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Patricia Yee
INTS Thesis
December 12, 2012

What Drives Shanghai



By: Patricia Yee

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Supervised by: Xiangming Chen

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Abstract

China has overcome some of the most difficult obstacles throughout the centuries, ranging from the Opium War of 1839, to finally being accepted into the World Trade Organization. Despite these difficulties in its past, China has managed to become the world's largest auto manufacturing country in under four decades, and exceeded other countries that have been producing for over a century. China's overall economy has benefited from the automobile industry in terms of raising its GDP and creating employment, but it has also caused other changes as well. Cars have become the center of attention, and many metropolitan cities have begun to revolve around the production of cars, making substantial changes in infrastructure and lifestyles to compensate for this relatively new luxury good. Using Shanghai, China's largest city, I will show just how large of an impact automobiles have made on this city over a multitude of different aspects. This thesis will give a macro overview of the auto industry in China, look specifically at Shanghai's as a production city, and move on the impact of rapid car growth and its results.

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Chapter 1 **Introduction**

The five countries largest economies in the world are the United States, China, Japan, Germany and France respectively, by nominal GDP and purchasing power. But among these five, there is one country that stands out from the rest in terms of speed and success of its rising economy, and that country is China. China's rise to the world's second largest economy was one that took time and hard work from the entire nation. One of the strongest regions that have contributed to China's growth is none other than its largest city, Shanghai. Shanghai serves as China's financial and commercial center, and some even consider this metropolitan city as an emerging global headquarters of growth and innovation.

The automobile sector also has made significant contributions to China's economic growth and urban transformation, and it is my goal to use Shanghai as evidence of how influential the automobile can be to a city. First, I will show the macro overview of the auto industry in China, then look specifically at Shanghai as a production city, moving on to the impact of rapid car growth on urban life. There are both benefits and harms of the auto industry, and while the Chinese government wants to promote employment and GDP growth that the auto industry brings, there is this dilemma of cars having a negative spatial and social impact on cities, raising the question of how to balance between the auto sector as a growth producer vs. its undesirable consequences for urban life.

The automobile sector has boomed due to foreign investments, joint ventures, and entrance into the WTO. Shanghai's urban infrastructure has experienced many changes as well in terms of building more roads and making

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building adjustments in order to compensate for the increase of vehicles. Finally,
from personal experience, there has been a change in culture and attitudes from the
residents of Shanghai due to cars.

Chapter 2

A Short History of China's Auto Industry

With its accelerating growth in economic power, coupled with high hopes in domestic and export markets, many have turned to China as a place for global automotive industry. The development of industries within China has been significant, and the automobile industry is no exception. As recently as 1975, production of passenger car within China was non-existent. The Chinese automobile industry is still surprisingly young, but has been making significant strides in production and has seen a large increase in interest levels from its residents. Throughout the recent decades, China's government has concentrated much of its attention on its automotive market. The automobile industry is one of the key sectors that drive the growth of China's entire economy. This also includes driving a wide spectrum of basic and service-related sectors such as machinery, automotive repair services, auto financing, etc. In order to investigate Shanghai's automobile industry, we must first examine the establishment and growth of the automobile industry within China as a whole, and then take a closer look at the auto sector's specific and significant impact on local life in the Shanghai context.

The Communist Party of China was established in 1949. Prior to its establishment, China had recently undergone some difficult wartime, including World War II and the civil war within China between the Communists and the KMT Party. During this time, a small and selective group utilized cars, and they consisted mostly of high-ranking officials (Holweg p. 7). With all these events taking place, the establishment of an automobile industry did not seem likely, but with goals and

ambition to emulate the West, China forced itself back on its feet to make sweeping improvements for its country during a critical time period.

Between 1950-1960 the USSR, China's primary ally, helped China form significant projects to get its economy back up and running. Of these major projects was the First Automobile Works (FAW). This was China's first step into the automobile world, and it has been growing ever since. FAW was established in 1953 in Changchun, Jilin Province (Holweg p. 9). In addition to the aid the USSR was providing, in 1958 China experienced an overall increase in steel output. "In 1957, the output of steel in China was roughly 5,350,000 tons. The Central Committee aimed to double the output of steel to 10,700,000 tons in 1958," (Xie and Oliver). Help from the USSR and the increase in steel production set the basis for China's automobile industry, and improved its economy significantly during this time frame. Economic improvements focused on "major industrial products such as steel, metallurgy equipment, power generators, and machine tools," all of which are used in the production of automobiles (Holweg p. 9).

In 1965, China entered the Vietnam War where they supported North Vietnam against the United States. "As part of the war effort, China set up a series of heavy and medium truck plants," (Holweg p. 11). Despite the tragedies of war, this improved the basis for China's automobile industry. China began to fully utilize its own resources without help from the USSR. The Chinese were now designing, manufacturing and running new automotive plants on their own, which led to the development of the Second Automobile Works, generally referred to as Dongfeng.

During the 1970s China was experiencing several significant changes in its political sector. In 1971, China re-joined the United Nations, leading to China-United States relationship to become normalized in 1978 after the Vietnam War with the help of U.S. President Nixon (Holweg p. 11). This normalization was enhanced with the death of Chairman Mao Zedong, and the placement of Deng Xiaoping as the *de facto* leader as well. Due to these political changes, this shifted China's focus from political to economical issues. As Holweg puts it, "'Developing Productive Power' rather than 'Class Struggle' became the predominant concern", (Holweg p. 11). China transitioned from a position where it had focused on a planned economy to instead a market economy, and due to this change, the automobile industry saw new growth and entered a proliferation stage. This stage was important because it generated an increase in various types of automobile products as well as increase in pure volume of production.

As previously stated, automobiles were predominantly used for either warfare, or for senior officials of great importance. But with industry growth primarily driven by rising domestic demand that originated from rising incomes and a growing middle class, private ownership of automobiles became more popular. China experienced a surge in manufacturing facilities, which aided its growth in economical strength (Schifferes). In 1979, a total of 55 automobile factories existed, and by 1985 the amount of factories more than doubled in six short years, totally the amount of factories to 114 (Holweg p. 12). But because of this explosion of auto companies, these small and abundant companies could not achieve economies of scale, the caliber of human resources necessary to become truly successful.

Therefore, the original automobile manufacturing facilities, such as the FAW and Dongfeng, became successful because they did have the ability to produce high quality and diversified products that were necessary for the growing automobile market.

In February 1994, China made even further strides to enhance its automobile industry with the *Automotive Industry Policy*. After this policy was created and submitted by the State Planning Commission, the State Economy, the Minister of Machinery Industry, and the Trade Commission, the State Council approved of this Policy. The Policy itself had three specific goals: (1) To replace small-scale manufactures with large-scale automobile producers; (2) to generate and improve automotive product development and capabilities; and (3) to promote individual car ownership (Holweg p. 15).

In addition to establishing policies such as the *Automotive Industry Policy*, China has also initiated significant actions as well, in order to improve its economical standing internationally, and its automobile industry as a result. China's improving relationship with the West throughout the past several decades from a financial and economical standpoint can be seen with its accession into the World Trade Organization (WTO) in November of 2001. Trade ministers from all around world unanimously approved China's entrance after 15 years of negotiations, and with this agreement, added a market of 1.3 billion people into the global trading system. This was a significant historical event for the once-isolated communist country, giving the WTO high hopes. "China already has a major influence in world

trade. Its participation in the WTO will be a boost for us and them,” said Robert Zoellick, U.S. trade Representative (CNN).

Prior to entering the WTO, China’s automobile market was controlled by content requirements, protected by high tariffs, and the government decided the prices of automobiles. But after joining the WTO, conditions changed to include tariff reduction as well as open market and industrial policies. Due to open market policies, China felt the growing pressure of quickly developing markets in addition to the increasing presence of foreign companies, which forced China to develop multiple large-scale, competitive automobile manufacturing facilities (Gao).

The following table shows the differences in statistics for China’s automobile industry during the pre/post WTO periods:

Table 1: Tariffs, China’s Pre/Post Entrance into the WTO

	Prior to entering WTO	Post entering WTO
Tariffs	200% in 1980s 80-100% in 1990s	25% by 2006
Import Quotas	30 thousand vehicles/year allowed from foreign	Quota increased by 20%/year phased out by 2006
Foreign Participation in Sales and Distribution	Limited to wholesaling through joint ventures; prohibited from consolidating sales organizations of imports, joint ventures	2006, allowed to won vehicle wholesale, retail organizations, integrated sales organizations

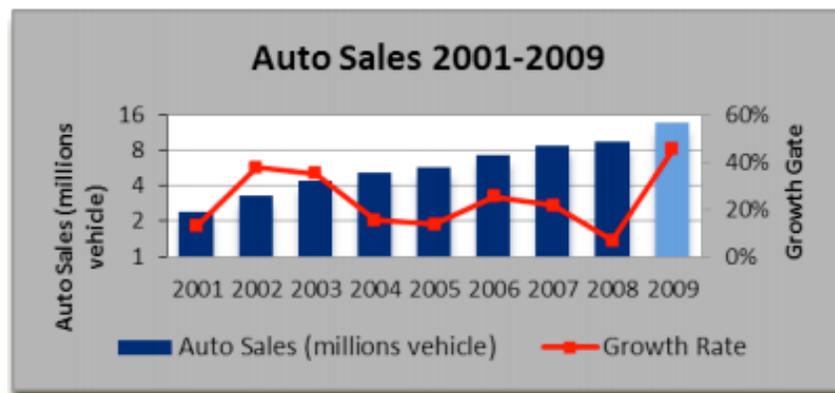
Figure 1:
 (Gao)

After entering the WTO, China experienced an incredible surge of automotive activity. Overall automobile production in 2002 increased by 38.8%, and pushed China to “become the fourth largest automobile production and the third largest auto market in the world,” (Holweg p. 15). In addition to foreign automobile

markets after joining the WTO there was also an increase in domestic companies.

This resulted in manufacturing facilities competed aggressively against one another.

With competition, came success for this country. In 2010, China achieved the title of the world's largest automobile producer and market with annual sales of almost 14 million vehicles. This was largely due to the fact that in 2009, China's per capita private car ownership rose to 4.78%. While this percentage does not sound all too impressive and is significantly less than the 40% average in developed countries, it must be kept in mind that China's population is much greater as well. By September 2010, China's automobile sales reached a whopping 13.08 million units, an increase of 36.1% from the previous year (APCO). According to predications made by the China Association of Automobile Manufactures (CAAM), growth in the automobile industry will continue to strengthen until 2020, and will have annual growth of 13%-15% (APCO).



Source: China Association of Automotive Manufacturers (CAAM)

Figure 2:

This chart shows the growth rate and total auto sales in China's auto sales from 2001-2009 (CAAM)

Through wartime, government changes, policy establishments, and entrance into the World Trade Organization, China's history of its automobile industry is impressive. Now, with the understanding and background of China's establishment of its automobile industry, it is time to look at, Shanghai specifically and then to its auto industry.

Chapter 3 Overview of Shanghai

Shanghai is situated on the western coast of the Pacific Ocean and at the central section of the north-south coastline of China. This growing city is constantly bustling with excitement, and is considered one of the major trading ports and gateways to inland China ever since the First Opium War in 1839. Despite the tragedies of this war, it forced Shanghai to open up to the West, and initiate foreign trade. The permanent resident population in Shanghai has surged to a whopping 23 million by the end of 2011, and there are predictions that this rising increasing is not expected to slow (Statistical Yearbook 2011). Many expect the number has the potential to reach 30 million by the end of 2020, which would only help China maintain it's standing as the most populated country in the world.

This energetic city is constantly moving and changing. Since 1949, there have been multiple efforts at administration readjustments, so that by the end of 2001, Shanghai consisted of one county with 18 different districts within it (Yang, p. 3). Popular districts include Minhang, Changning, Yangpu, Hongkou, Pudong, etc. With an urban area of 3,924.24 square kilometers and rural area of 2,416.26, Shanghai is fairly large, and has utilized the space well.



Figure 3:
Map of Shanghai and its districts
(Google Images)

Chapter 4 **Shanghai's Economy and Success**

The economic evolution of Shanghai has been an impressive one to say the least. As mentioned earlier, Shanghai is China's largest city, and is one of the major socioeconomic centers of the world. During the early 1990's, China's central government made the decision to speed up the development of Shanghai into a "world economic, financial and trade center, and to increase the economic development of the entire Yangtze River region where the city is located," (Yang, p. 4). The outcome of this move has been positive as can be seen since the city has achieved extraordinary economic growth since then. In addition, the opening and constant development of Pudong, just one of the 18 districts, has helped push Shanghai to "the forefront of the whole national economic reform movement (Yang, p. 4)". Pudong was the key to Shanghai's takeoff in the early 1990's and is also the location of where General Motors Co. established their largest factory with Shanghai Automotive Industry Corporation (SAIC) that will be further discussed.

In the 1990's, Shanghai experienced its fastest economic development in history with its GDP exceeded 12%. In latter part of 2008, the United States faced one of its worst financial crises in history, and caused a detrimental economic ripple effect to the rest of the world. Despite these setbacks, China's gross domestic product grew 9.2% in 2009, and an impressive 10.3% in 2010². Also during this time, Japan's economy shrank in 2010, which further helped China success and allowed for it to become the second largest economy; coincidentally China also became the largest auto market in the world in 2010, (Chen). These statistics

cannot be ignored and have increased China's overall strength and standing within the foreign market sector.

There are a multitude of reasons why Shanghai's economy has improved as rapidly as it has. One of these key reasons is its economy is much more open to foreign interaction than it has been in the past. Since 2001, Shanghai has approved of over 25,000 foreign-invested businesses, and participates with over 80 countries with foreign direct investments (Yang, p. 5). China's overall symbiotic relationships with various countries have strengthened the country as a whole through business practices and sharing of ideas and innovation.

Another essential factor for why Shanghai's economy is so strong is its diversification. There are several key industry networks that make up this metropolitan region and it includes: (1) Communication electronics, and information manufacturing, (2) Automobile manufacturing, (3) finance, insurance, and real estate, (4) biomedicine, (5) iron and steel manufacturing, etc. (Yang, p. 5). The automobile industry is one of the most fascinating of them all due to its historical development, contribution to Shanghai's economy, and how it has changed this city from both a urban and cultural stand point.

Chapter 5 **Shanghai's Automobile Industry**

Foreign Investments and Joint Ventures:

Due to economical and industrial improvements, China drew a great deal of attention from foreign investors. Unlike other auto manufacturing countries such as Korea or Japan, China's automotive industry has significantly developed due to foreign direct investment (Tang, p. 1). Countries were inclined to invest in China's existing manufacturers in order to expand their facilities and production levels. These investments come in the form of alliances, as well as joint ventures between international automobile manufacturers and domestic state-owned enterprises.

Without the aid of foreign investments and joint ventures, China's automobile industry would not as big of a powerhouse as it is today. When the central government of China made the decision to open its domestic automobile market to international companies, they were faced with a problem. Opening its market to foreign competition meant that domestic manufactures would most likely not be able to compete with the "more sophisticated and experienced foreign rival," (Tang, p. 12). To alleviate this issue, the Chinese government prefers joint ventures, because this allows foreign automakers to participate in the Chinese market with no more than 50% of control over the company. In addition, joint ventures also promote and improve technology transfers and increase growth in the automobile industry (Tang, p. 13).

Foreign countries were also inclined to create joint ventures with Chinese state-owned enterprises due to how inexpensive production is compared to more

developed countries. Internationally, automobile manufactures dealing with decreasing margins and profitability have looked for alternative and more affordable supply chain solutions, and found that China has a potential source for lower cost automotive components. In addition, “China’s inexpensive labor force presents an attractive option for producing lower-cost automotive components,” (APCO).

As previously stated, China’s government issued high tariffs to automobile manufacturing companies, but lowered them after their entrance into the WTO. For this reason, foreign automotive manufactures have been encouraged by lower tariffs; another reason for why foreign investments volumes have increased. Therefore, with foreign investments, joint ventures, and the inexpensive production characteristic China has to offer, the automotive industry’s basis became stronger for future growth. Presently, nearly every major global vehicle manufacturer has established joint venture operations in China.

Shanghai’s Auto Industry- SAIC

After understanding the history and development of the automobile industry throughout China, it is time to hone in on the city of Shanghai. Looking at its extensive industrial history, it’s no mystery why Shanghai was and remains as one of China’s leading regions for automobile manufacturing and why foreign investments were aimed specifically at Shanghai. Due to Shanghai’s convenient geographic location, this city was ideal for deep-sea logistics to import, and eventually export, from China. Its location, along with China’s overall increase in car manufacturing abilities, made this city an ideal area to establish auto companies.

Shanghai is home to one of the most successful automakers China has ever seen: Shanghai Automotive Industry Corporation (SAIC). SAIC's original establishment dates back to the 1960s, when it manufactured cars only on a modest scale and did not experience much success until the mid 1980s (National Research Council). Despite its early and slow progression, SAIC has made strives to attain its current standing. SAIC is currently one of the top three auto groups in China, along with FAW and Dongfeng. It was also one of the first automobile manufacturing companies within China. "SAIC is mainly engaged in the manufacturing, sales and research and development for passenger cars, commercial vehicles and auto components" (APCO). In 2009, SAIC sold over 2.7 million vehicles alone, which made up about 20% of China's overall auto market. In the same year, SAIC was ranked 223 of the Fortune 500 companies with consolidated revenue of \$33.6 billion. Today, SAIC's ranking has dropped slightly to #245, still a respected standing nonetheless (www.money.cnn.com). SAIC success story continues with international company expansions. SAIC now has branches in the USA, Europe, Hong Kong, Japan and Korea.

Shanghai has and continues to be one of the powerhouses for automobile manufacturing. It is clear that SAIC is a well-established and successful company, but it owes much of its success to joint ventures with foreign countries. Shanghai's SAIC has two successful joint ventures with foreign auto companies; one with Volkswagen and the other with General Motors.

Top 10 Passenger Vehicle Manufacturers In China (2009)					
Rank	Company	HQ	JV Partner	Sales (Unit)	Market Share
1	SAIC ¹	Shanghai	GM, VW	2,705.5K	19.83%
2	FAW ²	Changchun	VW, Toyota, Mazda	1,944.6K	14.25%
3	Dongfeng	Wuhan	PSA, Nissan, Honda	1,897.7K	13.91%
4	Chana (incl. Hafei)	Chongqing	Ford, Mazda, Suzuki	1,869.8K	13.70%
5	Beijing Auto	Beijing	Hyundai Daimler	1,243.0K	9.11%
6	Guangzhou Auto	Guangzhou	Honda, Toyota, Isuzu, Fiat	606.6K	4.45%
7	Chery	Hefei	N/A	500.3K	3.67%
8	BYD	Shenzhen	N/A	448.4K	3.29%
9	Brilliance	Shenyang	BMW, Toyota	348.3K	2.55%
10	Geely	Taizhou	N/A	329.1K	2.41%
	Others			1,750K	12.84%

Source: CAAM

Figure 4:
 List of the top 10 passenger vehicle manufactures in China as of 2009
 (CAAM)

Shanghai- Volkswagen

With the help of foreign investments, joint ventures, and the development of more private capital, SAIC experienced an overall growth in production capacity. In 1984, SAIC teamed up with Volkswagen creating Shanghai Volkswagen Automotive Corporation (SVW) and was SAIC's first joint venture, which was the largest China-Western JV at the time (Pujol, Elisenda p. 4). Volkswagen is an auto company that was established in 1937 during the Nazi dictatorship in Germany. In 2008, Volkswagen became the third largest automaker in the world and continues to hold that position presently. "Organizationally, Volkswagen Group consists of two divisions: the automotive division and the financial services division, both of which has seen incredible success" (Pujol p. 2).

SVW's initial joint venture of 1985 was a 25-year contract that partnered these two companies to make passenger vehicles within Shanghai. This also led to the establishments of several engine-manufacturing plants within the city as well. With roots in Shanghai, Volkswagen saw that its investments put them in a competitive position in the Asian automobile market. "Volkswagen aimed to achieve this objective (of having a significant standing in the Asian market) by gaining a low-cost manufacturing site for automobile to be sold in Asia and for components to be incorporated in products manufactured outside Asia," (Pujol p. 5).

Through this joint venture, a symbiotic relationship was formed. On one side, Shanghai provided their capital, land, labor, facilities, and energy to Volkswagen, in exchange for Volkswagen's commitment in designing and manufacturing technology, as well as their insights on production process and management skills (Pujol p. 6). In addition, this joint venture was shared equally with Chinese shareholders owning 50% of the interest with Volkswagen's German shareholders owning the other half.

Volkswagen's Shanghai automobile plant is best known for its production of taxis. For approximately 20 years after their joint venture agreement, SVW had a near monopoly in taxi within China sales, which allowed the company to sell large quantities of vehicles, and attain economies of scale during this period (Pujol p. 5). In addition, SVW announced in 2010 that it would develop a fifth assembly plant in Jiangsu province. This plant is planned to have a production capacity of 300,000 vehicles/year, and will begin operation by the end of 2012 (APCO). But it is recent statistics that show just how well this joint venture has panned out; In November

2011, SVW announced that it manufactured and sold over one million vehicles between the months of January and November 2011. This amount represents an increase of 13.7% from 2010's data and is a new record for SVW. The joint venture also set a new monthly record for auto-parts sales, selling over 110,00 parts in November as well (www.chinadaily.com). Due to the overwhelming amount of success, in April of 2002, SAIC and Volkswagen signed a new contract that extended the original agreement of this joint venture to 2030.

Shanghai- GM

Looking at the success in participating in a joint venture with Volkswagen, SAIC decided to continue this process with other foreign car companies as well. This introduces General Motors (GM). General Motors (GM) is an American car company out of Detroit, Michigan and was founded in 1906. Throughout the years, GM has been overall profitable through its designs, manufactures, and marketing of automobiles worldwide (General Motors).

In 1997, GM proposed, "an automotive joint venture, a joint venture technical center, and several other projects in and around the city of Shanghai", to SAIC in order to ensure that GM attains a major presence in China's expanding auto industry (Holweg, p. 23). At the time, GM was competing with Ford and Toyota to get the agreement from SAIC to become their second Original Equipment Manufacturer (OEM) partner. Nonetheless, GM was able to beat out its competitors and SAIC agreed to all these proposals with hopes and goals in mind (General Motors). This 50-50 joint venture between SAIC and GM (now called Shanghai GM or SGM) focuses on the manufacture of passenger vehicles. Overall, joint ventures were typically

concentrated in passenger vehicles due to the “strategic significance of the sector and the fact that knowledge of truck production was already relatively advanced,” (Holweg, p. 24).

Like SVW, SGM has turned out to be yet another successful joint venture for SAIC. GM has become one of the most dominant foreign auto company in China, through its joint venture with SAIC, and in return, GM has helped further promote SAIC into a full-fledged auto maker, fully equipped with top-tier designers, engineers and marketers (Terlep). Currently, Shanghai’s SAIC is China's largest automaker overall, while GM is the country’s largest foreign player. Just last year SGM sold 2.5 million vehicles in China, which more than what GM was able to sell in the United States.

SGM 1%

As mentioned previously, SGM initial agreement established a 50-50 alliance between SAIC and GM, but in 2009, this equality became unbalanced. Due to the United States’ financial crisis and economical recession, GM (like so many other companies) took a significant financial hit and was forced to seek bankruptcy protection (Terlep). In order to provide SAIC with confidence and in exchange for cash loans of up to \$5 million, GM agreed to give SAIC majority control of this joint venture, changing the ownership percentages to SAIC with 51% and GM with 49% (Terlep). SAIC said in a statement that the company and GM "have established a good and enduring relationship based on a foundation of mutual benefit. There is mutual trust and mutual support on both sides, and it is a model for successful cooperation in China and even the world," (Terlep). This imbalance of ownership

shows just how powerful Shanghai has become in the international auto industry.

In recognition of SAIC's success coupled with the importance of the Chinese market, in 2009 GM relocated their headquarters for all its international operations to Shanghai. SGM's future continues to look bright as they move their marketing focus onto other foreign countries, with particular interest in India.

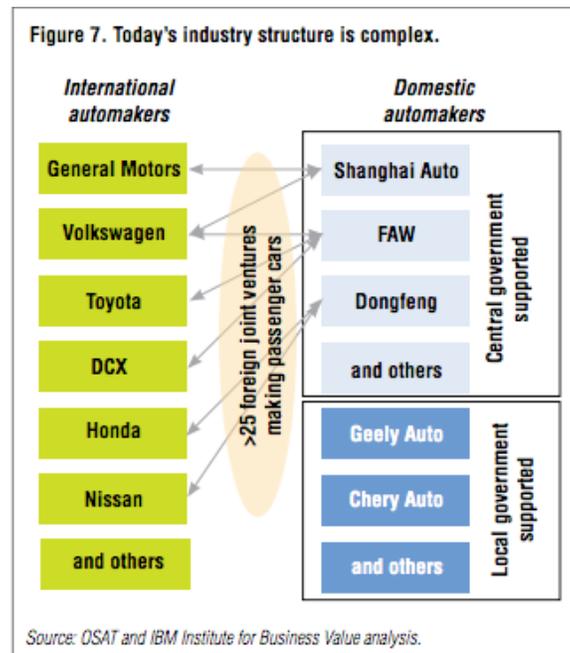


Figure 5:

This image shows the different connections between foreign and domestic car industries within China. SAIC leads the charge for Chinese domestic companies, having strong ties with GM and Volkswagen through their joint ventures
(OSAT and IBM Institute for Business Value Analysis)

Chapter 6

Impact of Cars: Traffic Congestion and Road Expansion

Throughout the decades, the growth rate of motor vehicles in Chinese cities has mirrored China's rate of economic growth. The need to develop and expand auto production is largely due to the increase in popularity of automobiles within China. China has exceeded the United States and has established itself as the world's largest car market in 2010, as automobile sales increased by a whopping 46% from the previous year. As its economy continues to grow and becomes wealthier and wealthier, Shanghai is home to a large population of citizens who have grown to become more and more affluent. There is no doubt that the Shanghaies have displayed a growing interest for the private automobile ownership. Shanghai's rapid motor vehicle growth increases, and with it, problems of urban layout and affects on everyday life.

Private Car Ownership:

The countrywide growth in private car ownership as increased significantly, but varies in amounts from city to city. For example, comparing the two largest cities in China; In 2004 Shanghai and Beijing each had about 2 million private cars each in, but by 2010, the total amount of private auto ownership was just over 3.1 million in Shanghai, while Beijing's amount was 4.8 million (Zhongshang Data, 2011). Despite Beijing's number exceeding that of Shanghai's, it is clear that it did not take long for both cities' private car ownership to increase drastically.

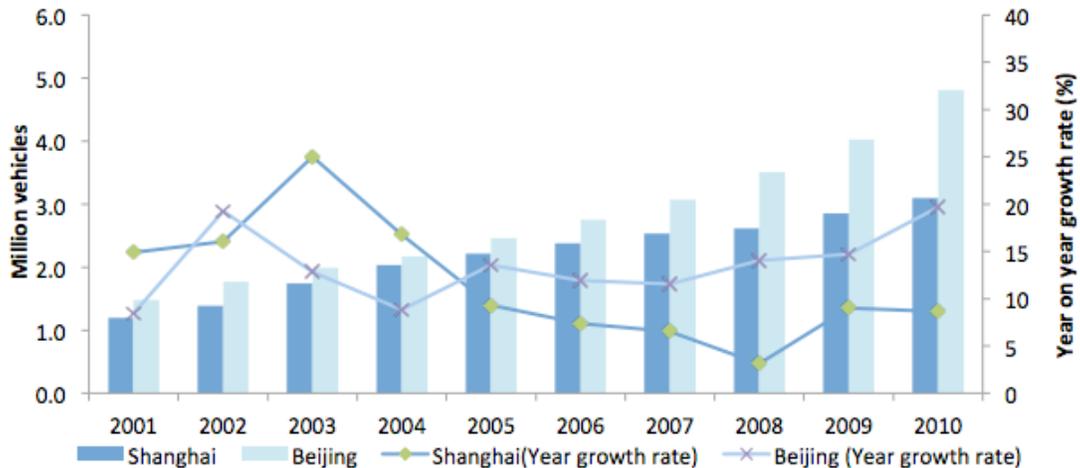


Figure 6:

This graph represents the total private passenger auto ownership as well as the annual growth rate in Shanghai (Shanghai Statistics Bureau, 2011) and Beijing (Beijing Statistics Bureau from 2001-2010 Chen, T. and J. Zhao)

According to a survey done by the Shanghai Municipal Statistics Bureau, the income of Shanghai residents in 2011 almost double from that of the previous five years. This coupled with China’s overall increasing disposable income, has increased overall wealth and therefore spending by the Chinese, and the city of Shanghai is leading the pack (Dong). During the past five years, private car ownership more than tripled for families in downtown Shanghai, and it has been found that of every 100 Shanghai families, 18 of them own a private car. The survey also investigated the changes and measurements of the quality of life in Shanghai between 2007-2011. It was found that “per-capita disposable income among downtown residents reached 36,230 ¥ per annum last year. With the impact from inflation taken into account, an average Shanghai urban resident's disposable income improved by 8.3%,” (Dong). Additional statistics show that in Shanghai, the number of registered private automobiles jumped from 200,000 in 1991, to 1.4

million in 2002. (Zhang, 2007). As this data shows, there is a direct correlation between wealth and private car ownership within Shanghai. As a whole, the Shanghaies are become richer and cars have become a symbol of wealth and pride. As a result, more and more people are buying these luxury cars, a category that brand name automobile falls into. There are of course automobiles that are produced and aimed for the more middle class people that are more affordable, but nonetheless cars are still considered a prized possession.

Crowded Shanghai:

Along with Shanghai's booming economy came drastic changes that have been made to include not only a profound restructuring of many of its outdated industries and infrastructures, but also the overall physical form and appearance of the city. Currently, Shanghai is one of the leading pioneers in experimenting with its urban land markets and is a point of reference to other major cities across the globe, while attracting foreign capital for property development and building of urban infrastructure (Weiping). But while Shanghai is an extremely densely populated city, it is a vertical one as well. In 1980, there were no skyscrapers in Shanghai. As of June 2011, Shanghai has twice as many as New York (Campanella).

Before the popularity of cars became so distinct, the city that was dominated by bicycles. A few decades ago, bicycles were highly used because that was the main option of transportation for the common Shanghaies to get around the city. In many ways, the usage of bicycles is more beneficial than cars since they avoid most of the negative affects of the automobile age; namely unmanageable traffic and unbearable pollution.

With rapid urbanization and economic growth, motorization has been accelerating in cities of developing countries, and in an already crowded city, the increase of automobiles in Shanghai as made things much worse. Traffic congestion and land use limits are the central concerns in Shanghai. In the case of traffic congestion, according to a case study done by Tongji University in Shanghai, the average speed of a car in 1995 was 22.3 km/hour. In 2004, the new average speed in Shanghai decreased to 15 km/hour (Li Ye). In the mid-1980s, Shanghai started to set up an advanced traffic management systems in order to help mitigate the traffic congestion problem. There are now around 18 different systems are working in controlling the auto-restricted zones, toll roads and special roads. The problem is that these systems are not efficiently linked and coordinated with one another. Traffic information is not shared among different systems (Zhao Hongchang). The city government is planning to correct this situation and develops and implements a more effective and integrated traffic coordination system. Due to the exponential increase in automobiles the level of road service has become noticeably worse throughout the years, and continues to worsen today.

The total amount of expressway in the city of Shanghai has reached 193 kilometers in 2006, and jumped to over 800 kilometers of expressway in 2010 (Xin, p. 3). Just one year after some roads were completed in 2005, "Shanghai reached vehicle flow volumes that were forecast for 15 to 20 years from now," said Yang Dongyuan, a professor at the School of Transportation Engineering, and vice president of Tongji University (French).

In addition, Shanghai has expanded its expressway system and has made it easier to pay highway tolls. Many of these new developments were in preparation to relieve traffic congestion during Shanghai's 2010 World Expo event, when 70 million people visited the city. Shanghai's government invests a great deal in transportation infrastructure, which is spent towards building spectacular bridges, elevated highways, and a new subway system in order to keep auto congestions under control. In June 2012 Xue Meigen, the director of the local transport planning institute of Shanghai, stated "there is limited room for building new roads in Shanghai since the city has a tight supply of available land resources. There should be more effective policies in controlling car use to ease road congestion," (China Business News). Municipal governments are taking these deliberate steps to reduce the density of Shanghai in order to reduce the amount of congestion as well as "adapt contemporary lifestyles and associated technologies," caused by the increase in private auto ownership (Si Ren Jiao p.134). These actions will help mitigate some of the congestions problems for the immediate future, but the problem lies with the issue of accommodating cars in the less developed areas of Shanghai.

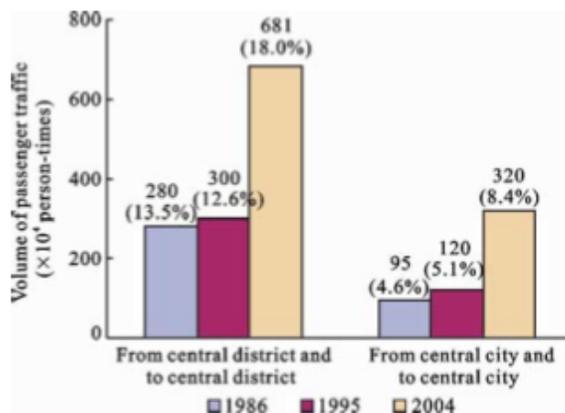


Figure 7:

This bar graph shows the increase of volume of passenger traffic between central districts and cities

Parking in Shanghai:

The problems with traffic congestion and expansion of roads is that there is a general lack of space within Shanghai. With the amount of people, infrastructure, and now vehicles, the city seems to be shrinking in size with the increase in amount of things it obtains. Streets are as crowded as ever due to the popularity of private car ownership, which makes parking much more difficult. According to the Global Parking Rate Survey of 2011, Shanghai's monthly parking rate is #47 globally for most expensive, and Shanghai is the only Chinese city included in the survey at present. The survey says it costs an average of RMB1, 900 per month (\$293) to keep your car parked in Shanghai, (China Economic Review). The reason why prices are so high is due to how valuable garages are because of the lack of space within the city. This generates a source of revenue for business owners who are able to acquire an area of land to form parking garages. For example, The Grand Hyatt Shanghai is a popular hotel in the center of the city. Their parking facility is able to hold up to 1000 cars and has strict requirements on charge fees. For guests staying in the hotel, it's free parking during their stay as a perk for their business. For guests of the hotel restaurant/bars:

- Spending between CNY 301-800 (1 hour complimentary parking)
- Spending between CNY 801-1600 (2 hours complimentary parking)
- Spending above CNY 1600 (4 hours complimentary parking)

(www.shanghai.grand.hyatt.com)

To put things in perspective this means that in order to receive 1 hour of “complimentary” parking, a guest of the hotel must spend \$48-\$128 at the hotel’s

restaurant/bars. Like so many other hotels and businesses in Shanghai, the Hyatt is able to price parking so highly due to the fact that the demand for parking greatly exceeds the supply.

Shanghai is growing and expanding with each day, and the automobile industry has been one of the biggest influential effects on this process. While this city's success has been extreme during the past decades, there is the question on the back of everyone's mind; *does Shanghai have the space and resources available to keep up with the rate of automobile increase?* Traffic congestion is worsening, and there's a general lack of space for infrastructure, highway expansion is increasing, and parking in the city is undeniably expensive.

Pedestrians:

As a result of the substantial increase in cars in Shanghai, specific infrastructure projects were implemented to aid pedestrians. These road projects included elevated walkways for pedestrians to ensure a much higher degree of safety. One of the most famous examples of these elevated walkways in Shanghai is The Circular Walkway in Shanghai's Pudong the financial district. This specific area in Shanghai is one of the focal points of businesses in Shanghai and is extremely crowded with both automobiles and pedestrians. In order to decrease traffic congestion and keep vehicles constantly moving, a roundabout was constructed. But this purpose is defeated if the intersection is busy with pedestrians as well as cars, since the cars will have to stop for people in the crosswalks and thus causing traffic and delays. In order to solve this problem, a double-level roundabout was created for pedestrians.



Figure 8:
The Circular Walkway

(<http://i.imgur.com/euTw6.jpg>)

As you can see in this picture of The Circular Walkway in Shanghai's Pudong financial district, traffic is alleviated due to the roundabout as well as due to the fact that pedestrians are above ground and will not interfere with vehicle traffic. Pedestrians are also much safer walking on their elevated roundabout, and it is therefore a win-win situation for both parties.

While studying abroad in Shanghai last fall (August 2011 – December 2011), I experienced the extraordinary amount of automobile traffic that was continuously hectic throughout the day and night. I was able to see first hand how skilled the Shanghaies pedestrians were in maneuvering their way through traffic, and their nonchalant attitudes when crossing the street with a car coming at high speeds straight towards them- a situation where a typical American would probably choose not to cross. The constant amount of traffic has undoubtedly had an effect on the typical Shanghaies, and has made them almost fearless when it comes to crossing the street with high volumes of traffic. Due to the constant amount of traffic and

pure volume of people within the city, everyone seems to be in a rush to get to point A to B. Cars are discouraged to yield to pedestrians, because if they stop to for one person to cross the street, they can be sure that another 50 people will be waiting to cross as well. At the same time, since cars will rarely yield, pedestrians will be more reckless and take their chances running across the street, instead of waiting for a safer opportunity because that could take a fair amount of time.

With the amount of private vehicles increasing in Shanghai, traffic congestion, and road expansion have definitely increased as well. Infrastructures in highways and areas to park have been affected, as well as pedestrians' relationship with traffic congestion. These are just some of the effects of the growing auto industry of Shanghai. This then creates a vicious cycle: because of the increase of cars, more roads must be built for them, which means less space in the city for pedestrians, which then leads to more cars being purchased, and the cycle repeats itself.

Chapter 7

Environmental Effects From Increased Automobiles

While automobiles have been in use for over a century in well-developed countries, developing countries are quickly picking up the trend, as well as significant increases in greenhouse gas emissions (GHGs). Decisions on infrastructure, vehicle and fuel technologies, and transportation methods are the prime components of GHGs increase, and studies have shown that while it is not overtly apparent, it is slowly yet surely exerting an effect on the typical Shanghaies person in the long run.

Vehicle ownership rates in developing nations are low compared to wealthy ones, but lead to far worse traffic congestion and air pollution, and Shanghai, China is no exception due to its magnitude of human population (Hays). Motorization is skyrocketing and populations are increasing. It is stretching limited infrastructure and institutional capacity as mentioned previously, which has contributed to pollution and GHG levels.

Vehicular Emissions:

Although it was not predicted to surpass the United States as the world's leading producer of greenhouse gases until 2020, according to a study done by a Dutch government funded group in June 2007, it was determined that China was already the world's No. 1 emitter of carbon dioxide (Hays). The Department of Environmental Science and Engineering of Tsinghua University in Beijing, China has also conducted a study that has looked at the trends in vehicular emissions in China's mega cities from 1995-2005. The mega cities that were focused on were Beijing, Guangzhou, and Shanghai. The consensus that was found for these three

cities was vehicular carbon dioxide (CO₂) emissions have noticeably increased during this 10-year period and has continued past 2005 (Hays). At room temperature CO₂ is a colorless, odorless, faintly acidic-tasting, none flammable gas. Passenger vehicles and trucks are major contributors to vehicular CO₂ and CO emissions, and were responsible for 70%-80% of vehicular mono-nitrogen oxide (NO_x) and aerosol (PM₁₀) emissions as well (Wang, Haikun). The amount of CO₂ a car emits is directly related to the amount of fuel it consumes, and due to the high amount of cars being used in Shanghai today, all of which are using fuel to get to place to place, it's no surprise that Shanghai's CO₂ levels have been increasing Gas Scenarios for Shanghai, China).

China's economic growth has been substantial throughout the past three decades, and so have its energy consumption, emissions of air pollutants, and the amount of poor air quality days in these mega cities. Studies have shown that over 75% of China's population is exposed to air that does not meet the National Ambient Air Quality Standards, NAAQS (Wang, Haikun). These pollutants are related to the exhaust emissions from automobiles, which grants vehicles the title of being the main source for air pollution in these mega cities. During the 1995-2005, motor vehicles populations have increased by 12%, 18%, and 8% per year in Beijing, Shanghai, and Guangzhou respectively. A correlation can be seen with vehicular CO₂ emissions increasing by 260%, 180%, and 220% in Beijing, Shanghai, and Guangzhou respectively as well. Shanghai is leading the mega city group for the amount of automobiles, but in terms of CO₂ levels, Shanghai takes third place, behind Beijing and Guangzhou (Wang, Haikun). Nonetheless, a 180% increase in

CO₂ levels is not something to be taken lightly.

So what does it mean to have these additional amounts of gases floating around in our Earth's atmosphere, and specifically that of Shanghai's? It means a multitude of things. For one, CO₂ has negative health affects. Exposure to CO₂ can produce a variety of symptoms such as headaches, dizziness, tiredness, etc. Other more serious affects are elevated blood pressure, asthma, etc. As mentioned previously, Shanghai's air quality falls short of NAAQS, which means that the million of Shanghaies residence are breathing in sub-par air on a daily basis, and things are only getting worse with increased industrial development and GHGs levels.

In addition to health effects, there are environmental and atmospheric effects as well. When fuel is burned in a car engine it reacts with oxygen to form CO₂ and water, and when this occurs some other compounds such as nitrous oxide and sulphides are also released which contributes the overall levels of GHGs. Vehicle emissions are responsible for up to 50% of the emissions that form ground-level ozone and up to 90% of carbon monoxide in major metropolitan areas (Hays). Driving a private car is probably a typical citizen's most "polluting" daily activity. This then leads to the severity of global warming the world is currently experiencing, and this means that there is an increase of the total amount of carbon dioxide circulating through our ecosystem.

The number of private cars, taxis, buses, etc. being used in Shanghai today has increased astronomically throughout the decades. It has had a huge effect in terms of Shanghai's urban change, and infrastructure layout as can be seen in highway expansion as well as increases in garages and walkways for pedestrians. These

changes have inevitably caused changes to everyday life in Shanghai through health, environmental, but also in a more personal matter as well. Cars have changed how Shanghaies think and value things. Owning a car is a sign of prestige and wealth, which is something that most people desire. People have also adapted to the amount of cars in this city, and are used to dealing with such high volumes of traffic at any given time of the day. As you can see, cars have not only caused a change in Shanghai's urban aspects, but they have also changed how people behave in everyday life.

Chapter 8 Getting Under Control

In the last couple of chapters, I described the occurring urban and cultural changes in Shanghai due to the increase in vehicles throughout the decades. From expansion of highways, to not paying much attention to crossing the street with on coming traffic heading right towards you, automobiles have made a substantial impact on Shanghai's urban infrastructure as well as its culture. Yet despite the positive economic activity automobiles have generated for Shanghai and China's economy, there have been several backlashes as well that were previously discussed. The negative repercussions that automobiles have implemented on Shanghai has forced the city to recognized that something must be done in terms of the amount of cars allowed in the city, before the negatives begin to severely outweigh the benefits. Through car restrictions and more environmentally friendly models, Shanghai is making strives to improve the current situation and keep the amount of automobiles within the city under control.

Car Licensing

Major cities in China, including Beijing, Shanghai and Guangzhou, are restricting the growth of vehicle traffic to improve everyday life for residences of these cities. How are they doing that?; Through car license plates. Traffic congestion is a main factor for the changing of Shanghai's infrastructure due to road expansion, building of more parking spaces/garages, etc. Traffic congestion is also responsible for changing the Shanghaies cultural outlook on cars as well as daily dealing with traffic. For these reasons, Shanghai has decided to control the issuing of vehicle license plates in order to alleviate traffic congestion, which in the long run

could potentially lead to the improvements of other problems automobiles have generated

This controlling of issuing license plates is a relatively new practice and cities are still in the midst of trying different methods out. For example, Beijing is participating in a drawing for who is able to purchase a license plate, where as in Shanghai, license plates are issued via open auction (www.wantchinatimes.com).

Shanghai initiated these restrictions back in 2002 by releasing several thousand license plates a month, which are allocated to local residents through an open auction. Over the past 10 years, the auction price for plates has risen from 10,000 ¥ (USD \$1,580) in 2002 to 63,000 ¥ (USD \$9,965) in August of 2012, (LeBeau). This means that the cost of the license plate alone is worth a large fraction of the economy class cars that many Shanghai residents are driving. According to Shanghai International Commodity Auction Company, Shanghai auctioned of 9,500 licenses during the month of June 2012. The average bid was roughly around 58,227 ¥ (USD \$9,145), and the amount of bidders came in at a whopping total of 24,774 (Bloomberg).

Why are the prices of car licenses so high? They are based off the simple fact that there is an imbalance between supply and demand of licenses. The demand for car licenses is significantly higher than the amount of licenses that are supplied. By simple economic analyses, due to this disequilibrium, if demand exceeds supply this will drive up prices, and that is exactly what has happened in Shanghai. As stated before, in the month of June of 2012, there were 24,774 bidders for the 9,500 issued licenses. That means that 15,274 unfortunate bidders could not compete and were

therefore not able to obtain a car license. This translates into the fact that without this bidding process, there potentially could have been an addition 15,274 cars roaming around the city of Shanghai. This means that the bidding process is doing its job with automobile control.

The policy of auctioning appears to be effective. In addition to depleting the growth in car ownership, it generates annual revenues of up to 4 billion ¥, which are then used to support transportation development (Chen, T. and J. Zhao). But important questions must be answered: Do Shanghai people accept the policy, and if so, to what degree? “Licenses in Shanghai cost more than 100 times the price of licenses in Beijing, and can be more expensive than the car itself for many smaller models” (Chen, T. and J. Zhao). As can be seen from previous statistics, thousands of people are not able to afford a license, leading to affordability and equity concerns. The policy of auctioning licenses has led to issues regarding the implementation process and the level of trust in the government. The high prices have also caused speculative activities where many Shanghai residents are cheating the system by obtaining non-local licenses. These responses have caused problems to the situation and exacerbate implementation and trust concerns. Due to all of these factors, there is a negative effect on public acceptance of the auction policy, despite their good intentions. As a result, many believe that a study of the public’s acceptance of the policy is needed in order to improve the policy as well as to increase its effectiveness (Chen, T. and J. Zhao). Nonetheless, Shanghai has recognized the need to make restrictions for the amount of cars allowed in its city,

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and will continue to improve policies that it will implement to its residents.

Chapter 9

Conclusion

China has overcome some of the most difficult obstacles throughout the centuries, ranging from the Opium War of 1839, to finally being accepted into the World Trade Organization (WTO). Nonetheless, China as a whole has managed to become the world's largest car manufacturing country in just a few short decades. Shanghai, China is considered one of the world's most successful mega cities of the 21st century. Shanghai has been one of the key players of China's success for the automobile industry, and as a result, its economy has been nothing less than impressive. But despite its economic success, Shanghai's urban infrastructure and lifestyles of its residents have changed drastically to compensate for the influx of automobiles and has therefore had both its benefits as well as its consequences.

This paper began with an overview of China's automobile industry, and how it has developed over time. Car manufacture did not begin in China until the mid-1970s, which was significantly later than its foreign competitors such as the United States and Germany who began manufacturing in the late 19th century. But with the help of entering the WTO, foreign investment, and foreign joint ventures, China overtook the United States in being the world's largest auto manufacturing company just 30 some years after its initial start.

From there, foreign countries looked to specifically to Shanghai to invest and start joint ventures, due to a number of reasons. First, Shanghai was unique in terms of its geographic location as a costal city. This made it easy to access this city for both imports as well as exports. In addition, foreign countries recognized the growing automobile market that Shanghai was undergoing, and targeted this city

due to the potential high revenue companies would generate. Shanghai was also looked at because it was the home of China's most successful auto-manufacturing companies; Shanghai's Auto Industry Corporation (SAIC). As thoroughly discussed, SAIC was and continues to be successful today, which is why foreign car companies, such as Volkswagen and General Motors, were so inclined to establish joint ventures with SAIC. For these reasons, Shanghai became one of the most popular cities for car manufacturing, and has been a sustainable contributor to China's automobile industry as a whole, which in turn as increased the success of its economy.

Due to Shanghai's overall success, the average income of its residents has seen in increase. This allows for the Shanghainese to obtain a higher purchasing power, and therefore more are able to purchase luxury goods, i.e. a car. Due to this influx of automobiles, that has forced the city to change its infrastructure and lay out in order to compensate. As described, the amount of highways has increased, and infrastructure has changed in order to reduce traffic congestion, as well as keep pedestrians safe. Shanghai has been forced to change its urban infrastructure to account for its growing population and their possessions, while working with the same amount of land area throughout the years.

There have also been changes to the Shanghaies lifestyle and culture due to automobiles. From studying abroad in Shanghai myself, I saw that Shanghai residents react much differently to automotive traffic than that of Americans. Pedestrians are a bit reckless in deciding when to cross the street despite on coming traffic heading towards them at high speeds. Drivers themselves are also reckless, and will usually not yield to pedestrians simply because it is far too crowded of a

city, and if they stop for one person to cross the street, they are inevitably stopping for many more than just that one person. In addition, automobiles have changed the city's environment, and have increased carbon dioxide levels and worsen the air quality within the city. This has negative effects to Shanghai's health, as well as the overall pollution levels.

It is clear that the results of automobiles in Shanghai are quite varied. On the one hand, it has had its positives where it has made China into the world's largest car manufacturing countries, as well as create more international business overall. It has also increased living standards and average income for its people, and has created significant economic activity. But then there are the negatives in terms of traffic congestion, general lack of space within the city, as well as environmental backlashes. Despite the benefits and the consequences, Shanghai has learned to adapt to the changes the automobile industry has imposed on this city, and has overall responded (how) well to these changes. With the process of auctioning of car licenses, that has helped to control the amount of vehicles allowed, and therefore is trying to control and mitigate the negative results that the automobile has caused. This thesis has analyzed the results the automobile has had on Shanghai and looked at how this city has responded to the influential product of the automobile, and all the changes that have occurred with this new innovation.

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Figure 1: Gao, Paul. "A Tune-Up For China's Auto Industry." *McKinsey Quarterly*, No. 1, p. 144-155.

Figure 2: APCO Worldwide. China Association of Automotive Manufactures (CAAM). Page 5.

Figure 3: Image:

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Figure 4: APCO Worldwide. China Association of Automotive Manufactures (CAAM). Page 6.

Figure 5: OSAT and IBM Institute for Business Value Analysis

Figure 6: Shanghai Statistics Bureau, 2011 and Beijing Statistics Bureau from 2001-2010 Chen, T. and J. Zhao

Figure 7: Li Ye, Ye Jianhong, Chen Xiaohong. *Transportation Characteristics Change under Rapid Urban Expansion: A Case Study of Shanghai*. School of Transportation Engineering, Tongji University Shanghai. 2008.

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