estates. With this in mind, we discuss the process of industrialization in Alwar district.

The first industrial estate in the district was the Matsya Industrial Zone developed in the suburbs some 10 km from the centre of the district's administrative headquarters, Alwar City, in 1971. At the time, the region was designated as underdeveloped with no notable industrial sites, for which industrial development in the district had been planned. One of the successful endeavours was the deployment of the commercial vehicle manufacturer Ashok Leyland. Bhiwadi industrial estate (Phase I) was then developed in 1976. Bhiwadi is located in borderlands with Haryana State and is barely 4 km from NH8 (see Figure 4.). The industrial estate was in a great position within Rajasthan State to enjoy the ripple effect of industrialization in Gurgaon and Rewari districts that began in the 1980s, with a focus on the automotive industry. It was sub-

Tbale 3. Industrial estates in Alwar district (2010)

S.N.	Industrial Estate	Sub-district	Year	Area in acre	Number of Plots	Area per plot in acre
A	Matsya Industrial Area (M.I.A.)	Alwar	1971	1,804	701	2.57
B	M.I.A. Ext.	Alwar	2004	201	204	0.99
C	AgroFood Park, M.I.A. Ext	Alwar	2006	186	203	0.92
D	Old Ind. Area	Alwar	n.a.	180	59	3.05
E	Bhiwadi (Phase I to IV)	Tijara	1976	2,138	1,701	1.26
F	Khuskhera	Tijara	1995	826	1,017	0.81
G	Chopanki	Tijara	1996	802	1,107	0.72
H	IID, Centre Khuskhera	Tijara	1996	152	479	0.32
I	Tapukra	Tijara	2007	781	22	35.52
J	Patherdi	Tijara	2007	538	115	4.68
K	Behror	Behror	1981	281	263	1.07
L	Shanjahanpur	Behror	1982	203	190	1.07
M	Neemrana (Phase I to II)	Behror	1992	960	110	8.73
N	Sotanala	Behror	2000	152	80	1.90
O	EPIP Neemrana	Behror	2006	211	220	0.96
P	Neemrana (Japanese Zone)	Behror	2007	1,166	132	8.83
Total				9,052	6,171	1.47

Source: Alwar District

sequently extended as far as Phase IV. Today it has 1,479 plants of medium-to-small size in operation, with a particularly large number of automotive-related industries. In the district as a whole, the extensions to Bhiwadi were the main focus of the 1980s, with only two other small-scale industrial estates (Behror and Shahjahanpur) established in Behror sub-district. Thus it can be said that prior to liberalization, the development of industrial estates occurred in areas within the district that were relatively suited to industrialization, namely those in the vicinity of the district headquarters and the NH8.

In the period of liberalization since the 1990s, the sub-districts of Tijara and Behror have become the main areas for the development of industrial estates. In Tijara, 800 acre developments have taken place in Khuskhera and Chopanki. Both of these lie within 10 km of the Bhiwadi industrial estate and can be effectively regarded as further extensions to that estate. In addition, in Behror, the only sub-district that the NH8 passes through, a 900 acre industrial estate has been constructed at Neemrana. Meanwhile, no new industrial estates have been developed in Alwar sub-district.

The 2000s have basically seen a continuation of similar trends as were seen in the 1990s. Two industrial estates, Tapukara and Patherdi have been developed in Tijara sub-district. This has led to development of several industrial estates in succession in the north of Tijara. If the establishment of factories continues as planned, it is expected to become a major industrial zone. Tapukara in particular has the potential to become the hub of the zone, with two of Honda Motor's local corporations establishing their second plants there. In addition, a dedicated Japanese industrial zone (Phase III) was developed in Neemrana in 2007.

This is the first attempt in India where an industrial estate that aims to attract companies from a specific country is proposed and it is worthy of note from the perspective of a DMIC initiative. It is not included in Table 2, but RIICO has acquired land in the north of Neemrana to be used for a new development, the Ghilot industrial estate,[10] and some construction has begun. Meanwhile, two industrial estates have been constructed in the Alwar, administrative headquarters of the district, but they are small in size. One of them specializes in targeting the agricultural products processing industry and differs from the industrial estates along the NH8, which aim to attract foreign investment and medium-large scale industry.

As shown above, the development of industrial complexes in Alwar district began in the district's administrative headquarters Alwar, as part of the scheme for the development of underdeveloped regions. This enjoyed a certain amount of success with the establishment of six large scale industries such as Ashok Leyland; however it seems that the development of such complexes has now moved to the NH8 corridor, one of the main arterial highways.[11] Alwar sub-district is located far from the main hub of the nation and much of the industry located there is oriented towards raw materials such as agricultural produce and non-mineral natural resources etc., and not necessarily towards the NCR. Even though they are in the same district, industrial development differs substantially between the sub-district of Alwar and the sub-districts of Tijara & Behror.

Neemrana industrial estate

Below, the subject of analysis in this paper is the Neemrana industrial estate. Phase I (645 acres) of the industrial estate's development began in 1992 and EPIP (a 211 acre Export Promotion Industrial Park) was established in 2006, followed by Phase II (315 acres) and Phase III (1,166 acres) in 2007, successively extending the complex (Figure 5.) This makes a combined total of more than 2,000 acres there are no other industrial estates of comparable scale beyond Neemrana along the NH8 in the NCR. Consequently, it can be regarded as a large scale industrial complex positioned at the frontier of industrialization in the Delhi metropolitan area.

The land utilized for the industrial estate had originally been used as farmland, which was bought by RIICO from the farmers and then developed and sold. Development on the north side of the highway has been faster, where Phase I and II as well as EPIP are located. On the south side Phase III has become dedicated to Japanese businesses. As a result, Indian companies are located to the

Figure 5. Neemrana Industrial Estate
Source: Google earth (As of May 18, 2011)

north and Japanese companies to the south. The main items manufactured by the Indian companies include sanitary ware, beer, biscuits, spinners, motorcycles, rubber for use in automotives, electric motors, battery, glass and so forth.

In 2006, RIICO and JETRO negotiated a memorandum on Phase III and decided that it would be an industrial complex dedicated to Japanese businesses. JETRO's main role is publicity for and liaison with Japanese companies, with the actual trading contracts concluded between RIICO and the incoming companies. In addition to investment incentives from the state government, Japanese companies moving into the industrial complex can apply for a special incentive which reduces the Central Sales Tax (a tax imposed on trades that cross the state lines; hereafter referred to as CST) from the normal rate of 2% to 0.25%. Presumably these tax reduction measures were adopted to promote the location, on the assumption that Japanese companies moving into the area would have the bulk of their trades with customers in the NCT crossing the state line, rather than within the state. Furthermore, there are discounts available on the land to be used for plant construction depending on the area of the land acquired and initial investment amounts.

Ground water is used in the factories and it is free if companies use the pumps installed in the factories. However, the quantities to be pumped must be approved by the union government's Central Ground Water Board at the Ministry of Water Resources. Electricity is supplied by the state electricity board, but the supply is unstable with frequent power outage, so it is normal for factories to install generators of their own. A residential area (for staff) of detached dwellings was built in the north of Phase I but it is not sufficient to accommodate employees working in the factories. Therefore, development of new residential buildings for staff and workers is planned on the eastern edge of Phase III.

Characteristics of the Companies Operating in Phase III, Neemrana Industrial Estate Dedicated to Japanese Businesses

An outline of the incoming companies

Table 4 shows the status of the companies moving into Phase III of the Neemrana industrial estate (hereafter referred to as Neemrana III) as of August 2012. 42 companies have acquired building site, but only 18 of them have actually started production. It could be because the sale of these lots started only in 2007 and particularly based on the fact that, of the 20 companies that have acquired the site since 2011, 19 are still in the middle of construction or have not yet used the ground.

The characteristics of the operating companies can be summarized from the details of their businesses. There are 21 automotive-related companies, or half the total number of the companies in the complex. This corresponds to the fact that the main focus of industry along the NH8 in Haryana state is the automotive sector and can have a similar breakdown. If we look in detail, we can see that companies in rivalry with one another have started operations in the area at around the same time. For example there are four companies (3, 7, 12 & 14) that manufacture polypropylene compound, a raw material used in plastic moulded products, and they have set up operations in anticipation of increased demand from Japanese consumer electronics manufacturers moving into the NCR (Panasonic in Jhajjar state and Daikin at Neemrana) and from automobile manufacturers. There are also three companies (6, 11, 19) planning to produce air-bags and their deployment is based on forecasts that air-bag regulations will come into force in India from around 2013–2015. It is of note that facilities other than factories are being built such as hotels (4), logistics/warehousing (16, 28).

Looking at the sale price of industrial sites, the basic price was 2,000 rupees per 1 m^2 in 2011/2012. As mentioned previously, there is a discount program that depends on the area of land acquired and as a result, only two companies have actually incurred this basic price because the area of their sites was less than 10,000 m^2; otherwise, it is understood that the price paid has been reduced in accordance with the size of the ground. The maximum discount of 25% applies to the acquisition of more than 40,000 m^2 and the effective sales price over the two years has been 1,500–2,000 rupees. Note that there are companies who have actually acquired land for less than the sales prices shown in Table 4, due to an additional incentive program that allows refunds to companies in accordance with the amount of investment capital they provide. Thus it seems that the price of factory building sites is far cheaper here than elsewhere along the NH8 in the NCR, resulting in reductions in initial investment for incoming companies or larger space available than in other sites. Furthermore, in 2007 when sales of the lots started, the unit price, to the tune of 700 rupees, was less than half of today's price. Apparently the initial price gradually increased to today's level, which indicates that there were even more advantages to acquiring land at the beginning.

Table 4. Outline of incoming companies in Neemrana III (as of August 27, 2012)

S. N.	Company	Year of Allotment	Size of Land (m^2)	Rate (Rs.)	Products or Businee
1	Daikin Air-conditioning	2007	160,000	825	Air conditioner
2	Nissin Brake India	2007	121,410	713	Brake component
3	ACI Mitsui Advanced Composites	2007	60,705	728	P. P. compounds
4	Tenjiku Hotel	2007	12,000	970	Hotel
5	Imasen Manufacturing Inia	2007	40,000	825	Slide adjusters
6	Takata India	2008	60,000	926	Automotive safety components
7	Mitsui Chemical India	2008	74,750	862	P. P. Non-woven fabrics
8	TPR Auto Parts Manufacturing India	2008	30,000	880	Cylinder liner
9	I.I. Inspection & Export	2008	10,000	990	Readymade garments
10	Dainich Color India	2008	23,000	926	Plastic compound
11	Toyoda Gosei Minda India	2008	79,677	825	Automotive steering wheel, Air bag
12	Mytex Polymer India	2008	16,055	938	P. P. compounds
13	Unicharm (I) Hygienic	2008	77,870	975	Baby napkins & Sanitary napkins
14	Mitsubishi Chemical India	2008	46,945	809	P. P. compounds
15	Mikuni (India)	2008	30,353	1,019	Fuel supply system
16	Nippon Express (India)	2009	37,700	995	Logistics
17	Beltecno India	2009	10,519	1,164	Stainless steel water storage panel tank
18	Koukoku Intech India	2009	20,000	1,458	Automotive rubber parts
19	Ashimori Industry	2009	20,000	1,458	Seat belt, Safety gear bag
20	Takahata Seiko	2010	40,831	1,313	Automotive parts & Mold die
21	Nippon Pipe India	2010	102,370	1,313	Mechanical tube & parts for automobile
22	Nihon Parkerizing India	2010	51,520	1,500	Metal surface jobbing
23	Yushiro India	2011	21,056	1,690	Metal working oil & fluid
24	E H Precision India	2011	9,000	2,000	Auto tools
25	Allied JB Friction	2011	30,000	1,600	Automotive disc brakes pads
26	Oiles Self Lubricating Bearing Mfg.	2011	18,923	1,711	Seal bearings
27	Sumikin Bussan Steel Services Centre India	2011	20,000	1,700	Steel components
28	Toyota Kirloskar Motor	2011	48,564	1,500	Warehousing
29	Daido India	2011	20,000	1,666	Motorcycle chain and Rims
30	Y. Tech India	2011	54,768	1,500	Automotive parts
31	Tokai Rubber Industrial Hose	2011	60,000	1,500	Rubber hose
32	Tokai Rubber Auto Parts India	2011	39,330	1,510	Anti vibration rubber parts
33	Daiichi N Horizon Auto Comp	2012	21,844	1,690	Screw & Auto parts
34	Hitachi Chemical India	2012	23,660	1,670	Automotive components
35	Amapai Corporation India	2012	15,204	1,750	Assembly copper connection pipes
36	Nachi KG Technology India	2012	40,000	1,500	Ball bearing & Special bearing
37	NIDEC India	2012	121,410	1,500	Electric motor
38	TS Tech. Sun Rajasthan	2012	47,697	1,500	Seats of four wheelers
39	Koide India	2012	9,480	2,000	Moulds & Dies
40	Sanjo Forge India	2012	23,942	1,670	Forged product for automobiles
41	Sanden Vikas Precision Parts	2012	20,000	1,700	Automotive components
42	Oji India Packaging	2012	34,158	1,560	Corrugated boxes and Sheet

Note: Rate stands for rate of allotment (Rs. per m^2)
Source: RIICO Neemrana office

Table 5. Exploring processes and reasons for moving into Neemrana

S. N.	Year of production	Exploring process of the site for location	Reasons
A	2008	From Delhi, along NH8	Inexpensive land price, size of available site, JETRO's recommendation
B	2009	From Gurgaon, along NH8	Japanese dedicated industrial estate, inexpensive land price
C	2009	Within commutable area from Gurgaon	JETRO's recommendation, inexpensive land price
D	2009	From Gurgaon, along NH8	Rising land prices in Haryana
E	2010	From Gurgaon, along NH8	JETRO's recommendation, inexpensive land price
F	2010	From Gurgaon, along NH8	Inexpesnsive land price, JETRO's recommendation
G	2010	From Manesar, along NH8	JETRO's recommendation
H	2011	From Gurgaon, along NH8	Inexpensive land price
I	2011	In the vicity of their customer, Bawal	Inexpensive land price

Source: Based on the author's survey in 2011

A locational analysis of the companies in our survey

1) Reasons for moving into Neemrana In September 2011, the author visited nine plants that had located to the site and begun production there to make enquiries regarding the history behind the deployment, the trading situation and the labor force structure. Table 5 gives a summary of the reasons for moving into Neemrana by the nine plants (randomly classified A-I). Basically, a similar pattern was noticeable. Namely, as a result of exploring the site for industrial estate stretching away from Delhi, along the NH8, the companies have arrived at Neemrana. The companies surveyed had all assumed to move in the vicinity of Delhi and decided on Neemrana after industrial site prices and the size of available sites are compared between the candidates located on the way from Gurgaon district via Rewari district to Neemrana.

The final decision to move into Neemrana was based on the inexpensive land prices, or to put it another way, on the conclusion that land prices were rising in Haryana. There were also companies who had received help from JETRO. It seems that the intervention of this kind from a Japanese public organization bestowed a sense of security on companies that were wishing to move into unfamiliar territory.

Of special note is the existence of an organization called the Neemrana Liaison Committee in Neemrana III. This organization was said to be created spontaneously, originating from various conversations held between the companies who moved into the site in the early period. These days, a meeting is held once a month to exchange information and formulate requests to RIICO. All the companies covered in the survey belong to this organization.

2) Trading conditions Of the nine companies only one manufactures an end product, with the rest manufacturing components or raw materials. As a result, they deliver products to specific customers, who are located outside the state of Rajasthan (Table 6.) Those plants that produce automotive components deliver mainly to car/motorbike manufacturers or auto parts manufacturers located in the NCR, and are thus included in their procurement network.

When companies deliver to customers outside of the state as shown in this case, the previously mentioned CST tax reduction program provided by the Rajasthan state government acts in their favour and lowers the barriers of the state line. However, the tax benefit is limited to a 2 year period. For this reason, some companies, such as company D maintain a warehouse in Gurgaon to which components are shipped and then delivered to customers. This is called stock transfer and it is exempt from CST.

There is a high degree of dependency on imports in the procurement of raw materials, rather than those sourced locally in India, as indicated in Table 6. In many cases, the Indian operations of automotive component industries go through phases as follows:

i) The pass through phase for imported goods;
ii) Simple processing and assembly phase;
iii) Integrated production initiation phase;
iv) Mass production phase

In general, the companies located at Neemrana are newly established, so many operate at the phases ii) and iii), with little production, the main reason for the low rate of local procurement (hereafter referred to as 'local procurement rates').[12] Therefore it seems that local procurement rates will be higher if the scale of production continues to expand smoothly. For example, company B forecasts an increase in the number of local suppliers from 10 to 20 in one year; while company C is projecting a gradual increase in local procurement rates from 10% to 15%. However, on the other hand, company E responded that it is impossible to use locally-sourced materials in India from the perspective of safety and company C

Table 6. Procurement of the surveyed companies

S. N.	Customers' location	Procurement
A	Gautam Buddh Nagar, Gurgaon	Local procurement rate is only 2%. Having 12 vendors, half situated in the NCR
B	—	Local procurement rate is only 7%. Having 10 vendors, mostly situated in the NCR
C	Gurgaon, Gautam Buddh Nagar	Local procuement rate is about 10 %. Having several vendors in the NCR
D	n.a.(order production)	Having a few vendors in India.
E	Gautam Buddh Nagar, Gurgaon	Importing all materials from Japan and Thailand.
F	Gurgaon, Gautam Buddh Nagar	Local procuremnt is about 70% of car related material, 40% of two wheelers. Having 25 vendors in India.
G	Gautam Buddh Nagar etc.	All materials from outside India. Now looking for vendors in India.
H	Gurgaon	95% imported form Japan, 5% from Thailand
I	Rewari	100% imported from Japan

Source: the same as Table 4

foresaw that it would take some time to improve local procurement rates as few domestic products meet the standards required by their customers.

3) Labor force structure When Japanese companies set up a new plant in India, aside from Japanese expatriates, they first determine their head Indian manager (in many cases this is the person who acts as the factory floor manager) and the heads of accounting and human resources. The Indian responsible for human resources will then hold discussions with Japanese CEO and the Indian factory manager to decide human resources policy, under which other staff and workers will be employed. Virtually all the companies studied used similar hiring procedures. As there is an insufficient supply of staff to meet the demand at Neemrana, companies have no option but to source employees from Haryana state, where industrialization is more advanced in districts such as Gurgaon and Rewari.[13] It is generally accepted that when hiring them, recruitment will not be successful unless wages higher than previously paid are offered, typically at a premium of 10–20%. It is common for the new hires to commute to Neemrana, rather than move there, in consideration of the issues of housing supply and educational environment for their children. In such cases, the daily long-distance commute put a considerable burden on them leading to a certain number of people quitting within a relatively short period of time and transferring back to other companies that are close to their home. Simply put, it seems that the companies located at Neemrana are at a relative disadvantage when it comes to securing staff. Consequently the need for a housing supply to allow people to live and work in close proximity has been recognized. Around half of the factory staff are single people in their 20s; a fact that reflects the current situation.

The companies surveyed hire workers primarily from the states of Rajasthan and Haryana, and we noticed two

Table 7. Employment structure

	Number of employees			Wages of regular worker
	Staff	Worker (regular)	Worker (temporal)	
A	54	84	40	8,000
B	163	310	137	12,000–15,000
C	83	331	34	5,200
D	20	40		8,000–10,000
E	20	50		6,000
F	60	60	130	10,000
G	25	61	42	n.a.
H	15	15	7	8,000
I	9	30		4,500

Source: the same as Table 4

policies at work (Table 7.) One involves recruiting from an extensive area outside the commuter belt, and the other is to recruit from within the commuter belt. Companies D, G and I are examples of the former, where the aim is to prevent worker organization and labor disputes by recruiting employees from a wide variety of home towns.[14] In fact, in recent years labor problems have become more conspicuous in Gurgaon district, an area advanced in industrialization, and the companies in our survey showed great interest in this issue. At the present time the Neemrana area has not suffered from any labor disputes, however it seems to be their intention to minimize the risks in advance, as the future situation is uncertain. Within our survey sample, there were companies that refuse to employ people with previous work experience in factories in Haryana, whereas Companies D and I recruit people mainly from agricultural villages. There is a relatively large supply of apartments for workers at Behror in the center of the sub-district, and consequently people from the state of Rajasthan rent rooms there and commute by company bus. Company G employs people from Haryana and other states and it has dormitories in Bawal,

with company buses running to the factory.

Companies A, F and H use the other employment policy of recruiting workers within the commuter belt. This is based on the concept that employing workers from the immediate vicinity is not a problem as long as the company has a good relationship with workers and strict labor management. These companies take into consideration the contribution to the local community and workers' convenience of living conditions. Factories that mainly employ workers from the local area also use company buses, with their employees mainly living close to the bus routes. From Table 7 alone, we can see a huge disparity between factories in the wages paid to workers (monthly figures). However, no simple comparisons can be drawn; in the first place, there are differences in skills and education, then some factories have included trainees in the category of regular workers, and there were also different interpretations of the questions that generate a mixture of responses from some companies indicating the overall cost to the company and others showing the actual wages paid to workers. Company B divides its regular workers into operators and trainees, requiring the former the ability to read and write in English. The figures shown in the table reflect the wages paid to operators. In company G, the workers called operators consist mainly of educated women with a diploma. As there is no union associated with this class of workers, the wages paid are not published, however we estimate their wages to be of the same level as those paid at company H which operates in the same industry and similarly requires employees to hold a diploma. On the other hand, all of the workers at company I are trainees, and their wages are low. At the time of our survey, the prevailing rate at Neemrana for contracted workers was 4,000–4,5000 rupees, and it was 4,500–5,500 rupee range for trainees. The difference in the amounts paid to regular workers appears to vary between companies.[15] Wages paid to contracted workers and trainees are largely set at the level of the state minimum wage. In Neemrana the figures are closer to 4,644 rupees paid in Haryana state than 3,510 rupees paid in the state of Rajasthan. From this, we can conclude that the wages paid to regular workers are of the same level as those paid in Haryana state.

Conclusion

This paper was contributed with the aim of clarifying conditions on the front line of industrialization in the NCR of Delhi, in light of the industrialization spreading out from the districts around the capital city Delhi and extending even further afield in recent years. Initially, having described the development of India's arterial highways, we looked at how the automotive industries concentrated in the NCR have been extending their sites. Next we discussed trends in Alwar district in the state of Rajasthan, where industrial development enabled by RIICO primarily has taken place on the NH8 corridor, one of the country's arterial highways. We also conducted local field surveys to allow us to extract the characteristics of companies located at Neemrana III, which has been developed specifically for Japanese businesses in Alwar district. Various points have become clear as a result of the deliberations of this paper, as listed below.

1. The progress in the industrialization of Alwar district owes to its advantageous location. Alwar is the only district in the state of Rajasthan that lies within the NCR and is intersected by the arterial highways that link Delhi and Mumbai. Moreover, the increase in the development of industrial estates in the 2000s and the sheer size of the area's potential supply have both contributed to the growth in Alwar's new industrial sites.

2. The land price of industrial grounds in Neemrana industrial estate, the object of this study, is the most inexpensive of any along the NH8 corridor in the NCR. Companies moving into the complex appreciate the price of the land, at half the price in Haryana state and the availability of good sized lots. Furthermore, the intervention of the Japanese public organization JETRO tends to encourage utilization of the site.

3. The companies in our survey have customers primarily located in the NCR and hence are included in their component/material procurement network. From the perspective of such trading environment, Neemrana can be seen as a further extension of the NCR's manufacturing hub. However, the companies surveyed procure materials/components exclusively from imports, with local affiliations being scarce.

4. The state minimum wage in Rajasthan is the lowest in the NCR, but the companies located at Neemrana pay their workers more than that. Managerial staff are paid more than salaries paid in Haryana state, and workers are paid at similar rates as those in Haryana. We can therefore conclude that the labor costs in Neemrana are in line with Haryana or the NCR, not with Rajasthan.

5. In the discussions in Chapter II, the acquisition cost of industrial land and labor costs were introduced as factors influencing the spread of NCR industrial locations further afield. However, our analysis in Chapter IV shows that while land costs are indeed a major factor, the same cannot be said of labor costs.

6. At Neemrana III, the Neemrana Liaison Committee functions well and expansion can be seen in services industries aimed at Japanese companies, such as hotels, restaurants, and logistics. Such services are beneficial to the Japanese businesses located in the area, making the industrial complex's status all the more advantageous.

We hope that the deliberations of this paper have somewhat clarified conditions on the front line of industrialization in the NCR. On this occasion, we targeted an industrial complex designed for the exclusive use of Japanese companies and we cannot discount the possibility that the characteristics attributable to a group that originates from a specific country are reflected herein. A study of local Indian companies is needed for comparison and we hope that this will be our next challenge.

Note

1. Okahashi & Tomozawa (1997) examined developments in the Madhya Pradesh Industrial Growth Center, focusing on rates of completed land sales and pointing out regional differences therein.
2. Highway construction has been developed by extending traditional national routes. This applies to the NH8 for Delhi-Mumbai; the NH2 for Delhi-Kolkata; the NH4 for Mumbai-Chennai and the NH5 for Kolkata-Chennai. Note that some sections of these highways use other national roads in part. Also, progress is underway on the north-south, east-west corridors as well as the Golden Quadrilateral.
3. IMT stands for Industrial Model Township. In Haryana state this has been achieved in the form of a large scale business park that includes not only industry, but also serves as a residential and commercial hub.
4. The factory was originally meant to produce passenger cars, but at the time of writing it was only producing automotive components.
5. At the time of its predecessor, Hero Honda, in the first half of the 2000's, the company acquired land at Neemrana industrial complex with a view to constructing a third factory on the site; however, priority was given to the construction of a factory at Haridwar in Uttarakhand state due to the significant incentives offered there. In June 2012, the company constructed a plant for its motorbike division at Neemrana industrial estate, and it announced the construction of a global components center in July.
6. In India, the price of industrial land developed by state industrial complex development corporations, generally refers to the cost of a 99 year lease. And even though it is called a lease, in fact it is for one-off lump sum payment.
7. Taken from the Alwar district website (http://alwar.nic.in/)
8. Taken from the MSME-Development Institute's (Ministry of Micro & Medium Enterprise) - Brief Industrial Profile of Alwar District (http://www.msmedijaipur.gov.in/district_report_ebglish.htm)
9. 1 acre = approx. 0.4 ha, so this refers to industrial complex with an areas of approximately 40 ha or more.
10. Development began in 2011. It is about 7 km from NH8. It is classed as a large scale development with an area of 1,961.6 acres.
11. Looking at the state as a whole, the NH8 corridor is important for RIICO in terms of location for industrial development. There are 307 industrial estates throughout the whole state, with 96 of them located along the NH8 corridor.
12. A comprehensive economic partnership agreement came into effect between Japan and India in August 2011, but none of the companies surveyed have benefited from the program's tariff reduction/elimination.
13. The Neemrana Liaison Committee has a gentleman's agreement on the poaching of staff and consequently new companies on the Phase III are not expected to head hunt staff from the more established companies.
14. It is thought that if you employ workers who live in close proximity to the factory, the group power of the workers increases and so unions are easily established, with more disputes likely to occur. An additional consideration is the matter of problems involving relatives and indigenous people.
15. From a meeting with RIICO.

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