

Original Paper

Pollution Reduction and Economic Growth —A Small Town’s Journey to Sustainable Development

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Abstract

It's commonly believed that one can do well by doing good. When applied to business, the concept means that an environmentally friendly and responsible business can also do well in regards to profit. Or, if a state or region devotes resources to improving the environment, the economic growth will be strengthened. This concept echoes the essential meaning of the famous quote by China's leader Xi J. P., "Clean waters and green mountains mean mountains of gold and silver."

Is this theory true in the real world? We intend to investigate the case of a small rural town from northern China which went from a heavily polluted town with small businesses scattered around, to today's paradise with clean waters, green parks, and sustainable agro-farms.

The town went from a poor rural town with low GDP before the 1990s to boomed economy in early 2000s, when the heavy pollution imposed a threat to the health of local residents.

After almost two decades of government intervention, the town has transformed into a clean and sustainable community with public parks and agro-tourism based farms.

Our paper intends to take a close look at the transformation process, and describe key factors of success, and identify areas for improvement. We also attempt to provide implications for future research, and recommendations for policy makers.

Keywords

sustainable industries, transitional business, pollution, environment

1. Introduction of the Town and Waste Plastic Processing Industry

Wangdu County, a rural town, is located in the outskirts of Baoding city, Hebei Province, China. The town sits right next to one of China's main highways, Hwy 107, and is about 200 kilometers south of Beijing. It has a population of 260,000 residing in an area of 357 km².



Figure 1. Map of Northern China (Wangdu is under Baoding)

Before year 2000, Wangdu was mainly an agriculture based rural area, with very few businesses to support the economy. Residents relied on sales of their farm crops which could hardly afford any modern luxuries such as private automobiles or condos in the city.

The advantage of transportation (since it sits right on the national highway 107) attracted wholesalers when the recycling processing businesses started to flourish around 2000. A few trading markets started to emerge in the area, where truckloads of recyclables (aka waste plastic) would be shipped to and unloaded, and local small factory owners would haggle with the sellers to buy whatever type of materials they could clean, re-process and resell to big factories.

The booming of trading markets and processing factories brought economic growth to the area. Local residents saw increase in their savings, gradually could afford cars, mobile phones, brand name clothing and accessories, and even modern condos with indoor bathrooms and hot water supplies.

On the other hand, the economic growth came with a price—pollution. The recyclables are actually waste plastic, mostly sorted and picked from trash piles from big cities around the country. Local factory owners and workers would sort them through, wash with water, and dispose the dirty water into the local rivers. Soon, the vegetation along the river banks disappeared. The sky turned gray. The air was filled with dense smog which made it hard to breathe. More villagers were diagnosed with cancer.

A dilemma was presented to the local residents and government officials: do you want higher income or better health?

The county happens to be the hometown of both authors, who have firsthand experience of the pollution caused by the waste plastic recycling industry. We are also fortunate to witness the improvement of the environment over the last two decades.

2. The Waste Plastic Process (WPP) Industry and Local Economy

For the sake of convenience, we'll refer to the "waste plastic processing industry" as WPP industry from here on.

2.1 Economic Growth since the WPP Industry Started

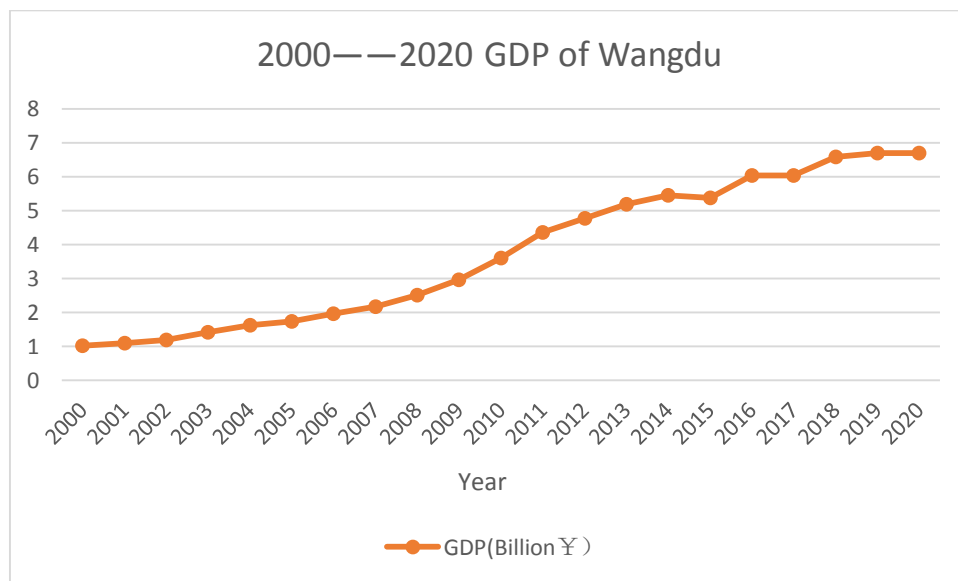


Figure 2. 2000-2020 GDP of Wangdu (Compiled from: CEI data)

According to the report from CEI (China Economic Information) data, the GDP of Wangdu County grew from 1.01 billion yuan in 2000 to 1.734 billion yuan in 2005. Seven years later, in 2013, the GDP increased further to 5.19 billion yuan, a drastic growth rate during those ten plus years. After 2013, the county started implementing a series of regulations and procedures to control the polluting industry so as to protect the environment, the GDP growth plateaued for the following two years, and started to show modest growth in 2016, with GDP reaching 6.7 billion yuan in 2020. (Anonymous, 2022)

2.2 Negative Impact by the WPP Industry

As a result of the rapid development of the WPP industry, pollution of water and air became a big problem. The air quality was so bad that many of the local residents tried hard to buy condos in the town area, slightly further away from the villages where the factories were. The water pollution was so bad that the streams in the village dried out, and all the vegetation disappeared. Local residents stopped drinking

well water and started to buy bottled water for consumption. The sky looked gray most of the time. It became a luxury to see the blue skies and white clouds.

The irony is, the WPP industry is about recycling, which is supposed to be helping the environment. But in this case, the WPP industry became a harmful element for the environment.



Picture 1. Great Wall with Heavy Smog (near Beijing), Taken in the Winter of 2010.

2.3 The Flow of WPP

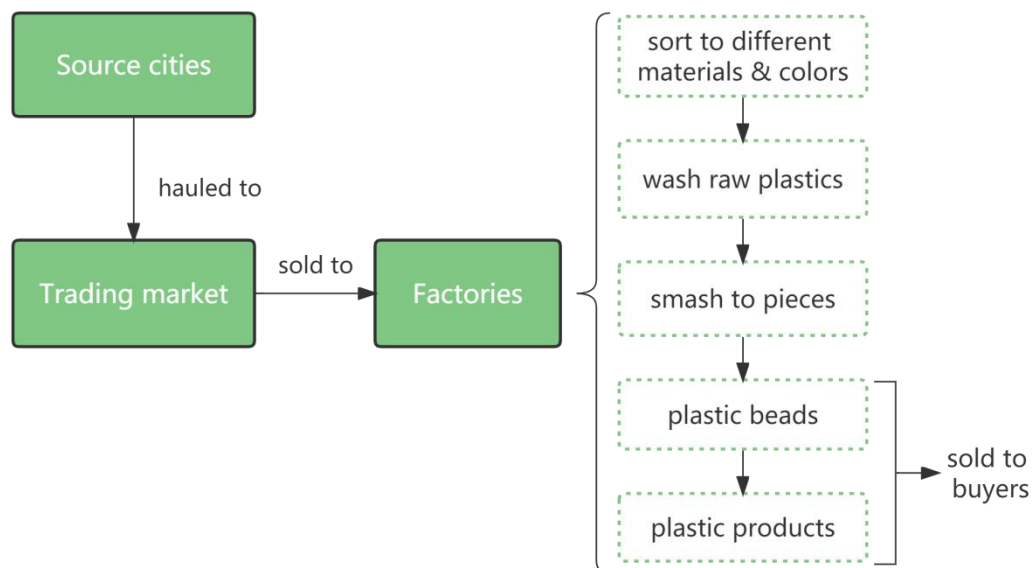


Figure 3. The Distribution Channel of Waste Plastic

The WPP industry involved mainly three entities: wholesalers of waste plastic, trading market owners, and processing factory owners and their workers.

As indicated in chart 1, the wholesalers travel around the country to buy waste plastic from waste collecting stations in cities, many of which are hundreds and thousands of kilometers away. After collecting enough quantity of waste plastics (such as water bottles, etc.), those wholesalers would hire a commercial truck to ship the waste plastics to the trading markets, such as the one in my hometown. (Note: there are multiple trading markets in my hometown, I'm using just one for simplicity of discussion.) After the large quantity of waste plastic is shipped to the trading market, the market owner would first hire local labors to unload the truck, and inform local factory owners who will come to the market to "shop" the newly arrived "goods". Different factory owners would be interested in buying different types of plastic, as most of them specialized in one or two types of materials. Therefore, some sorting of materials might be needed in the trading market. This created employment opportunities for more workers. In a couple of days, all the materials would have found their buyers. Smaller trucks will be used to haul the materials to the factories. The trading company make a profit by charging a small percentage fee for each transaction.

Once the "raw materials" (waste plastic) arrive at their factories, the factory owners will start by further sorting the plastics, then washing them in water, and finally place them in machines to be processed. The end product from the machines is either smashed bits, or reproduced plastic beads. Those bits and beads will be sold to large plastic factories to produce consumer goods such as plastic barrels or other products.



Picture 2. Sorted Waste Plastic in a Factory, Photo Taken in 2022

2.4 Stages with Potential of Producing Pollution

From the description above, we can identify a few steps where pollution would occur.

- 1). In the trading market, after all the materials (waste plastic) are sold to factory owners, and hauled away, the small amount of leftover would be cleaned up by the market owners. The disposal of the small amount of leftover could have a potential for pollution. If they dispose the leftover by burning, as is the case most of the time, that would cause pollutants to spread in the air.
- 2). In the factories, when the workers wash the “raw materials” (dirty waste plastic), the disposal of dirty water has a great potential of causing pollution. Factory owners used to let the waste water run into the stream and even the streets, which killed all the vegetation in the stream. Years later, the polluted water sink into the earth, and polluted the well water, which in turn would have a negative impact on human health.
- 3). In the factories, after each batch of materials are processed, there are often small amounts of waste from the materials. The disposal of those wastes could pose the same potential of pollution as that to the market owners—dumping at the trash station or burning to pollute the air.
- 4). Operating the equipment in the factories produces noise of 80 to 90 decibels, which is louder than the noise generated by cars, and slightly uncomfortable for the ears. (Li, 2017)

3. The Rectification Efforts Mainly Driven by the Government

The pollution started to become known as a big problem in early 2000s.

The series of rectification policies and actions were implemented top down. It was initiated by national government, as the country was preparing for the 2008 Olympics in Beijing. To minimize smog, and to ensure a good healthy environment for international athletes from around the world coming to Beijing, the government started preparing a few years ahead.

Wangdu County is only 150 km from Beijing, which means the pollution of the county would affect Beijing City. It was also one of the first rural areas to be forced to implement the environmental policies. A series of government interventions happened starting 2006. Specifically, the government rectification policies covered three main categories: 1) waste plastic recycling industry remediation (or overhaul) measures, 2) promoting agricultural park development, and 3) funding workshops for second career training.

3.1 Regulating WPP Industry

In 2006, the Work Team for Treating Pollution was formed in Baoding City. Team members would go into villages, visit business owners to inform them about the remediation policies from county government, and gather feedback from business owners. They also built water treatment tanks. (Zhang, 2006)

This initial period of persuasion didn't have much impact or improvement of the situation. Pollution continued, and the air quality continued to be poor. The government started implementing more forceful interventions and restrictions.

Starting from early 2013, a large scale of environmental remediation and reform movement started in Baoding City, of which Wangdu County is a part of. The more forceful actions taken by the government agencies include cutting off supply of water and electricity to those factories that didn't comply with environmental regulations. Business owners who failed to comply with regulations were ordered to clear up inventory, and dismantle their machines. Those who continued to operate with pollution consequences would receive monetary penalty of 50,000 yuan (equivalent to approximately 7000 USD). (Anonymous, 2013)

In 2017, in the report delivered at the 19th National Congress of the Communist Party of China, China's leader Xi Jinping pointed out, that China must continue to strive for harmonious coexistence of man and nature, emphasized the idea that "clean water and green mountains are mountains of gold and silver" (绿水青山就是金山银山), and promoted the national principle of saving natural resources and protecting the environment. (Zhang, 2017)

Wangdu County started to implement a more comprehensive and strict set of actions towards these businesses. All businesses were required to install pollution prevention systems. Those who failed would either be suspended till they met the requirement, or permanently shut down. (Anonymous, 2017)

3.2 Promoting Development of Agricultural Parks

After the polluting businesses were shut down, Baoding City government (the upper level above Wangdu County) introduced a number of new policies which encouraged the development of agricultural parks. The government would prioritize the approval of usage of government owned land for such development; fund improvements of surrounding roads; guarantee power supply to the agricultural parks; make it easier for such parks to register and obtain business licenses. (Li, 2015)

In 2017, Wangdu County government introduced programs such as Beautiful village, Agricultural and Ecological parks, fruit farms, and forestation. (Anonymous, 2017)

In 2018, Wangdu County incorporated the national policy of restructuring businesses in rural areas, and further improved infrastructure, supported the expansion of animal farming, and further development of ornamental horticulture and specialty farms such as hot pepper farms, cherry farms, and vineyards. (Anonymous, 2018)

The changes brought by these actions are more visible to local residents, and the effects are more observable as more local residents can enjoy spending time in the public parks, as well as picking/buying fresh berries and fruits from the specialty farms.



Picture 3. Cherry Farm, Picture Taken in 2023

3.3 Funding Workshops to Help Business Owners and Workers Find a Second Career

The strict forceful government interventions led to many small factories being shut down, and business owners and workers lost their source of income. According to the Hebei Daily (June 23rd, 2020), the provincial government issued a plan for expediting programs to train residents from poor areas for future employment such as home service (housekeeping) and baking. The reasons for sponsoring such programs include:

- 1) The entrance barrier is low. For most people, as long as they are healthy and willing to work, this program can train them in a relatively short period of time before they are qualified to enter the job market.
- 2) There was a growing demand for such services in big cities such as the nearby Beijing and Tianjin. Wangdu County is only a short distance away (30 minutes by train) from those big cities, which make it easier for workers to travel to the employment location. (Huang, 2020)
- 3) The home service employment can help with the household income of those counties, which plays a significant role in changing the poverty status of those counties, including Wangdu County.

These workshops were offered to the residents free of charge. The implementation of this program may be less visible to the public who are not interested in the program. But it did play a crucial role in helping the small business owners to find alternative source of income after closing down their “environmentally unqualified” businesses. This helped many household to continue to have a source of income to support their basic needs.

4. The Outcome of Reforms and Rectifications

After the series of policies and new regulations, many factories are closed, residents of Wangdu County can see the blue sky and white clouds again. Moreover, there are many parks for them to visit, and well maintained roads to drive on. The following two pictures are both taken on streets of Wangdu, (a) in 2012, and (b) in 2022.



Picture 4. Street of Wangdu in the Summer 2012 vs 2022

Today, there are seven major parks in Wangdu County. Many local residents would spend their spare time in the parks. The people enjoy their lives better than before.

There are also eleven agricultural parks in Wangdu. The parks are designed to include: service area, plantation area, agri-leisure area, and processing and retail areas. Currently 28 businesses are operating in those parks, servicing 100,000 tourists each year (Anonymous, 2017). Tourism growth can promote the local economy, enhance the living conditions and quality of life of local residents, and improve existing facilities and infrastructure to increase tourists' willingness to visit and spend money there (Lin, Ling, Lin, Liang, 2021).

There is also a down side resulted from the reform—disposable income for some households decreased hence their buying power decreased. The lower buying power of the local residents surely affected other businesses such as restaurants.

5. Discussion

Wangdu County is not an isolated case of pollution and going through transition. Many places in China have gone through the same journey. As indicated in the pictures, even the capital city of China, Beijing, had gone through years of air pollution and many stages of regulations and government interventions of industries. We hope the experience of this small town can serve as a reference for other cities and towns in the country and the world.

5.1 The Effect of Government Regulations

Wangdu' experience shows how the government regulations and strict implementations played an important role in controlling pollution and improving the environment. The methods of controlling businesses are far from perfect, but it is crucial for government to lead the effort of protecting the environment.

However, the same method may not work for every town or every city. Areas with different cultures and social norms may need different strategies.

5.2 Public Awareness of Environmental Issues—Anecdotal Examples

Although government regulations are important in protecting the environment, the public's cooperation is also critical.

What do local residents feel about the change? Are they aware of the issue of pollution and the environment? We conducted an interview with a convenient sample—family members. First to be interviewed is grandma, who is in her 70s, never attended school, but well versed in conversation. Topics were mostly picked from the UN website, including 3 Rs (reduce, reuse and recycle), circular economy, and consumption. Her responses indicated the importance of government direction and enforcement of the right regulations, and a lack of awareness and motivation to protect the earth.

For example, when talking about the pressure planet earth was facing, grandma asked, “does that mean we need to lose weight? So the pressure for the earth could be lightened? Or are you saying that the country will enforce family planning again? So that the population is controlled?”

When we clarified the issues of environment pollution and the need for public to consume more responsibly, grandma replied, “Then you need to persuade the government and leaders to enforce a policy so that everyone can comply. For example, your grandpa would not stop smoking. But if Xi Jinping shuts down all the cigarette factories, he will have to stop smoking.”

A similar lack of awareness about environment issues exist in public schools in the rural area. Elementary school and middle school students had little knowledge or education on environmental issues. In contrast, school kids from a small town (Fairbanks Alaska) in the United States would know about “reduce, reuse, and recycle” at a very early age, which is a result of communication and education at school. This shows us areas for improvement in the future.

5.3 The Myth about Environment and Economic Development

Most people would think economic growth comes at the expense of the environment, or we have to give up economic growth if we want to protect the environment. That's why the study of sustainable economy is so important for the world. (Abad-Segura, Fuente, González-Zamar, & Belmonte-Ureña, 2020)

The case of Wangdu county shows, economic growth might slow down during the initial stage of environmental improvement. In the long run, businesses and residents will all benefit from a cleaner and more sustainable environment.

The common saying in the US, “doing well by doing good”, as well as the quote of Xi Jinping, “clean waters and green mountains are mountains of gold and silver”, both emphasize the importance of

protecting and taking care of the environment. The bottom line is, we don't have to sacrifice the environment to create wealth, and we don't have to pollute the water, cut down all the trees to promote the businesses and industries. Having clean water and green mountains can also bring wealth to the local people.

6. Conclusion and Recommendations

From a close examination of the growth and development of the small rural town, we show how important the environment is for the well-being of local residents.

In maintaining a healthy and clean environment, government regulation is important, but not enough. All entities and parties in a society should participate in the effort of sustainable development.

We make the following recommendations:

- 1). Government directions and regulations are helpful in dealing with environmental issues. The government must play a big role in creating appropriate regulations, and find ways to implement those regulations.
- 2). Public awareness of the environment issues needs to be improved. Government agencies and academic institutions can create materials to education the public, inform them of the environmental problems which might affect their well-being, and encourage them to participate in the efforts of protecting the environment.
- 3). Educating students from a young age about environmental issues and sustainable development will be helpful. School children are easy to reach, and they can spread the word once they learn about the issues. In China, schools should offer regular sessions to students K-12 to enhance their understanding of the issues of sustainability (use their language to spread the word).
- 4). Make sustainable development a regular course or establish an ongoing program or student organizations in colleges. College students can have more in-depth participation in the effort, e.g., work on a project for a class, and create a video to publicize these ideas, share innovative ways to reduce, reuse, and recycle. Social media platforms can encourage and reward videos/postings that inform, education, and persuade the public on sustainability issues/topics. (Niesenbaum, 2019)

With multiple parties work together, we'll have a better chance to make a positive impact on the planet and future.

Lastly, future research can investigate the issue of pollution and environment improvement from multiple areas or countries, conduct more formal studies to produce scientific findings which can serve as guidelines for policy makers, educators, and practitioners.

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