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Sustainable Value Chain Development for Fenyang Huarui Rubber Products Company

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# Introduction

Due to the high level of PM2.5 pollution in China[[1]](#footnote-1)and the implementation of sustainable development strategy by the Chinese government, the environmental pollution control in China is getting stricter, especially in the high pollution industry, such as the rubber products industry.[[2]](#footnote-2) In an exhaust gas emission inspection in the Shanxi Province, a Chinese tire manufacturer, the Fenyang Huarui Rubber Product Company’s production plant is shut down due to its exhaust gas pollution exceeds the national standard. At present, the company’s short-term strategy is to resume the production activity and the long-term strategy is to launch IPO.

The aim of this consulting project is to propose an action plan for enhancing the sustainability of the Fenyang Huarui Rubber Product Company, in order to help the company to achieve its strategic goals in the short-term (resumption of production) and long-term perspective (launch of IPO). In this paper, the author collected primary information from conducted interviews with the Fenyang Huarui Rubber Products Company’s representatives (operation manager, procurement senior manager), and secondary information from the companies' sustainability reports, related academic journals, and media. Firstly, the author has examined theoretical frameworks, including stakeholder approach, SDG value chain, triple bottom line approach. Then, the author conducts an impact analysis of the tire manufacturing industry along the value chain, to identify the negative and positive impact created on each section of the value chain. Next, the author conducts benchmarking analysis of two international tire manufactures, contains the Michelin Group and the Bridgestone Corporation, and one local Chinese tire manufacturer, the Linglong Tire Company, to discover what are the practices implemented by them addressing the issues defined in the impact analysis of the tire manufacturing industry. Moreover, the author conducts an impact analysis of the Fenyang Huarui Rubber Products Company’s operational activities to identify the current issue of the company’s operation. Finally, the author combines the company’s current actual situation and the finding in the benchmarking analysis, to give recommendations for enhancing the sustainability of the Fenyang Huarui Rubber Product Company’s value chain.

# Company profile and managerial problem statement

## 1.1 Fenyang Huarui Rubber Products Co., Ltd.

Fenyang Huarui Rubber Products Co., Ltd. is a rubber product producer in China. Its main products are tires, including car cushion tire belts and car inner tubes for vehicles. The company was founded in 2009, in Fenyang City, Shanxi Province, owned by its founder Jinhu Wang. Currently, the Fenyang Huarui Rubber Products Company covers an area of 500,000 square meters, with more than 1000 employees, contains more than 80 engineering and technical personnel. At present, the company’s annual production scale has reached 25 million tires of various types of products, including all-steel radial tire, tubeless automobile wheel, inner tube automobile wheel, automobile inner tube, and semi-steel radial tire. Accordingly, its annual revenue generation is 1 billion yuan. After the 11 years of development, nowadays the company has entered the whole China mainland market (except HongKong, Macao, Taiwan), and established more than 100 retail restores over the China mainland. Moreover, the company has developed tire brands, such as "Fenzhou Zhengda", "Wutai Mountain", "Fen Shuangshi" and etc., for engineering vehicles and agricultural vehicles. In 2018, the company’s revenue is 1 billion yuan. It is now one of the biggest tire producers in the Shanxi Province. Currently, the company is exporting its product to more than 10 countries.[[3]](#footnote-3)

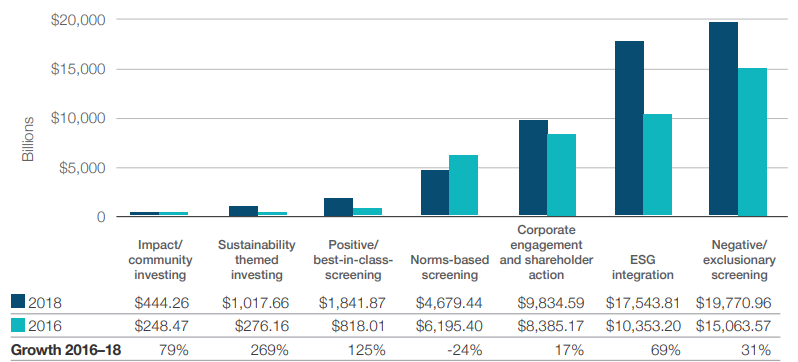
## 1.2 Managerial Problem Statement

According to the “Air quality ranking of 169 key cities” conducted by the Ministry of Ecology and Environment of People’s Republic of China, the Fenyang City has been ranked the least (169th) from 2017-2018.[[4]](#footnote-4) Hence, in January 2019, the Shanxi Environmental Protection Department has been investigated by the Central Environmental Protection Inspectorate sent by the Central People's Government of the People's Republic of China and was asked to come up with an emergency rectification plan. Relatively, 117 responsible persons have been punished. Later, the Shanxi Environmental Protection Department has issued the “Shanxi Province Air Pollution Prevention and Control Plan”, in order to resolve the pollution problem.[[5]](#footnote-5) In the plan, it is emphasized that the Fenyang City will make the treatment of volatile organic compounds (VOCs) a top priority in the treatment of atmospheric pollution, due to the fact that it is the ozone concentration has increased this year. Because VOCs participate in the formation of ozone and secondary aerosols in the atmospheric environment, which will cause a heavy impact on regional atmospheric ozone pollution and PM2.5 pollution. Therefore, the industries generating many VOCs will be the focus on remediation objects, such as the Auto repair industry, rubber products industry, construction industry, and so on.[[6]](#footnote-6) Starting from March 2019, the Shanxi Environmental Protection Department has started the air emission inspection to regulate the factories in the Shanxi province. On 28th of February, 2019, the Environmental Inspectorate from the Shanxi Environmental Protection Department has detected that in the production plant of the Fenyang Huarui Rubber Products Company, the air emission values are much higher than the air emission standard specified in “Emission standard of pollutants for rubber products industry”. Hence, the Environmental Inspectorate has given a Rectification order to the company. In the order, it is written that the Fenyang Huarui Rubber Products Company must install new air purifying equipment to make the air emission meet the national air emission standard within half a year. Then, in August 2019, the Environmental Inspectorate has come to recheck to the company’s air emission status in its production plant. However, the test result is still much higher than the national air emission standard. By the decision of Shanxi Environmental Protection Department, the company has been shut down and cannot resume the production until the efficient air purifying system is installed.[[7]](#footnote-7) In specific, the company is currently lacking sustainable orientated programs and it is crucial for the company, due to the fact that the government started to proposed initiatives that oblige the enterprises to establish more “green” production operations.

The resumption of production operations is the short-term strategy of the company that will be considered in this paper. Moreover, from the consultation session with the company, the author has defined other important strategy of the company but in the long term perspective: the company has plans to launch an IPO (initial public offering), thus, the company needs to create a relationship-specific asset with its stakeholders through the sustainability approach. The goal of this paper will be based on the stagey of Fenyang Huarui Rubber Products in the resumption of production operations (short-term strategy) and IPO launching (long-term strategy) though the sustainability approach that can bring company’s operation to a new level that is more sustainable, thus, more attractive for the potential investors.

To increase the company’s attractiveness to the investors, the company needs to enhance its sustainability. Because it is the trend nowadays for the investors to make sustainable investing, meaning that invest in the company that has high sustainability. This trend is widely proofed by various companies. In the questionnaires conducted by the United Bank of Switzerland (UBS), based on UBS Investor Watch global survey results in 2018, 39% of investors globally make sustainable investing.[[8]](#footnote-8) Also, in the questionnaire for institutional investors conducted by Morgan Stanley, as many as 70% of the respondents stated that they are incorporating sustainable investing into their investment process, which fully reflects the current popularity of the concept of sustainable investment.[[9]](#footnote-9)

1. Global Growth Of Sustainable Investing Strategies, 2016–2018



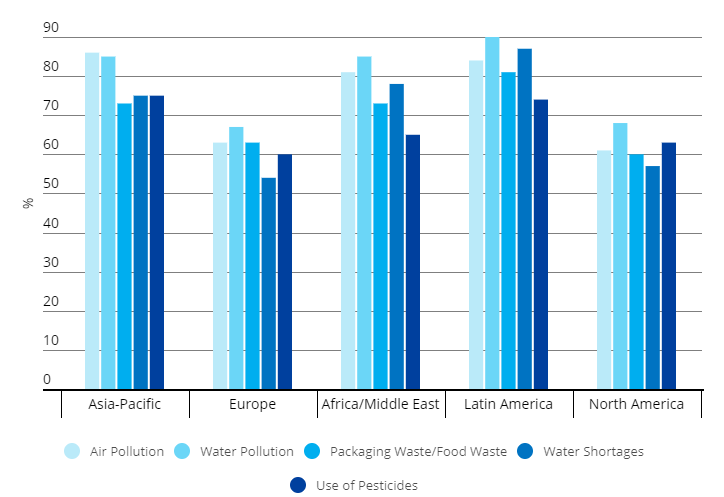
Source: Global Sustainable Investment Alliance, 2018 Global Sustainable Investment Review

From the graph, it can be seen that there is an increasing trend in the sustainable investment strategy on a global scale. From 2016 to 2018, the investment in various sustainable investment has significantly increased, especially in ESG investment.[[10]](#footnote-10)

Overall, sustainable investing is the current trend, and the company with higher sustainability is more attractive to investors. Therefore, for increasing the attractiveness to the investors in the future IPO, the author will suggest a sustainable development portfolio for the company to enhance its sustainability.

At the same time, the improvement of the company’s sustainability can also bring competitiveness to the firm in the global market. It is because of the increasing trend of customer’s care about the firm’s sustainability.

1. Percentage of respondents who care about the company’s impact on the environment in 2019



Source: The Conference Board, Global Consumer Confidence Survey

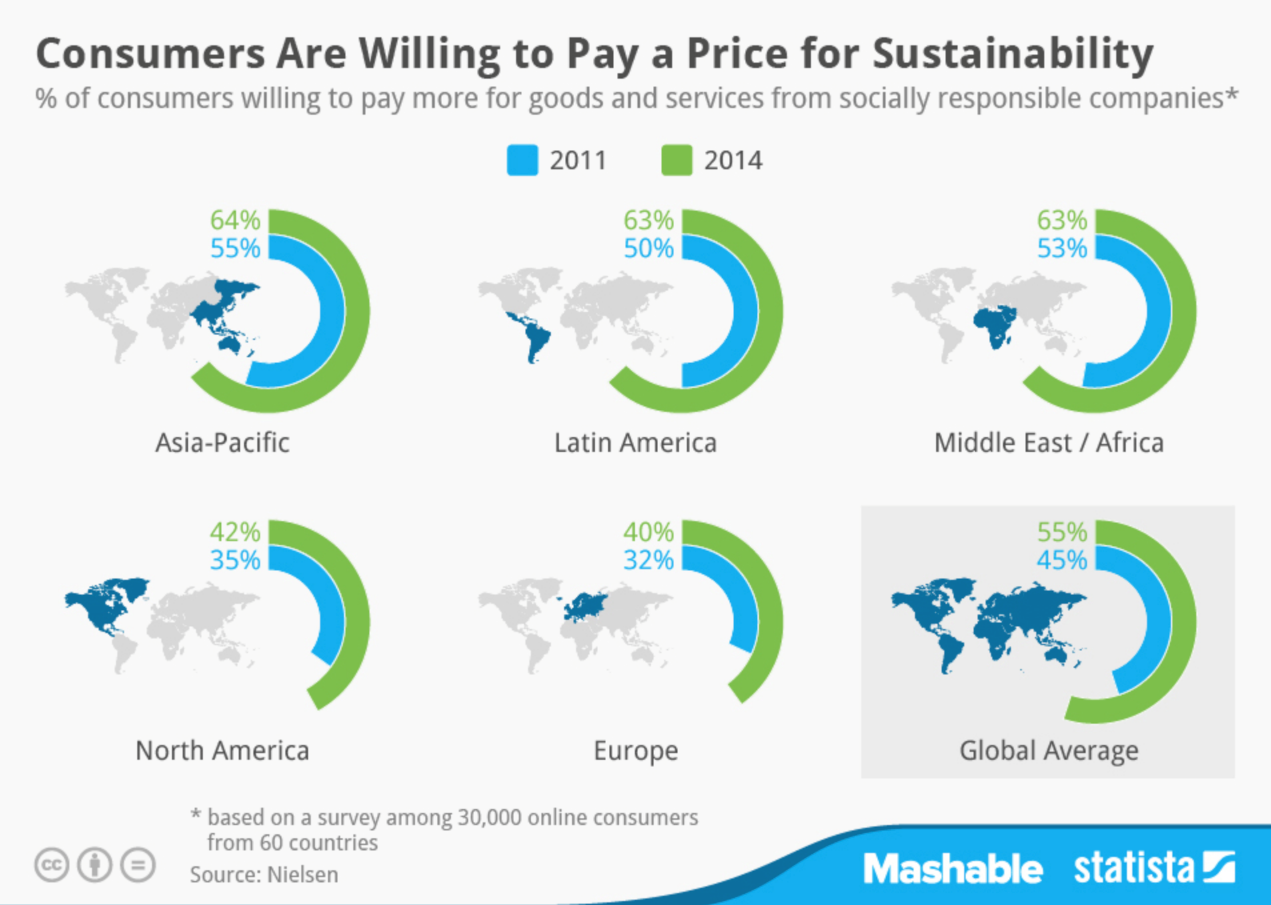
From the graph, it can be seen that the care of the customers to the company’s sustainability is common in the world. In Asia-pacific, Africa/Middle East, and Latin America, the average percentage is around 75%. Even in the low percentage area, like Europe and North America, the ratio is higher than 50%. In the company’s main market, the Asia-Pacific area, the customers have high care about the environmental issue.[[11]](#footnote-11)

1. Sustainable investment scale in global scale and China in 2018

|  |  |  |
| --- | --- | --- |
|  | Global | China |
| Acceptance of sustainable investment (ESG investment) | 65% | 83% |
| The sustainable investment ratio of total investment | 36% | 60% |

Source: UBS investor observation

The table above has shown that the concept of sustainable investment is popular in the world. More than half of global investors accept the concept of sustainable investment, and more than one-third of the global investors have made the sustainability-oriented investment. In comparison, the passion of investors in China to sustainable investment is even higher. More than 80% of investors accept the concept, and 60% of investors in China have made a sustainable investment. This data has reflected the trend of sustainable oriented investing method in China and the global market.[[12]](#footnote-12) Hence, it is reasonable to improve the company’s sustainability to increase the investors’ confidence and enhance the relationship with investors.

Consumers’ willingness to pay a price for sustainable

Source: Nielsen Holdings Plc

The graph above shows a growing trend in the global market that more and more customers are willing to pay more for the sustainability of the product/company. The global average ratio has increased by 10% in 2014 comping with the data in 2011. Moreover, in the company’s main market, the Asia-Pacific area, the ratio has increased by 11%.[[13]](#footnote-13) This graph has illustrated the growing trend of the prevalence of sustainable oriented consumption of customers in the world.

Overall, it is obvious that investors, companies, and customers are caring about sustainability more and more. In addition, it is the channel/method to enhance the company’s competitiveness in the global and local arenas and increase the attractiveness of the company to customers and investors.

**The managerial problem of the paper will be focused on shutting down of production plant (due to the inefficiency of the air purifying system and caused exhaust gas pollution exceeds standard)** **and current unsustainable operational orientation of the company (which creates obstacles to company’ long-term strategy of launching an IPO).**

# 2.0 Value Chain with Sustainable Operations in Tire Manufacturing Industry

## 2.1 Theoretical frameworks: stakeholder relations, sustainability, TBL approach, and SDG value chain

In this chapter, the author would like to examine theoretical frameworks that can be used for benchmarking analysis, impact analysis in the tire industry, and value chain analysis of the industry and company. After identifying the necessary theoretical tools, the author will conduct an impact analysis of the tire manufacturing industry, benchmarking analysis of tire manufacturers, and the impact analysis of the Fenyang Huarui Rubber Product Company along the value chain.

**CSR theory**

It’s important to understand the basis of the instruments that are going to be used, the author would like to outline the concept of corporate social responsibility. Oliver Sheldon first proposed the concept of corporate social responsibility in his book “The Philosophy of Management” in 1924. He has pointed out that corporate social responsibility is related to the needs of various stakeholders, including social, ethical, environmental, and economic factors.[[14]](#footnote-14) With the rapid development of the industrial economy, environmental pollution, economic disputes, product quality, and safety and other issues have followed, corporate social responsibility has become the focus of many scholars' research. Its content is constantly being developed and enriched. In 1953, Howard R. Bowen has mentioned in his book “Social Responsibilities of the Businessman” that the business activities of businessmen should be carried out under government policies and regulations. Their business decisions and behaviors should be consistent with social ethics and mainstream values.[[15]](#footnote-15) Next, in 1979, Carroll has given the definition of corporate social responsibility that “Corporate social responsibility encompasses the economic, legal, ethical, and discretionary (philanthropic) expectations that society has of organizations at a given point in time”.[[16]](#footnote-16) Later, a corporate social responsibility model is proposed by Carroll introducing stakeholder responsibility into corporate social responsibility. In the model, corporate social responsibility is redefined as economic, legal, ethical, and philanthropic responsibility. It is also known as Carroll’s pyramid of corporate social responsibility.[[17]](#footnote-17) In 1997, the Chinese scholar, Junhai Liu, believed that corporate social responsibility means that the purpose of corporate existence cannot be only making profits for shareholders, but also maximizing the protection of the interests of other stakeholders, including employees, communities, etc. [[18]](#footnote-18) In 2002, Daifu Lu has proposed that corporate social responsibility means that in addition to making profits for shareholders, companies also undertake the obligation to safeguard social interests. To a larger extent, corporate social responsibility refers to the ethical, moral, and legal responsibilities.[[19]](#footnote-19) In 2008, Qijun Jiang has proposed the definition of corporate social responsibility that in order to satisfy certain social interests, in addition to earning profits for shareholders, the company should also abide by the law and perform responsibilities to other stakeholders beyond the legal requirements.[[20]](#footnote-20)

It can be seen from the above literature summary that the definition of corporate social responsibility has been constantly improved and developed. Many experts define it from all sides. Although the definitions proposed by different people are various, most scholars agree with the following basic connotation, that is, in the process of creating profits, companies must fulfill corresponding social, economic and environmental responsibilities to the government, employees, consumers and other stakeholders.

**Sustainable development**

In 1981, Lester T. Brown has pointed out that only by controlling the population, protecting resources, and continuously developing green and environmentally friendly renewable resources, sustainable development can be achieved.[[21]](#footnote-21) Next, in 1987, Gro Harlem Brundtland, the Chair of the World Commission on Environment and Development (WCED), has proposed the definition of sustainable development in the “Chair of the World Commission on Environment and Development (WCED)” as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.[[22]](#footnote-22) Until 2015, the definition of sustainable development from the Brundtland Report still remains in the SDG Compass issued by the United Nation.[[23]](#footnote-23)

Overall, the sustainable development concept is generated based on the corporate social responsibility theory. They are related but with a certain difference that CSR is concerning at a boarder level, for instance, the enterprise’s charity activity and its role in the community, while sustainable development is more focusing on the impact made by the enterprise on the social, environmental, and economic perspective. Most importantly, the reason why the author would like to address the concept of sustainability in this paper is that sustainability is one of the approaches that help to link company’s economic goals (for instance being economically attractive for potential shareholders) while developing dynamic capabilities, that are important for the creation of the competitive advantage. Moreover, the economic interests of the company may not be sustainable without focusing on the stakeholders involved, who tend to have their own interests, and without meeting those interests the company wouldn’t achieve long-term prosperity. Addressing to company’s strategies it is important to make the actions, that will create strategical fulfillment with an orientation to sustainability, thus, long-term success.[[24]](#footnote-24)

Sustainable development is a business-specific approach. It focuses on the business operation of the enterprises to achieve long-term profitability, while remain the coordinated development with society and the environment. However, corporate social responsibility encompasses broader concerns that emphasize the obligations and accountabilities to stakeholders. Such as the enterprise’s philanthropic role in the community, and its charitable contribution. Therefore, in this paper, the author will put focus on sustainable development theory.

**Stakeholder theory**

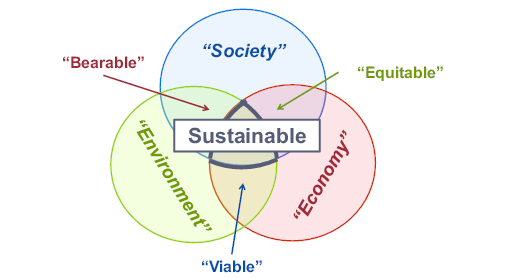
In 1984, Freeman in the "Strategic Management: A Stakeholder Approach" first used stakeholder theory to answer the question of what is the object of the enterprise's business activities to undertake social responsibility. He has defined stakeholders as any organization or individual who can influence the achievement of corporate goals. Stakeholders are broadly defined by Freeman, as shareholders, employees, suppliers, consumers, and other entities that directly affect the production activities of enterprises, as well as groups and individuals that indirectly affect enterprise activities such as governments, communities, and the environment.[[25]](#footnote-25)

In the stakeholder model proposed by R. Edward Freeman, the component of the stakeholder of a firm is clearly defined, including government, competitors, customers, employees, society, suppliers, and shareholders. It helps to understand the object of the practices that will be suggested in the paper as well as the object that is affected by the company’s current operations. The stakeholder approach can help to define the parties that were involved in the industry level as well, to see specifically who was affected by the impacts that will be covered there. The importance of understanding the stakeholders that are involved in the company operation is coming from the sustainability approach itself, which states that the company’s long-term prosperity and success are supporting their interests because without stakeholder’s support the corporation won’t be able to survive.[[26]](#footnote-26) This model is beneficial for the author to define the specific objectives of the company.

**Triple bottom line**

John Elkington thinks why a company can continue to grow and be invincible is because the thing is not just thinking about how to maximize profit, but always adhere to the triple bottom line principle, or triple surplus, that is, the unity of corporate profit, social responsibility, and environmental responsibility.[[27]](#footnote-27)[[28]](#footnote-28)

1. The triple bottom line framework

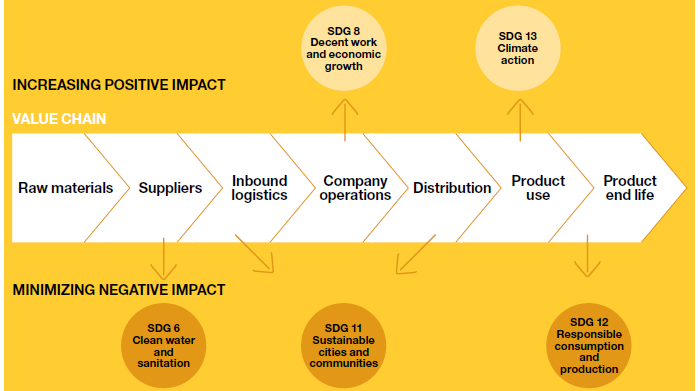


Source: John Elkington, Towards the Sustainable Corporation

From the graph, it is shown that the triple bottom line requires companies to pay attention to a social domain (such as honest cooperation, kind treatment of employees and community harmony, etc.) and environmental domain (such as natural resources, ecological protection, and recycling cycles) while paying attention to the traditional financial domain. This conceptual framework has introduced corporate social responsibility on the boarder dimension, included environmental responsibility. The three goals of economic benefit, environmental responsibility, and social responsibility are not isolated. They can facilitate the development of each other. Environmental protection participation and social responsibility fulfillment provide a large number of profits for enterprises, which is sufficient to compensate for the costs they pay. It is prominently shown to promote the long-term gain of enterprises. On the other hand, the improvement of economic efficiency can provide more capital for enterprises to carry out pollution treatment and corporate greening in a timely manner, so as to participate in environmental protection in an all-round way. At the same time, enterprises provide benefits to society and improve the living standards of employees, in order to assume greater social responsibility. In this paper, the triple bottom line approach can help the author to conduct an impact analysis of the rubber industry to identify the general impact caused by the companies’ operations through the economic, social, and environmental domains. Also, the author will define the benefit of the recommended practices for the enterprise through the three perspectives.

**Value chain**

For having a comprehensive picture of the impact created by the company along with its business operations, it’s important to refer to the value chain model proposed by the United Nations in SDG compass guideline:

1. SDG value chain

Source: United Nations

In this model, the logic between different sections of the value chain is clarified. Starting with the raw material to product end life, this model covers all the areas that company activities can reach by a sequence. It is more convenient to conduct a value chain analysis through the SDG model. Moreover, as it is shown in the picture, the positive and negative impact and how it contributes to the sustainable development goal is marked on each part of the value chain.[[29]](#footnote-29) In addition, the 17 sustainable development goals given in details in the SDG Compass, including no poverty, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, innovation, and infrastructure, reducing inequality, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace, justice, and strong institutions and partnerships for the goals.[[30]](#footnote-30) Hence, the SDG value chain model will be sued as a leading framework tool in this paper due to the reason that it covers the impacts generated by the company from a positive and negative perspective, and uses a clear structure of the value chain model that is connected with the business operations of the company. In this paper, the SDG value chain model would be used by the author to conduct value chain analysis for industry analysis and Fenyang Huarui Rubber Products Company to analyze the current impact generated along with the value chain segments. Also, the SDG value chain model will be applied in the benchmarking analysis to find out the possible recommendations for value modification for the company and proposal of recommendations, for having a more structured plan of suggestions for increasing the sustainability of the company.

**Stakeholder engagement**

In scientific literature, the trust of key stakeholders is considered to be the base for the survival of organizations. In the article “Engaging Stakeholders for Sustainable Development”, W. Leal Filho and L. Brandli have proposed that by engaging stakeholders on sustainability issues, the organization should build trust and long-term collaborative relationships.[[31]](#footnote-31) Also, in the book “Stakeholder Engagement and Sustainability”, it is defined that in the involvement of key stakeholders, the relationships need to be built based on trust and reciprocity of interest, thereby creating the condition for developing a sustainable business.[[32]](#footnote-32) In this paper, the author will focus on the improvement of the enterprise’s sustainability by enhancing the relationship between the firms and the stakeholders based on trust. The author would like to refer to the trust formation between the enterprise and stakeholders to identify the social benefit of the recommendation provided to the company.

1. Power-interest matrix for stakeholder prioritization



Source: Mendelow, A.L., “Environmental Scanning - The Impact of the Stakeholder Concept”

The graph above is the power-interest matrix model for the prioritization of the stakeholders. This model can prioritize different stakeholders according to their immediate interest (or concerns) and influence (or power) in the project. After the ranking, the relevant parties will fall within four quadrants, and then the company can adopt different communication and participation strategies for the relevant parties in four different quadrants. In the upper right corner of the matrix, the parties are deeply influenced by the project and have the right to speak. The company needs to let them fully participate in the project and do its best to meet their needs. Next, in the upper left corner, there are high-impact parties with weaker relevance. Their attitude is generally submissive, but they can also become key players if they are interested in the project because of unexpected reasons, such as excessive air pollution. The company has to satisfy their demand, but do not need to provide information and behavior beyond the demand. Then, in the lower right corner, there are stakeholders with low influence but who need to be fully communicated to ensure that there will be no problems. They usually express great interest in the specific situation of the project, and their opinions may also affect those parties with power. Finally, in the lower-left corner, there are stakeholders with low influence and little interest in the project. The company does not need to let them participate in the project, but keep paying attention to them.[[33]](#footnote-33)

This is a necessary step for the company to understand the urgent level of managing its relationship with different stakeholders. In this paper, the author will use the power-interest matrix to prioritize the company’s stakeholders and arrange the recommendations according to the stakeholder’s priorities.

**ESG investing (sustainable investing)**

Taken the definition of ESG investing (also called sustainable investing) from the Deutsche Bank Wealth Management, ESG is short for “Environmental, Social and Governance”. It sums up the key areas in which we must act to protect the natural world, ensure social progress, and improve the organizational governance standards that underpin the development and prosperity of the global economy.[[34]](#footnote-34) In other words, this is a kind of investment concept and corporate evaluation standard that focuses on the corporate environment, society, governance performance rather than the financial performance of the enterprise. Due to the fact that currently there is no international uniform standard of the content for each perspective (Environmental, Social and Governance), therefore the author has examined the guidelines of three major international organizations (ISO26000 Social Practice, SASB, GRI Sustainability Report) and the disclosure of ESG ratings by five global ESG rating companies (MSCI, Dow Jones, Thomson Reuters, FTSE, Morning Star), founded the common factors included:

1. Environmental aspects (E): carbon and greenhouse gas emissions, environmental policies, waste pollution, and management policies, energy use /consumption, natural resources (especially water resources) use and management policies, biodiversity, compliance.
2. Social aspects (S): Gender and gender balance policies, human rights policies and violations, associations (or communities), health and safety, management training, labor regulations, product liability, compliance
3. Governance (G): Corporate governance, corruption and bribery policies, anti-unfair competition, risk management, tax transparency, fair labor practices, ethical code of conduct, compliance

Based on ESG evaluation, investors can observe the ESG performance of enterprises to evaluate their investment behavior and the contribution of enterprises (investment objects) in promoting sustainable economic development and fulfilling social responsibilities.

This concept is sustainably oriented for both the enterprise and the investors. For the investors, they evaluate the company’s sustainability through the mentioned factors to find out the better choice, while for the company, it evaluates its investment to tangible and intangible assets through the factors above. Moreover, considering that the sustainable development theory only covers the environmental, economic, and social perspective, the governance perspective, as the “G” in the ESG investment concept, can help the author to define the benefit that company can receive from the recommendation to it-self, such as risk management and compliance with the law.

**Green competitiveness**

Michael Porter first proposed the concept of green competitiveness in the "New York Times" in 1991, and then became a hot topic in the world. He believes that green competition is the ability to gain market competitive advantage based on ecological protection and sustainable economic development model.[[35]](#footnote-35) In 1995, Porter and others put forward their own views from two aspects. First, strict environmental protection policies. In the short term, companies will gradually expand their investment in environmental protection, which has increased the pressure on enterprises and reduced the boots on the enterprises The impact of cost affects the competitiveness of enterprises; but in the long run, in order to reduce the pressure on the country's environmental policies, enterprises must constantly innovate. This innovation is fully reflected in technological innovation. Management innovation, to fundamentally solve problems, reduce environmental costs, and enhance the core capabilities of enterprises.[[36]](#footnote-36) Later, in the article “Green and Competitive: Ending the Stalemate” published in Harvard Business Review, it is written that the prevailing view is that there is an inherent and fixed trade-off: ecology versus the economy. On one side of the trade-off are the social benefits that arise from strict environmental standards. On the other are the industry’s private costs for prevention and cleanup—costs that lead to higher prices and reduced competitiveness. However, this static view of environmental regulation, in which everything except regulation is held constant, is incorrect. Because properly designed environmental standards can trigger innovations that lower the total cost of a product or improve its value. Such innovations allow companies to use a range of inputs more productively—from raw materials to energy to labor—thus offsetting the costs of improving environmental impact and ending the stalemate. Ultimately, this enhanced resource productivity makes companies more competitive, not less.[[37]](#footnote-37) Moreover, in the article “Green Competitiveness”, it is proved that economic growth and greenness are not mutually exclusive goals, but nor can they be guaranteed to be mutually enhancing.[[38]](#footnote-38) Therefore, the environmentally friendly practices/actions of the enterprise can increase its competitiveness, especially on a global scale. In this paper, the author will refer to the green competitiveness to evaluate the benefit brought from the environmental protecting operational activity of the enterprise.

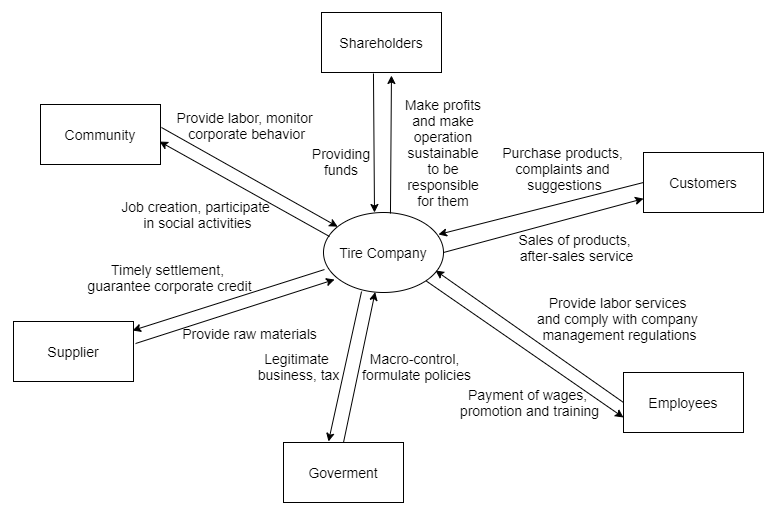
## 2.2 Impact analysis of the tire manufacturing industry

For analyzing the general impact creating activities of the tire manufacturing industry, the author would like to conduct an industry value chain analysis for defining the impact creating operations, specifies impact that is generated, and the stakeholders that affected by the specific operational activities. The analysis is important for the paper because it can give an outlook on the problems that are currently present in the rubber industry and give a basement on the analysis of the operational issues of Fenyang Huarui Rubber Products Company. Moreover, it can also help to understand the program orientation specifics and the basement of the companies that will be selected for the benchmark analysis.

### 2.2.1 Characteristics of the stakeholders in the tire manufacturing industry

Due to the fact that the impact analysis will be analyzing the impacts generated by the company to its stakeholders, the first step of the analysis is to identify the stakeholder in the tire manufacturing industry. In order to make the correlation between stakeholders and the company and their responsibilities more visualized, with the help of Freeman’s stakeholder theory, the author has made the following graph and table.

1. Stakeholders of the tire manufacturing industry



Source: made by the author

This graph has shown the identified stakeholders of the tire companies, and the activities that connect them. It’s crucial to understand this linkage between the company and particular stakeholders due to the reason, that it provides an understanding of the object of the impact created by the companies in the tire industry. It helps to understand the exact impact created from the company’s side to its stakeholders and from the stakeholders to the company.

The shareholders are presented here because, in relation to the company in the tire industry, they are providing funding support to the organization and in return, from the company’s side, they expect this enterprise to make profits and seek for the establishment of sustainable operations, for maintain company’s prosperity in the long-term perspective.

As for the customers, this stakeholder is crucial for the company because it provides a monetary benefit to the company through the purchasing of goods produced and possibly proposes suggestions on product improvements. From the company’s side, it provides to customers product itself available for purchasing, and after-sales service.

The employees are providing labor services, that are important for the production of tires, and comply with the company’s management regulations. From the enterprise perspective, tire company provides monetary compensation for the work (wage payments), promote employees to a higher position in the company and provide from training for increasing their productivity at the working place.

The government is presented here in relation to the company in the tire industry, it establishes a macro-control over the company’s business via regulations in the form of policy establishment. From the government perspective, the company is a tax-paying entity, thus, it contributes to the economic development of the country.

As for the suppliers, they are important stakeholders for the company because they provide necessary raw materials for tire production. From the company’s side, it provides suppliers’ timely payments for purchased raw materials for supporting good corporate reputation and good relationships with suppliers.

As for the last stakeholder, such as the community, the company contributes to employment by providing job positions at the production plants. The company also participates in social activities such a philanthropic activity (for example, it may provide an education program (lectures) to communities). From the community side, it provides a labor force that is important for the company and monitors the corporate behavior of the enterprise (monitoring of environmental violations, etc.)

The examination of the specific type of stakeholders in the tire manufacturing industry is important for providing an overlook of the specific stakeholders and their relationship with the company. However, after defining the stakeholders and their relation to the company, it’s important to address the stakeholders’ interests (concerns) and power (influence on the company), for having an understanding of the specific type of their interest and the influence they can have on the company. Thus, the author has constructed the following table:

1. Stakeholders’ interests and power

|  |  |  |
| --- | --- | --- |
| **Stakeholder** | **Main interests** | **Power (influence)** |
| Shareholders & investors | Dividends payment, growth in share price, profit growth | Have voting right effecting on business decision and director’s selection |
| Customers | Product quality, customer service, available choice of product | Word-of-mouth effect, affect revenue by the choice of product purchasing |
| Employees | Wage, working condition, motivation | Effect on production/service quality, employee turnover |
| Suppliers | The timely settlement, increase in purchasing volume, long-term corporation | Bargaining power, raw material availability, raw material quality |
| Government | Tax income, employment, company’s compliance with law and regulation | Regulate the company’s operation activities, has the right to shut down the production plant |
| Community | Local employment, environmental condition | Public opinion, supervision on the company’s activity |

Source: made by the author

The table above illustrates the stakeholders’ interests and how they can influence the company. As can be seen from the table, the main interest of shareholders and investors in the company is connected with the dividend’s payment and the growth in the share price. Another important attribute of this group of stakeholders is their interest in profit growth of the company because it connected with the company’s ability in dividend payments. In terms of power and influence that they may have on the company, they have a voting right, that may affect business decision and director’s selection.

The customer’s main interest in the company is connected with the quality of the product, customer service, and product availability on the market. In terms of power, the customers can affect the company’s reputation and business by “word-of-mouth” and affect the final revenues of the company by the product purchasing: if goods were not realized, the company will meet losses.

The employee’s main interest in the company is tightly linked with the wage payments, working conditions, and motivation instruments it can offer, for enhancing the will of employees to work for a certain company. From the influence perspective, the employees have a direct effect on the production process and quality of the final goods, as well as the service quality provided to the customers. Moreover, employees can also affect the company by employee turnover, the higher turnover – more negative it can affect on company’s reputation as an employer.

As for the suppliers, their interest in the company is connected with the timely payments provided by the company, the purchasing volume of raw materials, and long-term orientation in relationship with the company. From the power perspective, suppliers have bargaining power, raw material availability, and raw material quality in relation to companies.

The government’s main interest in the company is linked with the taxes paid by the companies, its ability to contribute to the employment rate, the company’s compliance with local laws and regulations. In terms of power, the state can impose strict regulations on the company’s operational activities and has the right to shut down the production plant in case of detected violations.

The community’s interest is connected with the local employment that the production facility of tire company can provide and the effect on the environment it brings by its business activity. The community’s power is represented in the public opinion that it can form and affect the company’s business, supervision on the company’s activity and ability to report to a local authority in case of some violations.

### 2.2.2 Tire manufacturing industry value chain: impact analysis

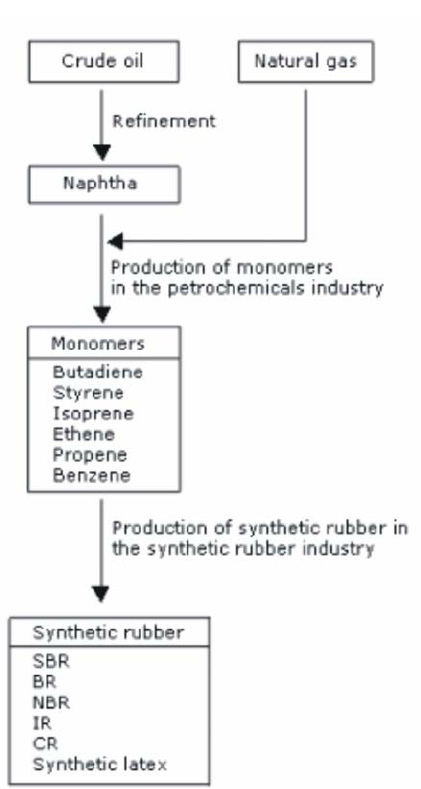
After identifying the tire industry’s main stakeholders and impact created to them from the company’s perspective, defining the specificity of relationships between the stakeholders and company, it’s important to clarify in details the specific type of business activity that is affecting the stakeholders, to define the impact created and impact objects involved such as specific stakeholders.

1. **Raw material**

For tire manufacturing, the main material consumed in the industry is rubber. It can be classified into two types according to the source: natural rubber and synthetic rubber. Natural rubber refers to natural latex collected from rubber trees. In general, the natural rubber itself is non-toxic and harmless for human beings and the environment. As for its source, the rubber forest is a sustainable tropical forest ecosystem and a pollution-free and renewable natural resource. Therefore, the consumption of natural rubber is the consumption of renewable resources. It is generating positive impact of delaying the depletion of natural resources that effecting on all related stakeholders, due to the reason that greenhouse effect and limited natural resources are affecting on whole human beings in their living conditions, so each stakeholder is a part of human society and in case of such global effect, all stakeholders are considered to be involved.

However, the production of natural rubber only accounts for one-third of the world total production, and the other 2/3 is a synthetic rubber.[[39]](#footnote-39) Synthetic rubber is a synthetic polymer with high elasticity. Also called synthetic elastomer, it is one of the three major synthetic materials, and its output is only lower than that of synthetic resin and synthetic fiber.[[40]](#footnote-40) Moreover, synthetic rubber is divided into general synthetic rubber and special rubber. Taken example of the most common one – general synthetic rubber, its main raw materials of general synthetic rubber are isoprene, butadiene, styrene, and chloroprene.

1. The fabrication of rubber products from



Source: made by Dr. Thoguluva Raghavan Vijayaram

From the graph it can be seen that there are various types of synthetic rubber, however, all of them are made from naphtha. And the naphtha is made from crude oil. Hence, the source of synthetic rubber is petroleum. Moreover, natural gas is another major raw material to produce synthetic rubber. Hence, the major raw material of synthetic rubber is fossil material.[[41]](#footnote-41) In the tire manufacturing industry, the synthetic rubber is the major raw material, due to its production mentioned above. In conclusion, by consuming the synthetic rubber, the tire manufacturing industry is vastly consuming fossil material. It is boosting the depletion of natural resources and contributing to the greenhouse effect to all stakeholders for the long term.

2. **Suppliers**

As it is explained in the raw material section, the naphtha is the common raw material of synthetic rubber, and various solvents, such as Isoprene, butadiene, styrene, and chloroprene. Regarding the source of naphtha, it is one of the petroleum products, also called chemical light oil, and is a light oil used in chemical raw materials processed by crude oil or other raw materials. Hence, most of the suppliers of the tire manufacturing industry is working in the oil industry and the petrochemical industry.[[42]](#footnote-42) Common air pollutants in the petrochemical industry include the following: (1) granular pollutants, (2) sulfur oxides, (3) nitrogen oxides, and (4) volatile organic compounds (Volatile Organic Compounds, hereinafter referred to as VOCs). These pollutants will cause harm to the human body. Moreover, there will also be a lot of pollution in the process of fossil material mining, including oil and gas extraction. For example, the main environmental pollution in the drilling process includes drilling waste liquid, gaseous pollutants from the combustion of the diesel engine in the well site, noise pollution during the drilling process, domestic sewage in the well site, pollution from blowout accidents, etc. Also, many environmental pollutants also produced during underground operations. During the acidizing operation, the acid liquid reacts with the formation's sulfur-bearing minerals, which may produce toxic and harmful hydrogen sulfide gas, causing atmospheric pollution; the well washing water after the underground operation will be rich in various acid liquids and chemical additives, forming a washing well sewage.[[43]](#footnote-43) Therefore, the environmental pollution caused by the suppliers’ production process is a common issue in the industry. Thus, they are vastly consuming fossil material, boosting the depletion of natural resources, and contributing to the greenhouse effect to all stakeholders for the long term.

3. **Inbound logistic & distribution**

Regarding the inbound logistics and distribution, the author has combined these two value chain sections due to the fact that they are all mainly about transportation. In general, most of the transportation methods, such as sea transportation and car transportation, are all using petroleum. It is consuming renewable resources. Moreover, the usage of petroleum will generate exhaust gas, contains greenhouse gas (carbon dioxide). Therefore, it is generating a negative impact to all stakeholders for the long-term. It is vastly consuming fossil fuel, resulting in the boosting of depletion of natural resources and contributing to the greenhouse effect to all stakeholders for the long term.

4. **Company operation**

During the rubber production process, a large amount of clean water resource is used to solidify and dilute latex, wash the cloth and rubber machinery, as well as a large amount of whey and unsolidified parts of fresh latex, eventually all become wastewater. The composition of wastewater is particularly complex. Except for the main containing rubber whey, there are proteins, lipids, sugars, and inorganic salts. It is a high concentration of organic sewage. Moreover, the wastewater is acidic. The COD concentration is particularly high, also the TN (total nitrogen) and TP (total phosphorus). If it is discharged directly into the river without treatment, it will deplete the dissolved oxygen in the water area, resulting in the growth of a large number of algae, and the occurrence of suffocation of aquatic organisms, which poses a serious threat to the ecological environment. Therefore, wastewater emission is contributing to water pollution, thereby affecting all stakeholders in the long run.

Next, large consumption of clean water comes from the company’s operation section, during the natural rubber processing and cooling stages. The main uses of water in the industrial production of tires are water for raw materials, water used directly as raw materials or as a part of raw materials; water for product treatment; water for boilers; and water for cooling, etc. Among them, cooling water generally accounts for 60% to 70% of industrial water.[[44]](#footnote-44) However, with such large water consumption, the waster after the cooling process more than 90% is lightly polluted. It can be used after proper treatment. Hence, the large amount of water consumption for a cooling function is causing unnecessary waste of the water resource. This operational activity is boosting the depletion of water resources affecting all stakeholders for the long term.

Except for the wastewater emission, the solid waste is another main source of the waste generated by the rubber production. In general, the solid waste contains unqualified products, waste rubber, dust ash, scraps, and waste packaging materials generated during the project production process. Commonly, the solid wastes are processed by landfill. In the long-term, it can pollute the land and underground water results in the risk to the people’s health. Hence, it is contributing to the pollution to land, negatively affecting all stakeholders for the long term.

During the tire production process, in order to make the rubber have higher strength and better properties various additives into the rubber in the production process, including Strengthener, softener, plasticizer, inhibitor, antioxidant, and so on. Among the additives, most of them are organic solvents, for instance, gasoline, chloroprene, and toluene. In most cases, these organic solvents are volatile and toxic. At the same time, in the major rubber production process, like mixing, calendaring, and vulcanization, the high temperature is needed. Therefore, during the production process, organic materials with lower boiling points can be released, resulting in a series of chemical reactions, and a lot of smoke is produced. The main components of rubber industry waste gas are sulfides and volatile organic compounds. This operational activity is contributing to air pollution, negatively effecting all stakeholders for the long term.

While focusing on the exhaust gas emission, another air issue is the VOCs generated in the job site. According to the chemical properties of VOCs, it can be divided into different types, such as alkanes, benzenes, alkenes, organic sulfurs, organic acids, phenols, etc. Among them, formaldehyde, benzene, and toluene are strong carcinogens. They can easily cause diseases of the human respiratory system, blood audit system, and nervous system. Also, hydrogen sulfide produced in the vulcanization process is a strong neurotoxin. It has a strong stimulating effect on the human’s mucosa. Moreover, sulfur dioxide is not highly toxic. However, long-term exposure to low concentrations of sulfur dioxide can cause headaches, fatigue, pharyngitis, bronchitis, bronchitis, emphysema, etc. Similarly, the VOCs (volatile organic compounds) can also make animals and plants sick. Overall, the rubber industry waste gas has serious harm to human health and the ecological environment.[[45]](#footnote-45) In other words, tire production is contributing to the VOC production, negatively affecting the health of employees in the job site, communities nearby, and society.

At the same time, the operation of enterprises is creating workplaces. It is providing a salary to employees so that it can benefit society. Also, it is contributing to the reduction of the unemployment rate benefiting the government. Moreover, the enterprises are contributing tax to the government. The tax contribution is benefiting the government.

Overall, when addressing the gas emission, all three benchmark companies have sufficient air purifying system as the initiative. However, about dealing with the VOCs produced in the job site, the hermetic production line of the Michelin Group and the ventilation system of Bridgestone Corporation is really high-technology and capital required. Next, all the benchmark companies have a cooling-water recycling system. It can save a large amount of water and cost. Then, only international companies have the capital to build a waste treatment plan, while the Linglong Tire Company is corporatizing with the city’s waste treatment station. Same as the solid waste. The additional initiative safety training is common for all three companies, to lessen the risk of production accidents.

5. **Product use**

When a company producing tires with good quality and offer it on the market, it satisfied the demand for tire using of people. It is generating a positive impact on customers. However, it is a common case that people do not know the appropriate way to use and treat the tire. Moreover, tire puncture is a factor that raises the risk of road driving safety. There is a statistic provided by the Ministry of Communications of China that in 2018, 48% of the total car accidents are caused by a flat tire.[[46]](#footnote-46) Commonly, the flat tire happens due to the fact that customers do not know how to protect the tire, and ignore the tire condition. As a result, road safety risk caused by tire puncture is seriously affecting customers’ safety. At large, it is affecting society.

In addition, when using the tires, it is common that petroleum needs to be consumed as the energy to drive the tire on the vehicles. Even though nowadays there are electric vehicles, the majority is still consuming the fossil fuel boosting of depletion of natural resources and contributing to the greenhouse effect to all stakeholders for the long term.

6. **Product end life**

In contrast to the “white pollution”, the pollution generated by waste tires is called “black pollution”. Waste tires have strong heat resistance, mechanical resistance, and degradation resistance. It will not be eliminated naturally for decades. Because of these properties, waste tires occupy many lands, and it is easy to breed mosquitoes to infect diseases. Moreover, waste tires are highly flammable. Once the waste tires burn, it will release a lot of toxic and harmful gases such as hydrogen sulfide, sulfur dioxide, benzene, xylene. In addition, it will generate waste oil, resulting in serious pollution of the soil, and destruction of the organic matter of the soil.[[47]](#footnote-47) Hence, the waste tire generation is increasing the pollutions affecting society, thereby worsening the relationship with society.

From the product end life section, it can be concluded that all the selected companies are addressing the problem of waste tire recycling though the adaptation of partnerships with organizations that are able to recycle the tire waste. Moreover, all three companies have also established a collecting service for waste tires to reduce environmental pollution caused by them.

For summarizing the findings from the impact analysis of the industry value chain, the author has developed a table:

1. Rubber industry value chain

|  |  |  |  |
| --- | --- | --- | --- |
| **Value chain segment** | **Activity** | **Impact generated** | **Stakeholders** |
| Raw materials | * Large fossil material consumption * Natural rubber consumption | Negative: contribution to the depletion of natural resources  Positive: consumption of natural and renewable resource | All stakeholders |
| Suppliers | * Environmental pollution caused by the suppliers | Negative: promotion of unethical employee treatment, reduction of land for plantation | Suppliers, employees, and communities |
| Inbound logistics and distribution | * Vast petroleum consumption | Negative: Generation of high CO2 emissions | All stakeholders |
| Company operations | * Exhaust gas emission * VOCs (Volatile organic compounds) produced in job site * Solid waste emission * Wastewater emission * Large clean water consumption for cooling * Tax contribution * Providing workplaces | Negative: generation of toxic organic components; CO2 emissions; large consumption of clean water (a non-renewable resource); pollution of the water banks by wastewater emissions; land and underground water pollution | Employees; all stakeholders |
| Product use | * Improper usage of the tires * Fossil fuel consumption when using tires * Proving of product that is needed by clients | Negative: possible car accident occurrence and health risk  Positive: satisfies the basic demand of its clients | Customers |
| Product end life | * Generation of waste tires (black pollution) | Negative: causes heavy environment pollution (soil, air, and water) | All stakeholders |

Source: made by the author

Overall, the author has conducted the industry analysis by using the SDG model of the rubber products value chain industry. The analysis conducted above helps to understand the peculiarities and specific impacts generated through the defined stages in the People’s Republic of China and is important for the further analysis of the paper as it prides an important outlook on the current problems that are present in the rubber industry and its main negative and positive impact generating actions.

## 2.3 Benchmarking analysis

In this part of the paper, the author would like to approach the benchmark analysis for identifying the possible recommendations that can apply to the Fenyang Huarui Rubber Products Company in the following part of the paper. Benchmark analysis is crucial for the paper because it can help to build the complex overlook of the practices that are implemented by international and local rubber products companies, for applying it for the value chain modification of the Fenyang Hurarui Company. As was mentioned earlier, the value chain modifications are curial for the company for being able to keep its business operations running nowadays when the government of China Mainland started to conduct checks on the pollutant content emissions and level of “green” operations established in the company. The orientation to “green” operations is connected with the company’s suitability focus along the value chain and proper action plan construction. However, for the building sustainable value chain its important to define possible programs that may be applied, so the benchmarking analysis takes place here. Thus, it will be able to compare not only the initiatives that are devoted to building sustainable operations of the companies in China mainland but also the international players in the rubber products industry, particularly the tire manufacturing industry. As it is mentioned, the benchmark analysis will consider tire manufacturing companies at the international level, and at the local level. In this paper, the benchmark analysis is conducted by using the SDG value chain model. Nothing that the author has united the inbound logistics and distribution as one section, due to the fact that the common focus on these two sections of the value chain is transportation.

For identifying the companies for benchmark analysis, the author has conducted an evaluation of 10 selected companies based on define criteria:

1. Benchmarking company selecting criteria

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Company/Criterion | Quality | Revenue USD ($) | Product variety | Dow Jones Sustainability Index | **Total** |
| Michelin | 10 | 10 | 9 | 10 | 39 |
| Pirelli | 9 | 5 | 7 | 7 | 28 |
| Cooper Tire | 8 | - | 6 | - | 14 |
| Goodyear | 6 | 6 | 8 | - | 20 |
| Continental | 3 | 8 | 4 | - | 15 |
| Dunlop | 5 | 7 | 3 | - | 15 |
| BFGoodrich | 4 | - | - | - | 4 |
| Bridgestone | 7 | 9 | 10 | 9 | 35 |
| Yokohama | 2 | 3 | 2 | - | 7 |
| Hankook Tire | 1 | 4 | 5 | 8 | 18 |
| Linglong Tire (Chinese) | - | 2 | 1 | - | 3 |
| Sumitomo Rubber Industries | - | 1 | - | - | 1 |

Source: made by the author

The criteria in the table were selected based on relevance to a paper theme and source reliability. Each score is given based on the company’s rank in the ranking list. The company in the first place will receive 10 points, the 2nd company receives 9 points, and the rest will be done in the same manner.

The first criteria stand for quality and show the company’s technological ability to maintain its production at high-quality global standards (safety and resilience orientation). In specific, the quality test result is a comprehensive indicator including dry braking, wet braking, handling, hydroplaning, snow traction, ice braking, ride comfort, noise, rolling resistance, and tested tread life (miles). This information is taken from the test result provided by the Consumer Reports Organization. Consumer Reports is an independent, nonprofit organization in the USA. The organization has the duty of driving regulatory and fair competitive practices to ensure transparency, and fairness in the marketplace. It is a reliable information source because all the test result is conducted in its self-owned testing center in Westchester County, N.Y. [[48]](#footnote-48)

The second criteria are revenue. This indicator stands for the company’s ability to acquire the capital and launch initiatives that are oriented at sustainable practices. Also, it can reflect the degree of customer acceptance of the products. This data is taken from Statista, a German online portal for statistics. It is reliable because its data is gained mainly from commercial organizations and government agencies. [[49]](#footnote-49)

The third criterion is the product variety. It shows the R&D abilities of the company, especially in acquiring new technological solutions for developing innovative products. This ranking data is provided by the Dongguan Securities Company. It is a state-owned national comprehensive securities company in China. Its data is reliable because the company has a professional data analysis team composed of 60 people, to provide reliable information for the investors. In 2015, Dongguan Securities Research ranked the 21st place in the ranking of the accuracy of research reports among brokerage research institutions in China.[[50]](#footnote-50)

The Dow Jones Sustainability Index shows the level of sustainability of the companies by evaluating the company’s practices through environmental, social, and governance (ESG) perspectives. In other words, this sustainability ranking is using the angle of sustainable investors’ ESG evaluating model. Hence, it also reflects the investors’ confident level to the company according to its sustainability level. By using the ESG evaluating model, this final score is a comprehensive score combining the performance in three domains, each domain accounts for 33.3% of the total score. In the governance domain, it includes factors, like operation management, risk management, codes of conduct/compliance, and other industry-specific criteria. As for the social domain, it contains factors, like human-capital development, talent attraction and retention, labor practice indicators, and industry-specific criteria. Finally, in the environmental domain, it has factors, like environmental reporting and industry-specific criteria.[[51]](#footnote-51) Regarding the information source, the Dow Jones Sustainability Index is considered the most respected independent sustainability ranking system.[[52]](#footnote-52) Until 2015, there is a global asset allocation of more than 5 billion US dollars made based on DJSI.[[53]](#footnote-53)

All the data in the table above covers the ranking conducted by 2018. From the table above, it can be seen that the Michelin Group has the highest score, accounts for 48 points, and the Bridgestone Corporation has 41 points as the second-highest score. These companies will be taken for the benchmarking analysis on the international level. The author has decided to pick Linglong Tire Company for the benchmark analysis at a local level. It was taken for the purpose of analyzing the practices established by the local Chinese manufactures and since the Linglong Tire is the only Chinese company in the ranking list. In the revenue ranking, the revenue of Bridgestone Corporation and Michelin Group in 2018 is 28 and 26 billion dollars relatively. As for the Linglong Tire Company, the company’s revenue in 2018 is 13.7 billion yuan, which equals 1.9 billion dollars. In comparison with the Fenyang Huarui Rubber Products Company’s revenue of 1 million yuan, equals 140 million dollars, the international companies’ scale is 192 times larger than the Huarui company, calculated by taking the average of the two international company’s revenue. However, the Linglong Tire Company is only 13.7 times bigger than the Huarui Rubber Products Company. Hence, it is reasonable to pick one local Chinese tire manufacture to see more feasible practices for the Huarui Rubber Products Company.

\*Note: all the information below in the benchmark analysis is taken from the companies’ sustainability report or corporate social responsibility report.[[54]](#footnote-54)[[55]](#footnote-55)[[56]](#footnote-56)

### 2.3.1 Raw materials

**Michelin Group**

Regarding the raw materials, the Michelin Group has put its focus on building a circular economy, including the commitment to the responsible management of natural rubber and using biomaterials to limit reliance on fossil-based raw materials. Since 2015, the Michelin Group has developed a global cooperation agreement with the World Wildlife Fund (WWF) to expand natural rubber production worldwide. The company has set up a program to develop sustainable natural rubber plantations and reforest concessions on Sumatra (66,000 hectares) and in East Kalimantan (20,000 hectares) with its partner Barito Pacific. As for the materials used in production, the company is using 28% renewable material. In specific, the Michelin Group has launched the “Biobutterfly” program for biomaterial research and development, corporate with French Petroleum Institute and the French Axens Company. In 2018, the project has successfully produced synthetic rubber by extracting biomass, such as sugar, wood, crops, etc. Moreover, the company is using recycled rubber in tire production as part of the raw material. After the waste tires are processed by the waste treatment plant, it will become micronized rubber powder. In such a form, the recycled rubber comes to be mix together with synthetic rubber or natural rubber for the tire production to replace part of the fossil raw material. Moreover, due to the fact that recycled rubber is a finished good, after the treatment with various solvents, it does not need to consume petroleum or aromatic hydrocarbon oil. Hence, it can reduce the usage of fossil material, such as synthetic rubber and petroleum. More importantly, in 2018, by applying recycled rubber, its raw material cost has been saved 50%.

These initiatives mentioned above are addressing the issue of large fossil material consumption. It is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term. Also, by reducing the fossil material content in the production, it can reduce the VOC produced in the job site, so that can reduce the employees’ health risk.

**Bridgestone Corporation**

In the raw material section, the Bridgestone Corporation is looking toward 100% sustainable materials. Firstly, the company is purchasing raw material produced from renewable resources. For instance, to produce synthetic rubber, the butadiene is needed. In general, industrial ethanol is refined from petroleum. However, the company is acquiring the ethanol generated from the biomass. Another example is the filler of the tire is produced from vegetable fats and oils, instead of the coal and petroleum. Such types of raw material can be used as a part of the business for the long run and reduce the consumption of fossil materials, like petroleum and butadiene. Secondly, the company is using recycled rubber in its production plants. Specifically, it is using the micronized rubber powder made from the waste tires. It can be applied to the production process for all types of tires, including the high-performance tires, and tires for agriculture and off-road applications. By using recycled rubber in tire production, the company can reduce the consumption of synthetic rubber and petroleum by 20%. The third initiative is the plant rubber plant to increase the production of natural rubber as a renewable material. Considering that the rubber trees like high temperatures, high humidity, quiet wind, and fertile soil, and the suitable average annual temperature are 26 ～ 27 ℃, currently, most of the rubber production is in South Asia. To expand the source of natural rubber, the company has developed the technology of extracting natural rubber from Guayule. The plant “Guayule” is a drought-tolerant and heat-resistant crop. Moreover, the company has discovered that the quality of the natural rubber produced from Guayule is basically the same as that of the rubber produced by the three-leaf rubber tree in Southeast Asia. Thus, the Guayule rubber can be applied in tire production. By planting Guayule, the company can increase the production of natural rubber and reduce the usage of synthetic rubber.

These initiatives mentioned above are addressing the issue of large fossil material consumption. It is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term. Also, by reducing the fossil material content in the production, it can reduce the VOC produced in the job site, so that can reduce the employees’ health risk.

**Linglong Tire Company**

As the rubber demand growing, the Linglong Tire Company is trying to increase the source of natural rubber. Currently, the main source of the natural rubber is the rubber tree. However, rubber trees can only be planted in tropical regions and require labor-intensive rubber collecting. When choosing the plant for natural rubber production, the company has examined the guayule, as the choice of the Bridgestone Corporation. Nevertheless, the guayule is suitable for growing in an arid climate, not in China with the temperate monsoon climate. Then, the company has picked Russian dandelion, also called rubber grass. Comparing with the guayule, rubber grass is suitable for cultivation in a temperate zone. In addition, it has the advantages of short planting time, high yield, and low planting requirements, thereby the annual planting can bring considerable economic benefits, so it is one of the ideal natural rubber raw materials. Nowadays, higher-quality Russian dandelion varieties have been cultivated and selected by the company, with a rubber content of 17% to 20%, much higher than 5% of the wild Russian dandelion type. Due to the fact that its physical and chemical properties are similar to the rubber of the trefoil tree, the company is using it in the tire production process. As a result, it has decreased the usage of synthetic rubber.

Regarding the tire production, the Linglong Tire Company has developed the technology to use highly dispersible silicide to replace carbon black together with its strategic partner Teto (Qingdao) Tire Technology Co., Ltd. Carbon black is a product of carbon materials (coal, natural gas, heavy oil, fuel oil, etc.) under incomplete combustion or thermal decomposition and under insufficient air conditions. Its production process produces a lot of exhaust gas-causing air pollution. In contrast, the highly dispersible silicide is extracted from quartz sand. It is widely found in nature, and its production process generates zero carbon dioxide. This is positively contributing to the environment. Moreover, in the tire production process, the plasticizers are needed. In general, it is produced from petroleum, such as aromatic hydrocarbons, naphthene, paraffin operating oil, and industrial petrolatum. It is not a renewable resource. Also, during the calendering process, petroleum-based plasticizers will generate carcinogens and stench, seriously endanger employees' health. Addressing the problem, with the help of the Teto Tire Technology Company, the Linglong Tire Company has developed the method to use vegetable oil instead of petroleum-based plasticizers. It is fully renewable and can reduce the carcinogens and stench produced during the production process.

These initiatives mentioned above are addressing the issue of large fossil material consumption. It is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term. Also, by reducing the fossil material content in the production, it can reduce the VOC produced in the job site, so that can reduce the employees’ health risk.

Overall, the initiatives of the three benchmark companies toward the issue of large fossil material consumption are similar. Its common focus in the development of “green innovation”, meaning that innovation can make the company more environmentally friendly and bring economic benefit at the same time. In specific, the first common initiative is the usage of recycled rubber. Considering that the recycled rubber is processed by the suppliers, it is not hard for a tire company to purchase it. However, to use such a raw material in the tire production process takes time to find out the suitable formula. Nevertheless, once the innovation succeeds, it can save the cost and bring more green competitiveness to the enterprise. The second common initiative is the usage of biomaterials in the production process. Different from the recycled rubber, to use biomaterial in tire production is high technology required. It is because the production of the biomaterial is already hard enough, also the physical properties of the biomaterials are truly different. Obviously, this solution requires the technology level of the firm and capital, and its R & D cycle is rather long. Except for innovations, the third common initiative is the planting of rubber plants. This initiative is providing more natural rubber resources for the companies to reduce the usage of synthetic rubber (fossil materials). At the same time, it is costly and time-consuming, and high technology required, . Moreover, while the latex of the rubber tree is collected by cutting the surface of the tree, the extraction of rubber from rubber plants also requires high technology equipment and talents. Hence, the usage of biomaterials and rubber plant planting is especially common for the rubber companies with large scale.

### 2.3.3 Suppliers

**Michelin Group**

For bringing sustainability to the company’s procurement section, the Michelin Group has proposed the Supplier Code of Conduct. It has defined fundamental principles for all suppliers to follow. In the Supplier Code of Conduct, there are several focuses. The first focus is the legal compliance. Meaning that all the suppliers must comply with the laws and regulations proposed in its region/country. Next, it focuses on labor and human rights. Relatively, suppliers should respect the employees and their human rights. Any kind of abuse, physical punishment, and harassment is prohibited. The third focus is on health and safety. Accordingly, suppliers must ensure a clean and safe working condition to minimize the health risk of their employees. Also, if the working condition is considered unsafe, the employees have the right to refuse to work. The fifth focus on the Supplier’s Code is the environment. Suppliers should do their best to prevent air pollution, water pollution, and solid pollution, consume energy efficiently, and reduce greenhouse gas emissions. The final focus of the Supplier’s Code is anti-corruption. It is written in the Code that any form of corruption or bribery in business activities is forbidden. Moreover, it is banned to send gifts between partners in a relationship to effect on one party. For all suppliers, if any kind of violation of the Code is discovered, the relationship between the Michelin Group and the supplier will be terminated right away. Moreover, to confirm all the suppliers follow the Supplier Code of Conduct, the Michelin Group has a partnership with an external auditor since 2016 to supervise the suppliers’ behavior. The external auditor will analyze the information provided by suppliers and find related evidence, and evaluate the suppliers’ performance. The investigation result would be delivered to the company in the form of the report. All the inspections are made based on the principle and standards contained in the Supplier Code of Conduct.

These two initiatives mentioned are addressing the issue of the illegal behavior of suppliers and environmental pollution caused by suppliers. It is reducing the environmental pollution caused by the suppliers to ensure the living condition of society. Also, it reduces the risk of the negative effect on the company due to the suppliers’ illegal behavior, thereby reducing the risk of losing the trust of the company’s future shareholders.

In addition, regarding the supplier selection, the Michelin Group has developed an evaluating system to ensure fair selection. The model consists of four categories, including quality, sustainability, business/strategic criticality, and safety at work. All the suppliers are involved in the evaluating system and must respond to the evaluating survey. After that, all the information collected will be published to the purchasing department, and the selection decision will be made objectively and understand the supervision of the company. This activity is enhancing the trust of suppliers through the creation of fair supplier competition.

Another additional initiative in the supplier’s section is that the company requires all the suppliers of chemical products to provide a Safety Data Sheet (SDS). In the production process of rubber product, many chemical solvents are needed, each type of solvent has different required storage conditions and emergency treatment method. The Safety Data Sheet is a comprehensive statement of 16 items of information on chemical composition information, physical and chemical parameters, explosive properties, toxicity, environmental hazards, and safe use, storage conditions, leakage emergency treatment, transportation regulations. It can help the company to better understand the storage method, emergency measures, and so on, to higher job safety. This initiative is reducing the risk of production accidents and enhancing the safety and trust of the employees.

**Bridgestone Corporation**

Regarding the supplier section, the Bridgestone Corporation has its own particular Global Sustainable Procurement Policy to ensure the sustainability of the suppliers. The standards covered in the Global Sustainable Procurement Policy represent the minimum requirements of the Bridgestone Corporation to its suppliers. If any of the violation of the policies is detected, the Bridgestone Corporation will terminate the partnership with the certain supplier immediately. Except for identifying the minimum requirements, the Global Sustainable Procurement Policy is also helping the company to evaluate and select suppliers of certain products and services.

In the Global Sustainable Procurement Policy, there are four major focuses of the suppliers. First of all, is transparency. The high transparency of the suppliers is the best way of supervision. More specifically, the suppliers’ policies and procedures should be transparent and disclosed in time. So that the suppliers’ decision making will be transparent and under the supervision of the stakeholders. It also results in the responsible decisions to the stakeholders. Moreover, high transparency can also strengthen effective governance regarding corruption, embezzlement, and so on. In addition, in order to be fully responsible for the company’s product, the Bridgestone Corporation asks the suppliers to disclose information until the origin of the product production. Such a policy can prevent the violations of rules during the production process of the suppliers, for instance, contempt for human rights, and child labor, also the damage to the natural environment, such as water pollution, plunder arable land, and destruction of biodiversity. Secondly, the focus is the compliance. By compliance, it means that the suppliers must obey the law and regulations of the countries and regions, where it operates. It includes but is not limited to child labor, labor abuse, inhuman working conditions, corruption, tax evasion, and so on. Moreover, the Bridgestone Corporation encourages suppliers to follow the international norms, if there is no different content defined by the local authorities. The third focus of the Global Sustainable Procurement Policy is quality, cost, and delivery (QCD) & innovation. For ensuring the quality of the final product, the Bridgestone Corporation requires the premium quality of the product or service provided by its suppliers. At the same time, they also pursuing innovative technology that can improve product quality and enhance the relationship with stakeholders. Finally, the last focus of the Global Sustainable Procurement Policy is sustainable procurement practices. As it is introduced in the industry analysis, the rubber industry is generating a negative impact on the environment. To enhance the sustainability of the suppliers, the Bridgestone Corporation inspects its sustainable practices, such as respect for human rights, compliance of the local law and regulations, pollutant purification, etc. By the establishment of the Supplier Code of Conduct and Global Sustainable Procurement Policy, the company has a standardized guild line and regulation to regulate suppliers.

Besides the Global Sustainable Procurement Policy proposed by the company, the Bridgestone Corporation also has a third-party assessment to the suppliers. At the aim of having a clear and objective evaluation of the suppliers, the Bridgestone Corporation corporate with EcoVadis Company to assess its supplier’s sustainability through the environmental, social, and governance (ESG) perspective. As for the EcoVadis Company, it is the world's most trusted provider of business sustainability ratings, intelligence, and collaborative performance improvement tools for global suppliers. Regarding the evaluating method, the ESG assessment including water, pollution, labor’s human rights, working condition, corruption, fraud, etc. With the help of the EcoVadis Company, the full assessment of the suppliers’ sustainability can be conducted. Thus, by the collaboration with the third-party supervising team, the company has a channel to supervise the suppliers.

These two initiatives are addressing the issue of the illegal behavior of suppliers and environmental pollution caused by suppliers. It is reducing the environmental pollution caused by the suppliers to ensure the living condition of society. Also, it reduces the risk of the negative effect on the company due to the suppliers’ illegal behavior, thereby reducing the risk of losing the trust of the company’s future shareholders.

In addition, the Bridgestone Corporation has fair procurement activity. Firstly, the company evaluates the candidate suppliers objectively by the team consists of specialists from the purchasing department, production department, R&D department, and with the third-party EcoVadis. Then, the results of the evaluation of all candidate suppliers will be shown to the Purchasing Committee. Eventually, the decisions are made by the Purchasing Committee, with detailed reasons published. In addition, all the operations of purchasing activities will be disclosed through the supplier relationships management system (SRM) to keep the transparency. Such a system can assure the fair selection of the suppliers. Also, regarding the procurement activities, another practice the Bridgestone Corporation has is the internal audits. The company has built a self-owned team for the audits of the company’s procurement and purchasing activities. Moreover, in order to make the result more trustable, the company has proposed a cross-audit program that auditors in different work sites with different locations will audit each other and examine each other’s audit results. This activity is enhancing the trust of suppliers through the creation of fair supplier competition.

**Linglong Tire Company**

When establishing a partnership with suppliers, the Linglong Tire Company will sign the appliance agreement with the stated policies of the Supplier Code of Conduct. In the Supplier Code of Conduct, there are several focuses. Firstly, it focuses on the human rights of employees. It states that suppliers should protect the human rights of their employees and make them feel dignified and respected, including the following aspects, such as no child labor, no labor abuse, no intimidation or sexual harassment, ensure employees’ legal work rights, ensure equal treatment, no discrimination and so on. The second focus is on occupational health and safety. Accordingly, suppliers should ensure that all employees work in safe and humane conditions. Also, facilities must be constructed and maintained in accordance with applicable laws and regulations, and emergency routes must be provided. Thirdly, business ethics, and legal compliance are contained. Meaning that suppliers should operate in good faith and comply with local laws and regulations. It is forbidden to have any kind of corruption, bribery, false report, embezzlement, and blackmail. The final focus of the Code is Environmental protection and land compliance. In specific, the suppliers need to optimize the use of natural resources, reduce the consumption of nonrenewable resources. In addition, the suppliers should comply with all applicable environmental laws and regulations. The respect to the land use rights of local communities and indigenous people affected is also required. To supervise the suppliers’ compliance with the Supplier Code of Conduct, the company has formed an inner team consists of 40 people from the procurement department to conduct a regular investigation to more than 1000 suppliers.

These two initiatives are addressing the issue of the illegal behavior of suppliers and environmental pollution caused by suppliers. It is reducing the environmental pollution caused by the suppliers to ensure the living condition of society. Also, it reduces the risk of the negative effect on the company due to the suppliers’ illegal behavior, thereby reducing the risk of losing the trust of the company’s future shareholders.

In addition, regarding supplier selection, the company has a fair selection policy to ensure fairness in the supplier selection section. The Linglong Tire Company has a comprehensive supplier evaluating system, containing the product quality, price, delivery time, business ethic policies, human rights policies, environment-protecting practices. The evaluation is made not only based on the information provided by the supplier itself but also on a team that will be sent to the supplier’s job site to make an independent evaluation. All the evaluation results will be recorded and saved in the company’s database. The final choice is made by the purchasing department based on the data provided in the database without the company’s name shown so that the decision-making process would be objective. This activity is enhancing the trust of suppliers through the creation of fair supplier competition.

Overall, the common initiative addressing the environmental pollution caused by suppliers is establishing the Supplier Code of Conduct. It is a standardized tool and regulation for regulating and guiding the suppliers. This is common for the companies at the international level and local level. Then, the third-party assessment is common only for global companies. This might because global companies have production plants and offices around the world. To corporate with a third-party organization is more efficient for global companies. Moreover, we can see that the fair selection program is common for all three benchmark companies. It shows that the companies at the international and local level are all promoting the fair competition of suppliers to enhance their relationships.

### 2.3.3 Inbound logistic & distribution

**Michelin Group**

Moving to the company’s inbound logistics and distribution, the Michelin Group has diversified the transportation method. Since the company is located in around 17 counties all around the world, it has the opportunity to switch from truck transportation to some alternative way that is more ecologically friendly. Therefore, a major part of the company’s raw materials and finished goods are delivered via sea or train transportation. Certainly, there is a shortage of the shipping method, for example, the low speed and inaccurate sailing date affected by climate uncertainty, compared with other transportation methods. However, sea transportation can bear a large volume of products. In general, a large cargo ship can load about 2000 containers at a time. Also, due to the large load and geography, sea transportation can transport products to many countries at once. Thereby reducing energy consumption and increasing transportation efficiency. Next, the Michelin Group has established the route optimization program. It means that the company is improving the transportation route in order to reduce the total distance traveled and higher transportation efficiency. By the improvement of route design, the total shipping cost and the energy consumption is lessened. Such a program is making the inbound logistic and distribution section more sustainable. Moreover, the company is trying to increase the fill rate which means that it reduces the empty driven kilometers by optimizing the vehicle capacity. As for the drivers of logistics and distribution, the Michelin Group gives training lessons to drivers on-road condition monitoring, so drivers are able to reduce the fuel consumption, which contributes to eco-driving and also help reduce the number of accidents.

These two initiatives are addressing the issue of large fossil fuel consumption. It is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term.

In addition, regarding the drivers of logistics and distribution, the Michelin Group gives training lessons to drivers on-road condition monitoring, so drivers are able to reduce the fuel consumption, that contributes to eco-driving and also help reduce the number of accidents. The training is conducted in the format of on-site diving with the invited professional instructors and teaches drivers how to operate in various situations that could potentially lead to substantial fuel consumption, such as changing weather and road conditions.

This initiative can reduce petroleum consumption so that it is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term.

**Bridgestone Corporation**

Regarding inbound logistics and distribution, transportation is the common focus. For the purpose of higher routing and delivery fleet performance, the Bridgestone Corporation has established a route optimization program for all worksites by using its big data platform. The route is designed according to the traffic big data collected to drive as little distance. Also, the loading rate of the transportation will be increased as high as possible. In addition, the different worksites will have a designed common procurement schedule to let the delivery fleet reduce the number of trips. It results in higher delivery efficiency and reduction of fuel consumption, leads to a decrease in carbon dioxide emission. Next, due to the company has many production plants around the world and sending products to the global market, various transportation methods are used, including sea transportation, rail transportation, road transportation, and air transportation. Among them, although the transportation speed of sea transportation is slow and needed to rely on forecasts to estimate arrival time, its cost is low and can transport large quantities of goods at once. As a result, petroleum consumption will be cut down.

These two initiatives are addressing the issue of large fossil fuel consumption. It is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term

In addition, except for the route design improvement, the product and raw material packaging is also the concern of the company. In 2018, the Bridgestone Corporation has implemented the tire sticker, replacing the polyester film (PET) package. As for the sticker, it is much smaller than the entire tire wrap of the polyester film. Such innovation can cut a lot of packaging material consumption and the total weight of the products. On the other hand, the Bridgestone Corporation also requires its suppliers to simplify their product packages as much as possible.

This initiative is reducing the consumption of plastic, thereby reducing the contribution to “white pollution” to the whole society.

**Linglong Tire Company**

Due to the fact that the Linglong Tire Company is selling its product to the whole China market and 20 oversea markets, sea transportation is a good choice. Considering the large cargo load of the ship, the company can send a thousand containers at once. Then, the ship can deliver the products to many countries on one trip. Such a transportation method can save a large amount of monetary cost and energy, thereby increasing transportation efficiency. In addition, the company has established a partnership with Hangzhou Tuchuan Technology Co., Ltd. By using the Tuchuan Intelligent Transportation Optimizing Software (ITOS), the system can find the route with the shortest total travel distance, appropriate delivery sequence, and suitable transportation mode in a different area. It results in the reduction of fossil fuel consumption and carbon dioxide emission. Its algorithm is running based on the traffic big data collected.

These two initiatives are addressing the issue of large fossil fuel consumption. It is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term

Overall, the route optimization is the common initiative for all three benchmarking companies. It is not very high technology required, considering its software is provided by the third party. As a result, it saves a lot of time and cost for the company. The second common initiative is sea transportation. It is common for international companies due to their destinations are located around the world. However, the Linglong Tire Company has this initiative is because it is located near to the sea. In other words, this initiative is highly connected with the geographical location of the firm and its destination of the products selling.

### 2.3.4 Company operations

**Michelin Group**

As it is mentioned in the raw material section, the company has the “Biobutterfly” program to produce bio-material. After the useful content, such as natural rubber and oil, is extracted from the plants, the rest biomass is delivered to the company’s production plant as an energy source. This is addressing the issue of the large consumption of fossil fuel. It is delaying the depletion of natural resources and reducing the contribution to greenhouse effecting not negatively effecting society for the long term.

It is known that during the tire production process, many organic solvents are inputted. As a result, there are tons of chemical hazardous wastes generated. If the hazardous solid wastes are buried in the soil, the soil and underground water all will be polluted and leads to further ecological damage. Dealing with such a danger, the Michelin Group is accelerating the zero waste to landfill program in all the production plants. Currently, all the hazardous wastes are reused as an energy source in the factory or sold to corresponding enterprises as raw materials. In 2018, the company has achieved zero solid waste to landfill. This program is reducing the land pollution caused by solid waste negatively affecting society for the long term.

As it is introduced in the industry analysis, tire production generates a significant negative impact on the environment due to the volatile organic compounds (VOC) and pungent odor. Coping with such problems, the best solution is to have a sufficient air purifying system. In specific, the company’s air purifying system is consists of three parts, including ventilation system, deodorization system, and purification system. With an effective ventilation system, the pungent odor produced in the workshop can be eliminated fast. Considering the fact that the pungent odor smell is not produced every minute. It is produced only when the calendaring process starts. Next, the deodorization system is responsible for two aspects. Firstly, it has the dust removing function to prepare the air for the following purification section. Secondly, it has the deodorant function to ensure the exhaust gas discharged to outdoor will not be smelling. Finally, the VOC content is eliminated by the purification system to ensure the gas discharged is not harmful to the environment and society. As it is introduced in the industry analysis, tire production generates a significant negative impact on the environment due to the volatile organic compounds (VOC) and pungent odor. Coping with such problems, the best solution is to have a sufficient air purifying system. In specific, the company’s air purifying system is consists of three parts, including ventilation system, deodorization system, and purification system. With an effective ventilation system, the pungent odor produced in the workshop can be eliminated fast. Considering the fact that the pungent odor smell is not produced every minute. It is produced only when the calendaring process starts. Next, the deodorization system is responsible for two aspects. Firstly, it has the dust removing function to prepare the air for the following purification section. Secondly, it has the deodorant function to ensure the exhaust gas discharged to outdoor will not be smelling. Finally, the VOC content is eliminated by the purification system to ensure the gas discharged is not harmful to the environment and society.

This initiative is addressing the issues of the generation of exhaust gas emission and VOCs produced in the job site. It is reducing the air pollution caused by exhaust gas negatively effecting the community nearby and the society for the long term. Also, it is reducing the VOCs in the job site negatively affecting the employees.

The production process of Michelin requires a large number of water resources. Accordingly, Michelin has installed a water-recycling system in all production plants, thus, the water-recycling system can recycle 85% of the cooling water during the production process. It significantly reduces the clean water intake and positively contributing to society, due to the reduction of the vast consumption of non-renewable resources. This initiative is addressing vast water consumption for cooling. It is reducing the consumption of clean water resources, thereby contributing to the delaying of depletion of natural water resources positively affecting the society for the long term.

Regarding the wastewater produced, the Michelin Group has built the self-owned sewage treatment plant around the world. It has ensured the wastewater discharged can meet the standards of the local authority. This initiative is addressing the issue of wastewater generation. It is reducing the pollution caused by the wastewater negatively effecting the nearby community and society.

Apart from a large amount of waste generated, energy consumption during the production process is vast. Regards the energy source, the production plant in Brazil of the Michelin Group is using renewable energy, such as biogas and biomass. The natural gas usage in the production plant in Brazil is 27% of the total energy consumption. Another initiative of the company to create renewable energy is building solar panels. As part of the sustainability efforts, the electricity consumed in the production plants will be partially provided by the solar panels. This initiative is reducing fossil energy consumption, thereby delaying the depletion of natural resources and reducing the greenhouse effect that negatively affects society.

Occupational health and safety are an integral part of the company’s sustainability development. Relatively, the Michelin Group has established an online safety training program. On the online platform, employees can study by themselves by watching videos and readings regarding chemical safety knowledge, safety operation regulations, first aid measures, etc. The online training platform enables the employees to study in the whole world, regardless of their location and job position. Moreover, the safety training program has a form of a game to increase the fun. As a result, in 2019 the occurrence of security accidents has decreased by 51%. This initiative is reducing the production accident risk thereby reducing the life safety risk of the employees, to enhance the trust and relationship with employees.

Except for the production process itself, the employees are the fundamental element to maintain the production running. To ensure the employee's equal treatment, the Michelin Group has proposed an equal employment policy. It stipulates that all the employees of the Michelin Group should receive equal treatment, regarding gender, religion, race, age, language, nationality, and so on. Each employee in the company should be equally treated and respected. This initiative is protecting the human right of employees, thereby enhance the trust and relationship with employees.

The Michelin Group has its own laboratory to conduct the quality test for the tires produced. In the testing section, high-speed durability, wear durability, and rolling resistance. This initiative is ensuring the product quality to give better product experience to the customers thereby enhance the trust and relationship with customers.

**Bridgestone Corporation**

As it is introduced in the industry analysis, the rubber products production generates various solid wastes. Among the solid wastes, most of it is toxic to the environment and the human race. Therefore, how to deal with solid waste is a crucial problem in the company’s operations. Addressing the solid waste pollution, the Bridgestone Corporation proposed the “Zero waste to landfill” program. This initiative requires all the job sites to prohibit any kind of landfill of solid waste. Instead, the company collect and classify the solid waste, then sell it or deliver it to the partners. For instance, the tires that do not meet the quality standard before the vulcanization will be collected and sold to the conveyor belt producers. Having the “Zero waste to landfill” program makes the company can have certain economic benefits while remaining environmentally friendly production. In 2018, the “Zero waste to landfill” program is fully achieved by all job sites of the Bridgestone Corporation. This program is reducing the land pollution caused by solid waste negatively affecting society for the long term.

In rubber product production, another main source of waste is wastewater. In the production process, the tire production process requires a large number of water resources. Accordingly, the Bridgestone Corporation has built its own sewage treatment plant to process the wastewater discharged around the world. After the waste treatment, the discharged water can meet the local waster emission standards. This initiative is addressing the issue of wastewater generation. It is reducing the pollution caused by the wastewater negatively effecting the nearby community and society.

Next, regarding the cooling water consumption, the company has installed a water-recycling system in all production plants. It can recycle 60% of the water consumed during the production process. Also, the system can reuse the wastewater after the purifying section for cooling function. In addition, due to the large area of the production plants, the rain collectors are built for most of its plants. Sometimes the content of the rainwater does not meet the standard of production, so the rainwater collectors are also connected with the water purifying system. In 2018, by using the water-recycling system, the company’s clean water consumption reduced 37% compared with 2017. The water recycling system and rainwater collecting system of the Bridgestone Corporation are addressing vast water consumption for cooling. They are reducing the consumption of clean water resources, thereby contributing to the delaying of depletion of natural water resources positively affecting the society for the long term.

As it is explained in the industry analysis, in order to produce rubber products with excellent quality, it is needed to add various solvents into the rubber material. Among them, most of the solvents are organic and highly volatile. Solving the air pollution caused by high VOC content, the Bridgestone Corporation has spent 20 years developing the hermetic production line. Through the hermetic continuous equipment, personnel and materials can be separated to achieve the goal of safe production. Moreover, the VOC content will be sealed in the hermetic equipment until entering the air purifying system. By the implementation of the hermetic production system, the VOC content generated has reduced 83%. Regarding air pollution, another main source of the air emission generated is the usage of fusil fuel. To resolve the high carbon dioxide pollutant produced by the fossil fuel combustion, the Bridgestone Corporation has rebuilt the boilers to be biomass boilers. Instead of fossil fuel, the boilers are driven by the wood pellet biomass combustion. It is much more eco-friendly than fossil fuel. As a result, the company’s carbon dioxide emission in 2018 has reduced by 50%. In addition, for making the exhaust gas cleaner, the company has rebuilt its boiler to be a natural gas boiler. These two initiatives are addressing the issues of the generation of exhaust gas emission and VOCs produced in the job site. It is reducing the air pollution caused by exhaust gas negatively effecting the community nearby and the society for the long term. Also, it is reducing the VOCs in the job site negatively affecting the employees.

Currently, the Bridgestone Corporation has rebuilt the boiler to be natural gas driven. However, natural gas is also one of the fossil energy sources. Hence, the company does not have any initiative addressing the problem of fossil energy consumption.

In addition, in company operations, the most important point is the quality of the products produced. The Bridgestone Corporation has established a quality inspection section in all the production plants. To have a clear assessment of the quality risk, the company has adopted the Failure Mode and Effect Analysis (FMEA) model and Critical to Quality (CTQ) inputs. Moreover, for having a better understanding of the data, all the results are visualized in the system. This initiative is ensuring the product quality to give better product experience to the customers thereby enhance the trust and relationship with customers.

In addition, human resources is also an important part of company operations. Accordingly, the company has proposed the Bridgestone Group Global Human Rights Policy. In the Bridgestone Group Global Human Rights Policy, the first focus is the prohibition of discrimination and harassment. The discrimination caused by any kind of reason in the company should be eliminated, such as gender, religion, race, language, age, sexual orientation, and so on. The next focus is the commitment to responsible labor practices. It is written in the policies that any violation of responsible labor practices, for example, child labor and forced labor, is not allowed. The Bridgestone Company fully respects the human rights of the laborers and assure clean and safe working conditions, reasonable working hours, and market-competitive salary. Nothing that the Bridgestone Group Global Human Rights Policy is not only applied inside of the company, but also for its suppliers to follow. Then, in order to ensure the complacence with group’s human rights policy, the company has formed a Global Human Rights Enhancement Committee (GHREC) to regulate the human rights practices on a global scale with the global human rights management system. Under the global human rights management system, the Human Rights working group verifies the status of the labor practices and diversity in all job sites and reports it to the management of every strategic unit and regional office. At the same time, for the purpose of improving the implementation of responsible labor practices, the company gives in-depth training for managers. In the whole group of the Bridgestone Corporation, all managers have accepted training about human rights policies, and new policy added every year on a regular basis. Regarding the training content, is not just introducing the policy itself, but also explaining and giving a case study about how to apply the policies in the actual work and what is the potential risk and benefit. This enables the managers with strategic thinking at all management positions and adjusts the practices according to the actual condition. In addition, the company has opened the 24-hour hotline, called “BridgeLine”, as the feedback and complaint channel for its employees. Accordingly, the hotline will answer the questions related to the company’s policies and code of conduct, also record the reports with human rights concerns. In addition, the company has opened the 24-hour hotline, called “BridgeLine”, as the feedback and complaint channel for its employees. Accordingly, the hotline will answer the questions related to the company’s policies and code of conduct, also record the reports with human rights concerns. This initiative is protecting the human right of employees, thereby enhance the trust and relationship with employees.

At the same time, for the purpose of improving the implementation of responsible labor practices, the company gives in-depth training for managers. In the whole group of the Bridgestone Corporation, all managers have accepted training about human rights policies, and new policy added every year on a regular basis. Regarding the training content, is not just introducing the policy itself, but also explaining and giving a case study about how to apply the policies in the actual work and what is the potential risk and benefit. This enables the managers with strategic thinking at all management positions and adjusts the practices according to the actual condition. This initiative is reducing the production accident risk thereby reducing the life safety risk of the employees, to enhance the trust and relationship with employees.

**Linglong Tire Company**

It is known that in the tire production process, a lot of wastewater and waste gas will be produced. Facing the waste treatment problem, the Linglong Tire Company has established a wastewater treatment plant and air purifying system. In specific, the company's exhaust gas purifying system is consists of three parts, including ventilation system, deodorization system, and purification system. With the usage of all three systems, the dust and VOC will be cleaned to meet the national emission standards. Also, the air pollutant in the workshop will be circulated to outdoor to offer a better workshop working condition. In addition, the odor is decomposed by the synergistic effect of high energy ultraviolet rays and ozone oxidation reaction. Such a system is pure electricity-driven and does not generate any kind of pollutant. Moreover, the company has started to use natural gas instead of coal to reduce the pollutant in the exhaust gas produced. This initiative is addressing the issues of the generation of exhaust gas emission and VOCs produced in the job site. It is reducing the air pollution caused by exhaust gas negatively effecting the community nearby and the society for the long term. Also, it is reducing the VOCs in the job site negatively affecting the employees.

Apart from air pollution, wastewater generation is also large. In terms of this issue, the Linglong Tire Company has built a wastewater treatment plant next to the production plant. In the plant, it is using the electrolytic flocculation method for wastewater purifying. The electrolytic flocculation method uses iron as the anode. Under the action of direct current, the anode dissolves and produces iron ions. After a series of hydrolysis, polymerization, and iron oxidation processes, the colloidal impurities and suspended impurities in the wastewater are flocculated and precipitated to be separated. In addition, the electrolytic flocculation process not only has the effect of coagulation and precipitation of colloidal impurities and suspended impurities but also can remove a variety of pollutants in water due to the oxidation of the anode and the reduction of the cathode. Comparing with other wastewater processing method, the electrolytic flocculation method consumes only electricity and has high purifying efficiency and shorter processing time. Certainly, the biological treatment method is more sustainable, however, it is suitable only for small wastewater volume processing. This initiative is addressing the issue of wastewater generation. It is reducing the pollution caused by the wastewater negatively effecting the nearby community and society.

Regrading the cooling water consumption, the Linglong Tire Company has built a double-composite cooling line designed as three floors, with a total length of 50 meters, covering an area of 250 square meters, and is designed as a five-floors 30 meters through technical transformation, saving more than 100 square meters of plant area. Moreover, seventy sets of water circulation equipment have been successively put into operation, and more than 60 pipelines have been transformed to form a closed water circulation system, so that the cooling water resource circulation rate has reached 100% in 2018, and 8,000 cubic meters of water can be saved daily. This initiative is addressing the issue of vast water consumption for cooling, thereby contributing to the delaying of depletion of natural water resources positively affecting the society for the long term.

As for the solid waste, currently, the Linglong Tire Company has a partnership with many solid waste collecting and treatment companies. All the solid waste is sold or given to its partner for appropriate processing. Currently, there is no pollution caused by the company’s solid waste. This initiative is addressing the issue of solid waste generation. It is has eliminated the pollution caused by the company’s solid waste, thereby enhancing the trust of society.

In the company, the employees are the most important resource to maintain the company’s operations. For the higher safety of employees, the Linglong Tire Company has proposed safe training to employees, covers accident case training, safety laws and regulations training, fire protection training, special operations training, occupational health training, job hazards, and operating procedures training, etc. In addition, the company has arranged necessary special training in daily routine. Through training, improve the safety awareness of all employees.

As it is introduced in the industry analysis, during the production process of the rubber products, many volatile organic compounds are produced. It is toxic for human beings, especially first-line workers that under long-term exposure to organic matters. Addressing the employees’ health risk, the protection for the first-line workers is necessary. Regarding the first-line worker health protection, the company equips its employees with labor protection supplies, including anti-dust and anti-poison masks, gloves, earplugs, goggles. This initiative has reduced the health risk of employees to enhance the trust and relationship with employees. This initiative is reducing the production accident risk thereby reducing the life safety risk of the employees, to enhance the trust and relationship with employees.

During the production process of rubber products, many volatile organic compounds are produced. It is toxic for human beings, especially first-line workers that under long-term exposure to organic matters. Addressing the employees’ health risk, the annual physical health check is afforded by the company, including routine health check, and occupational disease examination. Moreover, Different detailed occupational disease examinations are offered to employees in different positions. Except for the health check-ups offered, the protection for the first-line workers is necessary. Regarding the first-line worker health protection, the company equips its employees with labor protection supplies, including anti-dust and anti-poison masks, gloves, earplugs, goggles. By the protection provided, it has greatly reduced the risk of workers getting sick. These two initiatives are reducing the health risk of the employees, thereby enhancing the trust of employees.

Moreover, in order to improve the personal qualities and abilities of employees and fully mobilize the initiative and enthusiasm of all employees, the company has created a fair, just, and open promotion mechanism. First of all, the company forbids discriminations caused by any kind of reasons during the promotion process, such as gender, age, job type. Then, all the promoting decisions are made based on the employee’s performance evaluated in its department. In the Linglong Tire Company, after working in the company for 2-3 years, the employees with high performance can be promoted to be key employees of the department. Then, after working in the company for 3-5 years, the hard-working employee can be promoted to be a reserve cadre. Finally, after working in the company for 5-8 years, outstanding employees can be promoted to be a cadre of experts. Consequently, an open and fair promotion mechanism can promote the healthy competition of employees and enhance the working efficiency. This initiative has ensured the fair competition of the employees, thereby enhancing the trust of them.

### 2.3.5 Product use

**Michelin Group**

As it is explained in the impact analysis of the industry, one of the main sources of carbon dioxide emission is the vehicle’s fuel consumption while driving vehicles on the road. The negative impact generated from the greenhouse gas to the environment is significant. Therefore, the Michelin Group has developed a special tire surface to decrease the rolling resistance. Logically, the lower the rolling resistance is, the smaller the fuel consumption and CO2 emissions will be. By the end of 2018, the rolling resistance of the tires produced by the company is 8% smaller compared with the data in 2013, and it is reflected in the reduction of petroleum consumption.

This initiative is addressing the issue of large fossil fuel consumption. It is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term.

During the use of the product, it is a common situation that the drivers are not aware of the current condition of the tires. If the tire is in poor condition, the risk of occurring car accidents will be significantly higher. For solving the problem, the Michelin Group has established a digital scanning service “SnapScan”. In specific, the customers just need to enter the registration number in the APP and send the checking request. Later, the customers will receive a free report about the current tire condition, with the evaluation of the tire safety correlated. This service is bringing a positive impact on road safety around the world.

This initiative is addressing the customer’s unawareness of the proper usage of the tires. It is reducing the risk of a traffic accident caused by a flat tire affecting the customers and the whole society, thereby enhance the trust and relationship with customers and society.

As the only contact part between the car and the ground, the tire is self-evident for the safety of driving. Since 2003, Michelin has held lectures regarding the tires in different cities around the world every year. In the tire lecture, Michelin engineers generally share the knowledge of "basic knowledge of tires", "maintenance of tires", "misuses of tires", and "common tire failures". Also, the engineers will answer some popular questions from the audience, such as "When to check tire pressure", and "How to get the best tire wear" and other issues”. Through the lectures, more and more car owners understand the correct and comprehensive knowledge of tire safety and realize the importance of tires for driving safety.

This initiative is addressing the issue of customer’s unawareness of the proper use of the tires. It is reducing the road safety risk affecting the customers and society, thereby enhancing the trust and relationship with customers and society.

In addition, the Michelin Group has developed a series of studless winter tires. This invention is based on the appearance of polygonal crystals of diamond-like tough grip particles, which can improve the tire's ice grip like embedded tire nails. As the tire wears, environmentally friendly crystals are evenly distributed on the tread to prepare for grip. Such technology can protect the drivers from the winter slippery road, and not damage the road surface by installing snow spikes or snow chains. It results in higher driving safety.

This initiative is reducing the risk of a traffic accident caused by a flat tire affecting the customers and the whole society, thereby enhance the trust and relationship with customers and society.

**Bridgestone Corporation**

One more point worth mentioning is that the Bridgestone Corporation has developed a tire rolling resistance reduction to decrease the carbon dioxide emission. In detail, the NanoPro-Tech™ technology developed is nanotechnology to analyze and control the molecular structure of the rubber at the nanometer level. It can minimize the tire rolling resistance, in order to reduce the energy consumed, leads to higher fuel efficiency. Eventually, it results in less carbon dioxide emissions of the vehicles.

This initiative is addressing the issue of large fossil fuel consumption. It is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term.

The driver’s safety is also a focus of the Bridgestone Corporation. In 2014, the company has developed a new technology - DriveGuard tire to protect the drivers. Specifically, the DriveGuard tire is specially designed and process to enable the tire to keep working up to 80 kilometers, after the puncture (flat tire). So the car crash caused by the puncture is prevented. Also, the Bridgestone Company is following the trend of the internet of things. Besides the demand for after-sales service, the need for product monitors and measures is also an important part of the product user experience. In other words, the customers need the information of when they need what kind of service, and how is the current status of the product in use. On such a purpose, the Bridgestone Corporation has established the “IntelliTire” program. This program enables the customers to track the current status and safety of the product purchased in real-time. Regarding the channel, the company puts a unique QR code on each tire produced. When customers scan the QR code by their phone, they can see the visualized information on the webpage, containing the origin and production date of the tire, recommended service according to the product usage time, current product safety index, and so on. All the mentioned information is collected by the sensor installed inside of the tire. Moreover, the IntelliTire system can help the customers to have a regular schedule of repairing service, resulting in the higher safety of the passengers. In addition, the IntelliTire system can improve the repairing efficiency in the job site and lower the costs. It is because a lot of information is collected by the sensor inside of the tire, so the workers in the repairing center do not need to waste time and energy to make many regular tests, for instance, tire pressure checking, tire usage time tracking, etc. On the other hand, it also saves them time and money for the clients. One point worth to notice that this service is completely free for all clients.

These two initiatives are addressing the customer’s unawareness of the proper usage of the tires. It is reducing the risk of a traffic accident caused by a flat tire affecting the customers and the whole society, thereby enhance the trust and relationship with customers and society.

It is known that professional tire knowledge and correct tire use methods are the basis for ensuring road safety. The Bridgestone Corporation has held Bridgestone tire knowledge lecture in 100 cities around the world in 2018. At the lecture, the company’s expertise has focused on how to choose a tire and the safe use of knowledge of tire. Moreover, the expert has explained how to choose tires with excellent wetland performance in the rainy season and how to choose a suitable tire to improve the safety of driving on rainy days. It is because in the extreme weather road driving risk is much higher than in the sunny weather.

This initiative is addressing the issue of customer’s unawareness of the proper use of the tires. It is reducing the road safety risk affecting the customers and society, thereby enhancing the trust and relationship with customers and society.

In addition, regarding tire technology, the Bridgestone Corporation has developed a BLIZZAK tire. It is a type of studless winter tire. Credit to foamed rubber technology of the company, the special pattern designed and the special tire material processed can make the tire gain higher resistance on ice. Such technology can protect the drivers from the winter slippery road, and not damage the road surface by installing snow spikes or snow chains. Except for the technological innovation, the Bridgestone Corporation is giving road safety education seminars to all levels of the society. To drivers, the company provides free road safety education workshops with safe driving exercises. Hence, the drivers will not only study the safe driving theories but also learn practical driving skills to prevent themselves from distracted driving behaviors. Moreover, the company organizes free lectures in high schools about driving safety, to build the road safety concept throughout their lives.

This initiative is reducing the risk of a traffic accident caused by a flat tire affecting the customers and the whole society, thereby enhance the trust and relationship with customers and society.

While producing high-quality products, the Bridgestone Company is also concerning for the convenience of the product use and maintenance for the customers. Accordingly, the company has established the Ranger Mobility Solution. It means that the company offers mobile tire maintenance service, tire air refill, and so on, in the physical stores. Thus, drivers can have convenient service anywhere without worries. Moreover, the Bridgestone Company is not only considering the convenience but also considering the cost for the clients. In order to make a convenient service affordable for everyone, the company offers a subscription service with the name “MOBOX”. It contains the services, including guarantee for all types of tire damages, battery changing, oil changing, and other maintenance services with a low monthly payment.

This initiative is reducing the customers’ time cost, thereby enhancing the product experience and the relationship with customers.

**Linglong Tire Company**

For decreasing the fuel consumption during vehicle driving, the best solution is to lower the tire’s rolling resistance. The Linglong Tire Company has developed new mixing technology, by using novel functionalized solution polystyrene-butadiene rubber and highly dispersed silica. It can reduce the rolling resistance coefficient of the tire by 12%, while remaining the other tire performance, such as road holding, stability, strength, and corrosion resistance. According to the data provided by the company, fuel consumption will reduce by 2%.

This initiative is addressing the issue of large fossil fuel consumption. It is alleviating the depletion of natural resources and reducing the contribution to the greenhouse effect on the whole society for the long term.

While improving the safety level of the product, the company is also considering the safety of people. The Linglong Tire Company has organized and joined many promotional activities to promote green tire knowledge and safe use of tires to consumers, for example, road trips for safe travel, “China Green Safety Week”, and so on. In addition, these activities are free and publicly opened to society.

This initiative is addressing the issue of customer’s unawareness of the proper use of the tires. It is reducing the road safety risk affecting the customers and society, thereby enhancing the trust and relationship with customers and society.

In addition, the company has noticed the problem that new produced tires are generally with a strong smell, it is causing distress to the customer. Addressing the problem, the company has innovated the low-odor tire. This is made by the low-odor tread rubber composition founded by the company, including natural rubber, a copolymer of styrene and butadiene, neodymium cis-polybutadiene, reinforcing filler, and sulfur.

This initiative is reducing the odor affecting the customers, thereby enhancing the product experience and the relationship with the customers.

Currently, the company does not have any initiative addressing the tire puncture issue.

To conclude, road safety education seminars are a common initiative for all three benchmark companies. It is easy to hold and can increase the company’s exposure and brand image at the same time. Next, the tire surface improvement is also common for all three benchmark companies. It is technology and capital required. Then, only international companies have digital scanning service for tire monitoring. It is high technology required, due to the fact that to collect the tire data, a chip needs to be well designed and put into the tire. An additional initiative is DriveGuard tire (drivable after the puncture) product of the Bridgestone Corporation. This is high technology and capital required because the tire inner structure is changed (redesigned) and the inner material is resin. One more additional initiative is the low-odor tire. This is a result of the company’s R&D research. It should be noticed that all three benchmark companies have their own laboratory and R&D center for product development. This is might be not common for small and medium tire companies.

### 2.3.6 Product end life

**Michelin Group**

A waste tire is one major source of the environmental pollution caused by the rubber products industry. Coping with the problem, the Michelin Group has a well-established recycling service in European countries. In 2018, in France, the tire recycling rate is about 94%. However, there is one exception that in Russia the waste tire recycling rate is 21%.

This initiative is addressing the environmental pollution caused by the waste tire. It is reducing the “black pollution” effect on society, thereby enhancing the relationship with it.

After the waste tires are recycled, the company can be shredded or granulated to join the production process of the new tire production. To this end, Michelin recently acquired Lehigh Technologies, an expert in refining fine rubber powder after recycling tires. Moreover, the Michelin Group has developed partnerships with various companies. For instance, the rubber particles produced from waste tires can be added into the road construction process, so the rubber particles or waste tires will be sold to the road construction enterprises. Moreover, the rubber particles are sold to the horseracing arena, because it can be an elastic base material in horseback riding. Therefore, with the high waste tire recycling rate, the partnerships with other enterprises of the Michelin Group is making sure that the tires recycled can be reused efficiently.

These two initiatives are addressing the issue of waste tire generation. It is reducing the number of waste tire generated, and the relative pollutions affecting the society, thereby enhancing the relationship with society.

**Bridgestone Corporation**

In the product end life section, the biggest source of pollution is waste tires. As it is mentioned in the industry analysis, the “black pollution” is a technical problem for the whole world. The Bridgestone Corporation provide waste tire collecting service in its retail stores and promote its partners’ waste tire collecting actions.

This initiative is addressing the environmental pollution caused by the waste tire. It is reducing the “black pollution” effect on society, thereby enhancing the relationship with it.

After the waste tires are collected, the first focus of the Bridgestone Corporation is the reuse of high-quality waste tires. Due to safety concerns, the life of the tire body is much longer than the tire’s tread. In reality, it is a common case that the tire tread has been severely worn, but the tire structure is intact. If this kind of tire was sent to a garbage disposal plant, it would be a large waste of resources. Relatively, the Bridgestone Corporation has built repairing points in many of its retail stores. As a result, the customers can receive the retread tire within 2 hours in the retail stores, with price equals to 10% of the normal tire. Next, for making the recycling process more efficient, the Bridgestone Corporation has built a Waste Tire Recycling Center. It openly purchases waste tire from society and recycles the waste tire according to its status. If the main body of the tire is still fine, then it can be made as a retread tire. The rest low-quality waste tires will be processed to be rubber power to join the new tire production process. Moreover, the company has established a partnership with the Delta-Energy Group to Develop methods to recover carbon black from used rubber products (including tires). Compared with traditional carbon black manufacturing methods, CO2 emissions can be reduced by 81% per ton. In 2018, the Bridgestone Corporation has purchased 235 tons (equivalent to 70,000 used tires) from Delta to recycle carbon black for use as a reinforcing filler for tires for agricultural and passenger applications.

These initiatives are addressing the issue of waste tire generation. It is reducing the number of waste tire generated, and the relative pollutions affecting the society, thereby enhancing the relationship with society.

**Linglong Tire Company**

The Linglong Company has established a partnership with waste tire recycling organizations and plants. In specific, the company provides the waste tire collecting service in its retail stores, and the customer will receive a coupon with a discount of buying new tire after they bring the waste tires to the store.

This initiative is addressing the environmental pollution caused by the waste tire. It is reducing the “black pollution” effect on society, thereby enhancing the relationship with it.

Regarding the partners, the company has established a partnership with the China Rubber Industry Association, it will help the company to do promotional work about the recycling service provided. Then, the waste tire collected will be sent to their partner company the Guangzhou Value Group. All the waste tires received will be processed in its waste tire processing plant. After the waste tires are processed, the rubber powder will be sent back to the Linglong Tire Company with a low price as the raw material of the new tire production. With such a virtuous circle, sustainable production and consumption patterns are facilitated, thereby contributing to the environment and society.

These initiatives are addressing the issue of waste tire generation. It is reducing the number of waste tire generated, and the relative pollutions affecting the society, thereby enhancing the relationship with society.

### 2.3.7 Benchmark findings

In the benchmark analysis, the author has chosen the Bridgestone Corporation and The Michelin Group Company according to the ranking in the Dow Jones Sustainability Index 2018 conducted by the S&P Dow Jones Indices, and the investment expert RobecoSAM. The analysis of the two companies at the international level is conducted along the SDG value chain model provided by the United Nations.

Next, for having a comprehensive overlook of the practices not only implemented by the international players but also, considering the peculiarities of the Chinese market, the author decides to examine the tire manufacture at the local level. There is only one tire manufacturing company, The Linglong Tire Company, which is chosen, according to the Ranking of Chinese Enterprises' Sustainability Index 2019 issued by the China Business Council for Sustainable Development. For better visualization, the following table has combined the initiatives of international companies and the local Chinese company.

1. Benchmark findings of the tire manufacturers at the international and local level

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Value chain section | Issues addressed | Company | Company initiatives | Impact generated | Stakeholders involved |
| Raw material | 1. Large fossil material consumption | Michelin Group | Usage of recycled rubber; Usage of biomass materials; rubber yielding plant planting (Guayule) (1) | Alleviate the depletion of natural resources, reduce contribution to the greenhouse effect; reduce VOC in job site | All stakeholders; employees |
|  | Bridgestone Corporation | Usage of recycled rubber; Usage of vegetable oil, rubber yielding plant planting (Guayule) (1) | Alleviate the depletion of natural resources, reduce contribution to the greenhouse effect; reduce VOC in job site | All stakeholders; employees |
|  | Raw material quality inspection (add.) | Ensure raw material quality | Customers |
|  | Linglong Tire Company | Usage of recycled rubber; usage of vegetable oil; Usage of highly dispersible silicide; Rubber yielding plant planting (Rubber grass) (1) | Alleviate the depletion of natural resources, reduce contribution to greenhouse effect; reduce VOC in job site | All stakeholders; employees |
| Suppliers | 1. Environment pollution caused by suppliers | Michelin Group | Supplier Code of Conduct; Third-party assessment of supplier; Establishing internal audits (1) | Reducing pollution caused by suppliers and supplier’s illegal behavior | All stakeholders |
|  | Fair supplier selection (add.) | Promote fair competition | Suppliers |
|  | A requirement of the chemical safety data sheet (add.) | Ensure raw material safety | Employees, community |
|  | Bridgestone Corporation | Supplier Code of Conduct; Third-party assessment of supplier (1) | Reducing pollution caused by suppliers and supplier’s illegal behavior | All stakeholders |
|  | Fair supplier selection (add.) | Promote fair competition | Suppliers |
|  | Linglong Tire Company | Supplier Code of Conduct (1) | Reducing pollution caused by suppliers and supplier’s illegal behavior | All stakeholders |
|  | Fair supplier selection (add.) | Promote fair competition | Suppliers |
| Inbound logistic & distribution | 1. Vast petroleum consumption | Michelin Group | Route optimization, sea transportation (1) | alleviating the depletion of natural resources and reducing the contribution to greenhouse effect | All stakeholders |
| Product packaging simplification (add.) | Reduce indecomposable material consumption | All stakeholders |
| Bridgestone Corporation | Route optimization; Sea transportation; Increasing loading rates; Encouraging eco-driving (1) | alleviating the depletion of natural resources and reducing the contribution to greenhouse effect | All stakeholders |
| Linglong Tire Company | Route optimization; Sea transportation (1) | alleviating the depletion of natural resources and reducing the contribution to greenhouse effect | All stakeholders |
| Company operations | 1. Exhaust gas emission 2. VOCs (Volatile organic compounds) produced in job site 3. Solid waste emission 4. Vast water consumption for cooling 5. Wastewater emission 6. Vast fossil energy consumption | Michelin Group | Exhaust gas purifying system (1) | Reduce air pollution caused by exhaust gas emission | All stakeholders |
| Ventilation system (2) | Reduce employee’s health risk | Employees |
| Zero waste to landfill (3) | Reduce land occupation and land pollution | All stakeholders |
| Water-recycling system (4)(5) | Reduce water pollution, delay depletion of natural water resource | All stakeholders |
| Bridgestone Corporation | Exhaust gas purifying system (1) | Reduce air pollution caused by exhaust gas emission | All stakeholders |
|  | Hermetic (closed) production line (2) | Reduce employee’s health risk | Employees |
|  | Zero waste to landfill (3) | Reduce land occupation and land pollution | All stakeholders |
|  | Water-recycling system (4)(5) | Reduce water pollution, delay depletion of natural water resource | All stakeholders |
|  | Usage of bioenergy (6) | Delay depletion of natural resource and reduce contribution to greenhouse effect | All stakeholders |
| Linglong Tire Company | Exhaust gas purifying system, usage of natural gas (1) | Reduce air pollution caused by exhaust gas emission | All stakeholders |
| Partnership with solid waste disposal company (3) | Reduce land occupation and land pollution | All stakeholders |
| Cooling water circulatory system (4) | Delay depletion of natural water resource | All stakeholders |
| Wastewater treatment plant (5) | Reduce wastewater pollution caused by water emission | All stakeholders |
| Product use | 1. improper usage of the tires | Michelin Group | Road safety education seminars (1) | Increase customers’ awareness of the proper usage of the tires | Customers |
| Improve tire surface to minimize rolling resistance (2) | Reduce contribution to depletion of natural resource and greenhouse effect | All stakeholders |
| Digital scanning service for tire monitor (add.) | Reduce road driving risk | Customers |
| Bridgestone Corporation | Road safety education seminars (1) | Increase customers’ awareness of the proper usage of the tires | Customers |
| Improve tire surface to minimize rolling resistance (2) | Reduce contribution to depletion of natural resource and greenhouse effect | All stakeholders |
| Digital scanning service for tire monitor (add.) | Reduce road driving risk | Customers |
| Linglong Tire Company | Lecture of safe use of tires(1) | Increase customers’ awareness of the proper usage of the tires | Customers |
| Improve tire surface to minimize rolling resistance (2) | Reduce contribution to depletion of natural resource and greenhouse effect | All stakeholders |
| Product end life | 1. Generation of waste tire | Michelin Group | Waste tire collecting (1) | Reduce environmental pollution caused by waste tires | All stakeholders |
| Acquisition of tire recycling company (2) | Reduce the number of the waste tire, create value of waste tires | All stakeholders |
| Bridgestone Corporation | Waste tire collecting (1) | Reduce environmental pollution caused by waste tires | All stakeholders |
| Tire retreading service (2) | Reduce the number of waste tire, create value of waste tires | Customers, all other stakeholders |
| Linglong Tire Company | Waste tire collecting (1) | Reduce environmental pollution caused by waste tires | All stakeholders |
| Partnerships with recycling organizations and plants (2) | Reduce number of waste tire, create value of waste tires | All stakeholders |

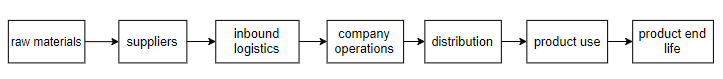
Source: made by the author

As it is shown in the table, it can be seen that in the raw material section, both the international and local tire producers have developed the technology to use renewable raw material, such as vegetable oil and resin, instead of nonrenewable or harmful raw material, like petroleum and aromatic oil. Also, they all have plant plants other than rubber trees to diversify the source of natural rubber and to have self-supply of natural rubber. Regarding the supplier section, both international and local tire producers have a supplier code of conduct and fair supplier selection. However, only international tire companies have the third-party supervision of the supplier selection process and the procurement process. Next, in the inbound logistic & distribution section, both the international and local tire producers have implemented the route optimization and sea transportation. The possible reason why the Bridgestone Corporation does not have much sea transportation, is many factories of the company are built around the world and close to the target market. As for the company operation section, both international and local tire producers are paying attention to the production safety and employees’ health by offering a safety training program, health check-ups. Also, the well-established waste purifying systems show that waste treatment is another focus of the companies. Nevertheless, only the Bridgestone Corporation has fully achieved zero waste to landfill, while the Michelin Group Company has partial waste to landfill and the Linglong Tire Company has all solid waste to landfills. Moreover, the Michelin Group Company and the Linglong Tire Company are using natural gas as their main source of energy, in contrast, the Bridgestone Corporation is replacing the fossil flue by using biomass and biogas. Regards product use, both the international and local tire producers have designed the special surface to reduce the tire’s rolling resistance and the promotion activity to the public about the safe use of the tires. Nevertheless, only the international tire producers have developed studless winter tires to higher the driving safety and providing digital scanning service by printing QR code on the tire body. Finally, in the product end life section, both the international and local tire producers have a waste tire collecting service and partnership with recycling organizations and plants.

Overall, from the benchmark analysis conducted above, it can be seen that the programs and initiatives of the international producers are more costly and high technology required compared with the Chinese local tire producer. Such a difference could be explained by the international company’s huge scale and capital. Both two international companies have production plants in many countries and have cooperation with different universities around the world.

## 2.4 Impact analysis of the operational practices of the Fenyang Huarui Rubber Products Company along the value chain

For building the sustainable value chain for the Fenyang Huarui Rubber products company, it is necessary to analyze the current value chain statues of the company to find out the practices and the impact created on each section of the value chain. Same as in the benchmark analysis, the author will refer to the SDG value chain model provided by the United Nations. The value chain model includes the following components: raw materials, suppliers, inbound logistic and distribution, products use, and product end life:

1. Value chain

Source: SDG compass

1. **Raw materials**

According to the information provided by the Fenyang Haurui Rubber Products Company’s representatives in the interview, in the tire production process, all the rubber used is a synthetic rubber, because the natural rubber is much more expensive in comparison to the synthetic since 2015. However, the usage of synthetic rubber as a main raw material is considered to be a negative impact creating action due to the fact, that synthetic rubber is fully produced by petroleum and petroleum-based solvents. In addition, another main material of organic solvent is also petroleum products, such as aromatic hydrocarbon oil. Hence, in the company’s raw material section, its raw materials are all made from petroleum. Such a choice of using fossil raw material is contributing to the depletion of natural resources and the greenhouse effect that effecting on all stakeholders.

To summarize the findings the author would like to construct the table below:

1. Huarui Rubber current operations in the raw material section

|  |  |  |  |
| --- | --- | --- | --- |
| **Huarui Rubber Company’s current operational practices** | | | |
| Issues addressed | Company initiatives | Impact generated | Stakeholders involved |
| 1. Large fossil material consumption | Full reliance on fossil material (synthetic rubber, petroleum) | Contribution to the greenhouse effect and depletion of natural resource | All stakeholders |

Source: made by the author

1. **Suppliers**

According to the interview conducted with the company’s representatives, Regarding the suppliers, currently, there is an absence of the management and supervision of the supplier’s business activity. For now, the Fenyang Huarui Rubber Products Company only focuses on the checking of the product/service supplied and the delivery date. The suppliers’ behavior is not in the care of the company. Nevertheless, they neglect the suppliers’ behavior is potentially generating a negative impact on the environment, society, and the company itself. Because if any of the suppliers do not comply with the law and regulation, or producing the products by harming the environment and society, the company is indirectly supporting their action. In addition, if any of the suppliers lose their reputation due to being reported or inspected, it will also affect the Fenyang Huarui Rubber Products Company and on the trust of its future shareholders.

Moreover, concerning the supplier selection procedure, the company has only selected based on the price and quality criteria, but the problem here is that the selection process is not transparent at all. The whole supplier selection process is made by several representatives from the procurement department and all negotiations are conducted with the supplier’s representatives face to face. There is an only a paper record made by the representatives from the procurement department. so there is a high risk of occurrence of the bribery presents and unfair supplier selection practices as well. Therefore, the current selection procedure is negatively contributing to the creation of fair supplier competition.

To summarize the findings the author would like to construct the table below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Huarui Rubber Company’s current operational practices** | | | |
| Issues addressed | Company initiatives | Impact generated | Stakeholders involved |
| 1. Environment pollution caused by a supplier | 1. Supervision and regulation only on suppliers' product quality and delivery data 2. low transparency of supplier selection | 1. High risk of supplier illegal actions and unethical behavior; high risk of unfair supplier selection 2. negatively contributing to the creation of fair supplier competition | Suppliers, |

1. Huarui Rubber current operations in the supplier section

Source: made by the author

From the table above it can be seen how the company’s initiates are connected with the issues that were earlier defined from the industry value chain analysis. The company is generating a negative impact in relation to the issue that was discovered from the tire industry analysis.

1. **Inbound logistic & distribution**

According to the information given by the company’s representatives, currently, the company is using airplanes and trucks for the raw material and product transportation. However, regarding the exporting product, the company is mainly using sea transportation. This is a less petroleum consuming transportation method that reducing the contribution to the greenhouse effect and depletion of natural resources affecting all stakeholders. In addition, the company does not use any software for optimizing transportation routes. In other words, the transportation route is designed manually by the employees from the logistics department. Under such conditions, the loading rate of the vehicles is not high and the transportation route is not optimized. Therefore, this company's operation activity is negatively contributing to the greenhouse effect and depletion of the natural resource affecting all stakeholders.

To summarize the findings the author would like to construct the table below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Huarui Rubber Company’s current operational practices** | | | |
| Issues addressed | Company initiatives | Impact generated | Stakeholders involved |
| 1. Vast petroleum consumption | 1. Sea transportation 2. Transportation routes are designed manually | 1. reduce contribution to greenhouse effect and depletion of natural resource  2. Contribution to fossil fuel consumption and greenhouse effect | All stakeholders |

1. Huarui Rubber current operations in inbound logistic & distribution section

Source: made by the author

From the table above it can be seen how the company’s initiates are connected with the issues that were earlier defined from the industry value chain analysis. The company is generating a negative impact in relation to the issue that was discovered from the tire industry analysis.

1. **Company operation**

As it is mentioned in the managerial problem statement, the company’s operations were forced to stop after the checking from the national department that resulted in the ineffectiveness of the air purifying equipment. According to the interview conducted with the company’s representatives, currently, the company has insufficient air purifying system. It is because in 2017 the company has expanded its capacity by opening a second production line. However, they did not update the air purifying system. Additionally, the air purifying system is installed in 2009, after ten years it can not work as effectively as before, thus the exhaust gas emissions exceeded the national standard. This is violating the regulation rule set by the government, and generating air pollution affecting all stakeholders. Therefore, to reduce the negative impact generated by air pollution, the company must install a sufficient air purifying system to ensure the air emission meets the national emission standards. As for the solid waste, it is all collected and transported to the landfill by the municipal waste removal service. However, it should be noticed that landfilling is not a sustainable waste treatment method. It is generating a negative impact by polluting the contaminated soil and groundwater and occupy a large area of land. Thus, the company should set the finding of a sustainable solid waste treating method as one of the future aims for mitigating the negative impact created on the community and government. One more problem related to air pollution is the usage of coal. In China, coal is a common and cheap energy source. Nevertheless, when the coal burns, it produces a variety of air pollutants and dust. It is also generating a negative impact on the environment and society accordingly. Hence, the company needs to set the usage of the clean energy source as one of the future aims.

In contrast, the company has no problem with water emissions. In specific, the company discharges the wastewater through the sewer pipe, which is connected to the Fenyang Municipal Sewage Treatment Plant. Then, the wastewater is treated by the sewage treatment plant. This initiative is reducing the pollution to the water resource. Regarding the clean water consumption, the current equipment of the company’s cooling water recycling system is an open-type cooling tower installed in 2009. It has spray water's drifting and evaporation problems. By using the current cooling water recycling system, the company’s annual clean consumption is 141,000 m³. This is considered a negative impact creator towards all stakeholders, due to the high consumption of nonrenewable natural resource.

As for the employees, the company only organizes general training for newcomers. Indeed, it can raise the awareness of the potential production accident risks at the job site and lower the possibility of newcomer’s injuries, however, its effect is rather limited. This generating the positive impact that reducing the safety risk of the employees. Nevertheless, in 2019, there are 41 work injuries and one death occurred. This is heavily affecting the company’s sustainability. As for the air pollution (VOCs) in the workshop, it is considered heavy, because of the usage of various chemicals and heating processes. Currently, the employees are working at the production plant only with a minimum required protection, such as nondurable masks FFP1 and short nondurable gloves. This initiative is reducing the health risk of the employees but rather limited. At present, the company’s first line worker’s turnover rate is high, due to the ignoring of the workers' health condition.

To summarize the findings the author would like to construct the table below:

1. Huarui Rubber current operations, company operation

|  |  |  |  |
| --- | --- | --- | --- |
| **Huarui Rubber Company’s current operational practices** | | | |
| Issues addressed | Company initiatives | Impact generated | Stakeholders involved |
| 1. Generation of exhaust gas 2. Vast fossil fuel consumption 3. Generation of solid waste 4. Vast water consumption for cooling 5. Generation of wastewater 6. High employee health risk due to VOCs (Volatile organic compounds) in a job site | 1. Insufficient air purifying system 2. Usage of coal 3. Landfill solid waste 4. Insufficient cooling water recycling system 5. Wastewater discharging to a Sewage treatment plant 6. Minimum required protection | 1. Over exhaust gas emission 2. Large fossil fuel consumption, large greenhouse gas emission 3. Generate land pollution and land occupation 4. large consumption of nonrenewable resource 5. Reduce wastewater emission 6. High risk for employees’ safety especially at the chemicals section | 1. Community, government 2. All stakeholders 3. Community, government 4. All stakeholders 5. Government, all other stakeholders 6. Employees |

Source: made by the author

1. **Product use**

According to the interview conducted with the company’s representatives, at present, the company is improving the design of tire surface to reduce the rolling resistance. As a result, during the car riding process, petroleum consumption will be reduced and the generation of greenhouse waste emissions will be decreased. This is reducing the petroleum consumption that effecting on the customers (helps them to save the budget on petroleum consumption) and reducing the greenhouse effect that affects the other stakeholders (decrease contribution to the gas emissions and act on climate action). However, as it is defined in the impact analysis of the tire manufacturing industry, it is a common problem that customers do not know the proper usage of the tire then resulting in a traffic accident. Currently, the company does not have any initiative to share the knowledge of proper tire usage for the customers. It is needed to be strengthened.

To summarize the findings the author would like to construct the table below:

1. Huarui Rubber current operations in production use section

|  |  |  |  |
| --- | --- | --- | --- |
| **Huarui Rubber Company’s current operational practices** | | | |
| Issues addressed | Company initiatives | Impact generated | Stakeholders involved |
| 1. Improper usage of the tires 2. Fossil fuel consumption when using tires | Tire surface improvement to minimize rolling resistance | Reduce nonrenewable fuel consumption and exhaust emission | Customers |

Source: made by the author

1. **Product end life**

According to the information given by the company’s representatives, the company offers a waste tire collecting service only in Fenyang City until now. Also, the company has a partnership with the Fenyang Junbao Rubber Factory, a Waste rubber processing plant. All the waste tires collected will be sent to the partner for having proper waste tire treatment. These two initiatives are reducing the environmental pollution caused by the waste tires that effecting on all the stakeholders. However, due to the fact that the waste tire collecting service is offered only in Fenyang City, its effect is rather limited.

To summarize the findings the author would like to construct the table below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Huarui Rubber Company’s current operational practices** | | | |
| Issues addressed | Company initiatives | Impact generated | Stakeholders involved |
| 1. Generation of waste tires 2. Environmental pollution caused by waste tires | 1. Waste tire collecting service (only in Fenyang city) | 1. Reduce environmental pollution caused by waste tires | All stakeholders |

1. Huarui Rubber current operations, company operation

Source: made by the author

To summarize the finding of the value chain analysis, the problems are united into the following table:

1. Operational issue defined in value chain analysis of the Fenyang Huarui Rubber Products Company

|  |  |
| --- | --- |
| Company  Value Chain Section | Huarui Rubber Products Company |
| Raw materials | 1. Full reliance on fossil material (synthetic rubber, petroleum) |
| Suppliers | 1. Lack of regulation and supervision to suppliers |
| Inbound logistic & distribution | 1. Low transportation efficiency |
| Company operation | 1. Insufficient air purifying system 2. Landfill solid waste 3. Large consumption of fossil fuel (coal) 4. Insufficient cooling water recycling system 5. Poor protection of employees from VOCs in job site 6. Lack of specialized safety training |
| Product use | 1. Lack of tire usage knowledge sharing with customers |
| Product end life | 1. Limited area coverage of waste tire recycling service |

Source: made by the author

From the table above, it can be seen the summarized main problems of the Fenyang Huarui Rubber Products Company along the value chain that were discovered during the analysis of the current programs adopted by the company. The interesting point that can be seen from the problems presented in the table is that the current company’s technology level of development is relatively low, thus, it resulting in the unsustainability of the current value chain. These problems will be considered in the recommendation section in the following part of this paper.

## 2.5 Conclusion

In this chapter, the author has examined theoretical tools, including stakeholder approach, SDG value chain, interest power grid, and triple bottom line. After the selection of theoretical frameworks, the author has conducted an impact analysis of the tire manufacturing industry to identify the common impact generated in each section of the value chain and the stakeholders involved. Next, the author has conducted the benchmarking analysis of two international and one local Chinese tire manufacturing companies to find out what practices those companies have to address the issues (negative impact generated) defined in the impact analysis of the tire manufacturing industry. Then, the author has analyzed the Fenyang Huarui Rubber Product Company’s operational practices to identify the impact created by the company’s current operational activity along the value chain.

# 3.0 Recommendations for enhancing the company’s sustainability along the value chain

## 3.1 Suggestions for sustainable operation of the Fenyang Huarui Products Company

In the previous chapter, the author has conducted a benchmark analysis and analysis of the current impacts creating activities of the Fenyang Huarui Rubber Products Company by using the SDG value chain model proposed by the United Nations. For proposing the possible solutions to the defined issues, the author would like to build an action plan based on the SDG value chain model provided by the United Nations, including raw material, suppliers, inbound logistics & distribution, company operations, product use, and product end life sections.

### 1. Raw material

**Current operational issue: full reliance on fossil material**

Regarding the problem in the raw material section, the Fenyang Huarui Rubber Products Company is fully relying on fossil raw material, such as synthetic rubber, petroleum, and polyisoprene. It is negatively affecting all stakeholders, due to its contribution to the greenhouse effect and depletion of natural resources. It is not an urgent issue at present, however, obviously, this is the direction for the company to focus on and develop for the long-term.

In the benchmark analysis, all initiatives of three benchmarking companies are the green innovation that can enhance the relationship with all stakeholders by environmental protection and reduce the cost at the same time. This is the initiative that bringing the core competitiveness to the enterprise. However, all initiatives of three benchmarking companies require high technology development or large capital input. Considering that, the Huarui Rubber Company has only a small laboratory with limited technical staff and equipment, and limited funds, it is high doubtable for the company to adopt the same initiatives. For discovering the feasible initiative, the author has had a consultation with the Linglong Tire Company’s technological partner in China – the Teto (Qingdao) Tire Technology Co., Ltd. According to the information given by the consultant of the Teto Tire Technology Company, to develop the technology for adopting the recycled rubber as part of the raw material for the tire production generally takes from 1.5 years to 2.5 years, taking the example of Linglong Tire Company is 2 years. Its overall monetary cost for the 2 years' research and development, including cooperation costs, raw material cost, and so on, is around 3,000,000 yuan. As for the economic result, taking the example of Linglong Tire Company provided by the consultant, the usage of recycled rubber in tire production could reduce the cost of the rubber processed for 0.18 yuan per ton. Considering the annual rubber consumption volume of the Fenyang Huarui Rubber Products Company is about 5,880.000 tons, the raw material cost can be saved is 1,058,400 yuan per year. Hence, under the condition that the usage of recycled rubber can save around one million raw material costs, it takes three years to cover the investment. In other words, the payback period for this initiative is 5 years. Logically, this initiative will be a long-term project for the Huarui Rubber Company to implement.

As for the common initiative of development of the usage of biomaterial, according to the information given by the consultant of the Teto Tire Technology Company, the annual R&D cost will be at least 10 million yuan per year, and the research period will be at least five years. Currently, there is no commonly applied biomaterial usage technology in the tire industry, it is still considered as a kind of cutting-edge technology. Therefore, the R&D of the usage of biomaterial does not match the Huarui Rubber Company’s ability at present. Nevertheless, the company can consider it as a long-term goal after the IPO. As for the plantation of rubber grass or guayule, rubber extraction technology is still a technical challenge that needs to be solved. In comparison, the rubber extraction rate of all three benchmarking companies is less than 35% (taken from the companies’ sustainability report 2018). Thus, this is not a consideration for a middle size company, like the Huarui Rubber Company.

To summarize the recommendation provided above, the author would like to construct a table:

1. Recommendations to raw material section

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Purchasing of recycled rubber for tire production** | | | | |
| Company issue | Cost | Benefit | Impact on stakeholder | Stakeholder |
| High consumption of nonrenewable material, high employee health risk | 3 million yuan for 2 years | Reduce raw material cost for 0.18 yuan per ton (1 million yuan annually) | Decrease nonrenewable material consumption, reduce the contribution to CO2 emissions | All stakeholders |

Source: made by the author

The initiative proposed above addresses all the related stakeholders of the company, due to the reason that the proposed initiative addresses the decrease of nonrenewable material consumption (natural resource depletion such as petroleum) and reduction of contribution to the greenhouse effect produced by CO2 emissions. For the Huarui Rubber Company, this initiative can be classified as an R&D project. Currently, the company has an R&D cost of three million yuan for the development of product performance, such as improvement of tire surface to reduce the rolling resistance, extension of product life, and new product development. According to the feedback given by the Huarui Rubber Product Company’s representative, at present, the company does not have enough funds to increase the R&D budget. Hence, the author suggests the company raise funds from investors. Given that, the initiative is targeting green innovation that can reduce environmental pollution and generate economic benefits, thereby increasing the investors’ confidence. Thus, it will not be too hard to attract investors, especially sustainable oriented investors. By communicating with the company representative, the author has received the feedback that this amount of funds is possible and reasonable to rise in the future.

In addition, after the company starts to implement the usage of recycled rubber in the tire production process, the company can mark themselves as an eco-friendly product as a way to show the increase of its green competitiveness, and initiate marketing activities, such as social media marketing, but the label of “using recycled rubber” on the package of the product. It can lead to a possible increase in customer loyalty and better word-of-mouth effect.

### Suppliers

**Current operational issue: lack of regulation and supervision to suppliers**

In the supplier section on the value chain, the problem that the Fenyang Huarui Rubber Products Company has is lack of supplier management and supervision. Studied from the Bridgestone Corporation, the Michelin Group Company, and the Linglong Tire Company, the author recommends the company to establish a Supplier Code of Conduct. Considering that its monetary cost is rather low and the content is well defined by all three benchmarking companies, it is easy for the company to adopt.

Taken from the three companies’ common focus on the Supplier Code of Conduct, the focus should be the following:

* + - 1. Legal compliance

Meaning that all the suppliers must comply with the laws and regulations proposed in its region/country.

* + - 1. Labor and human rights

Suppliers should respect the employees and their human rights. Any kind of abuse, physical punishment, and harassment is prohibited.

* + - 1. Health and safety

Suppliers must ensure a clean and safe working condition to minimize the health risk of their employees. In addition, if the working condition is considered unsafe, the employees have the right to refuse to work.

* + - 1. Environment

Suppliers should do their best to prevent air pollution, water pollution, and solid pollution, consume energy efficiently and reduce greenhouse gas emissions.

* + - 1. Anti-corruption

Any form of corruption or bribery in business activities is forbidden. Moreover, it is banned to send gifts between partners in a relationship to effect on one party.

The Supplier Code of Conduct should be signed when establishing a partnership. It is worth it for the company to note that if any kind of violation of the rule is discovered, the Fenyang Huarui Rubber Products Company should terminate the contract and the partnership immediately. This initiative can reduce the risk of illegal behavior of suppliers.

Connected with the initiative above suggested, a supervision team is needed to inspect the suppliers’ compliance with the Supplier Code of Conduct. In comparison, in the benchmarking analysis, the international companies corporate with a third-party organization to conduct supplier inspection. It is reasonable for them due to the fact that the company has production plants and suppliers around the world, hiring third-party inspection is much more effective and convenient. However, this is too costly for a middle size company and not necessary. Therefore, studied from the Linglong Tire Company, the author suggests the company to establish an internal team for the supplier monitoring. In detail, the team will conduct the annual or semi-annual investigation in the suppliers and its production plant. Relatively, the items to be investigated should be along with the Supplier Code of Conduct, such as employee treatment, legal compliance, corruption, and so on. Each investigation result should be recorded and reported to the Fenyang Huarui Rubber Products Company. For forming the internal investigation group, the possible cost is the payroll for group members. Due to the fact that the Linglong Tire Company is much larger than the Fenyang Huarui Rubber Product Company, and the number of suppliers is much higher, the scale of its supervision team does not suite the company. Hence, the number of group members will be decided by the company. Relatively, according to the information provided by the Shanxi Statistics Bureau, the average annual salary in private enterprises in Shanxi Province is 37,501 yuan in 2019. By forming the investigation group, the company will receive primary information to identify whether the supplier is violating any rule given in the Supplier Code of Conduct. The purpose of establishing the supervision of suppliers is to prevent potential to the company’s reputation caused by the possible irregularities. For instance, if there is an environment pollution case or labor abusing cased discovered in the supplier’s production plant, not only the supplier will lose its reputation, it will also negatively affect the company’s reputation and brand image. Hence, it is necessary for the Fenyang Huarui Rubber Products Company.to have regular supervision of suppliers.

In addition, the author suggests the company establish a fair selection program as one additional initiative in the supplier section. This is studied from all three benchmarking companies. Concerning the fact that the monetary cost is rather low, and the fair selection method is well-practiced by the benchmarking companies, it is worth it and easy for the company to adopt. In specific, the author suggests the company form an independent group from the procurement department to evaluate the suppliers, record the basic information and its characteristics, then upload the results (data) to the system anonymous. Next, the selection decision will be done by the procurement department according to its demand. The difference is that the procurement department can only see the data in the company’s database anonymously so that it can ensure the objectivity of choice and prevent bribery. This initiative is promoting the fair competition of suppliers and reducing the risk of bribery, thereby enhancing the trust of suppliers.

To summarize the recommendation provided above, the author would like to construct a table:

1. Recommendations to supplier section

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Establish a supplier Code of Conduct and supervision team** | | | | |
| Company’s issue | Cost | Benefit | Impact on stakeholder | Stakeholder |
| Environmental pollution | Time cost for formulating the Supplier Code of Conduct, payroll for forming the supervision team | Standardized guideline and channel of monitoring the suppliers’ behavior | Avoiding the risk of environmental pollution caused by the supplier’s actions | Supplier, all other stakeholders |
| **Fair supplier selection (additional initiative)** | | | | |
| Non-anonymous selection (bribery may occur) | Payroll and time costs | Promotion of fair selection and gain the trust of suppliers | Fair competition between suppliers | Supplier |

Source: made by the author

From the table above it can be seen that the author has addressed to problems such as environmental pollution, that might be caused by the suppliers and current non-anonymous supplier selection procedure that may lead to the bribery issues.

### Inbound logistic & distribution

**Current operational issue: low transportation efficiency**

The negative impact in the inbound logistic & distribution section is generated by the exhaust gas produced due to the inefficient transportation route design. In the benchmarking analysis, international companies have built their own big data system to improve the transportation route design. However, it is too costly and time consuming for the Huarui Rubber Products Company to implement. Nevertheless, referring to the Linglong Tire Company, it has purchased the transportation route optimization software from the Hangzhou Tuchuan Technology Co., Ltd. and using the big data provided by the company. This is much more acceptable for the Huarui Rubber Products Company, considering that its IT department is not well developed, and not many IT talent is currently working in the company. Therefore, for achieving higher transportation efficiency, the author suggests the Fenyang Huarui Rubber Products Company adopt Tuchuan Intelligent Transportation Optimizing Software (ITOS) developed by the Hangzhou Tuchuan Technology Co., Ltd. It has the function to design and manage the transportation process, and phone APP to enable the connection and communication between the drivers and the company, and track the vehicles by using phone GPS. This software can help the company to save costs through the following three aspects:

* 1. The best loading solution

At present in the company, the loading is mainly manual design and packing. The container spacing utilization rate is not high and leads to a waste of space. Moreover, when there are many types of goods, the calculation is often too large and time-consuming. By using the Tuchuan Intelligent Transportation Optimizing Software, it can intelligently generate loading design reports. Considering the actual loading problem, the software has optional filling modules such as placement gap, vertical placement preference, placement priority, etc., making the generated loading scheme more reasonable and accurate. In addition, the software is tightly integrated with Microsoft Excel forms. It can import and export cargo data in batches, which is convenient for managers and personnel to view loading reports in time, guides the loading of goods on-site, and it is also convenient for data storage and retrieval.

* 1. Optimal transportation route

Tuchuan Intelligent Transportation Optimizing Software uses a special route optimization algorithm, combined with basic background data (orders, routes, drivers, warehouses, terminal locations, freight rates, etc.) to design an optimal logistics route in advance according to the administrator's target needs, and stores the secondary route for future adjustment.

* 1. Transparent shipping fee

In general, there will be a lot of expenses during the transportation process. The Tuchuan Intelligent Transportation Optimizing Software will calculate the total expenses (including expressway fee, bridge toll, and so on) in a few seconds according to the actual transportation situation and formulate the whole process. If there are temporary changes, the management personnel can apply for special approval through the APP, and the software will also calculate the new total cost within 2 seconds for managers to check the statistics and approve the application.

Comparing with other transportation route optimizing software, the biggest advantage is the big data technology of the Tuchuan Intelligent Transportation Optimizing Software. It has a partnership with the most popular and professional map - Baidu Maps. Relatively, the data supporting the software’s algorithm is collected and offered by the Baidu Maps. Hence, the optimal route calculated is not only by the artificially designed algorithm but also according to the conclusion drawn from big data. Another advantage of the software is that it can reduce the risk of accidents in transit. Unexpected conditions are the most difficult part to control during transit. Even if the system has designed an optimal route plan before departure, it may have to adjust the route due to uncontrollable factors such as road congestion, vehicle accidents, and cargo volume changes. For reducing the risk, the software receives real-time traffic data provided by the Baidu Maps, when an accident occurs, the software can receive it in real-time. Then, the system will calculate the current location and the remaining route optimization plan at the fastest speed. If the vehicle has a problem on the way and cannot transport the cargo normally, the system will also search for and notify available vehicles nearby to reduce corporate losses.[[57]](#footnote-57) Regarding the cost, it will be defined according to the specific demand and the scale of the Fenyang Huarui Rubber Products Company. The approximate price is around 800,000 yuan for one year, offered by the Salesperson, Mrs. Li (1016542786@qq, com). Taken the example of the Linglong Tire Company, its transportation cost has decreased by 20%. According to the information given by the company representative, in 2018, the transportation cost of the Fenyang Huarui Rubber Products Company is 11,846,429 yuan. Reducing the cost by 20%, it can save 2,369,285 yuan. This software is trustable also because currently, the company is a partner of SF Express (one of the biggest express company in China), Wumart (one of the biggest supermarket chains in China), and others. [[58]](#footnote-58) After applying the software, their total transportation distance decreases 30%-50%, and the vehicle dispatch times reduce 10%-20%. As a result, fossil fuel consumption will be decreased and the exhaust gas emission will be cut.

To summarize the recommendation provided above, the author would like to construct a table:

1. Recommendations to inbound logistics and distribution section

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Adopt Tuchuan Intelligent Transportation Optimizing Software (ITOS)** | | | | |
| Company’s addressed | Cost | Benefit | Impact on stakeholder | Stakeholder |
| Vast petroleum consumption, inefficient transportation (high emissions produced) | 800,000 annual software licensing | Higher transpiration efficiency, save annual transportation cost for 2,369,285 RMB. | Decrease fossil fuel consumption, reduce the contribution to the greenhouse effect | All stakeholders |

Source: made by the author

From the table above it can be seen that the author has addressed to problems such as vast petroleum consumption, that contributes to the excessive consumption of fossil fuel, and inefficient transportation system, that results in large greenhouse gas emissions.

### Company operations

**Current operational issue: Insufficient air purifying system**

As the company’s production plant was forced to shut down after the unsuccessful pass of the environmental pollution checking conducted by the Central Environmental Protection Inspectorate about the air pollutants emission, the company had no option but to elaborate the short-term goal for recovering its business operation. The statement given by the checking authority has concluded that the company can continue and restore its production process only after the measures for reducing the pollutant content emissions in the air. Therefore, the most urgent initiative for the company is to install a new air-purifying system. In the benchmarking analysis, all three benchmarking companies have sufficient air purifying system as the solution. This is also necessary for the Fenyang Huarui Rubber Product Company to implement. Therefore, the author suggests that for preventing air pollution from happening in the nearest future and being able to reopen the production facility successfully, the company should focus on the installation of an air-purifying system. This should be a prior goal of the company to recover its operation in the shortest perspective.

For urgent resolving the air pollution problem, the author has contacted the air purifying system provider of the Linglong Tire Company to consult for the feasible solution.[[59]](#footnote-59) According to the consultation given by the salesperson, Mr. Zhang (762594832@qq.com) of the Dezhou Guangyuan Environmental Protection Technology Co., Ltd., to install the low-temperature plasma + ultraviolet photolysis (LTP+UVP) air purifying system is efficient and relatively low cost for middle size company. The LTP+UVP system is consist of washing tower, low-temperature plasma waste gas treatment equipment, and ultraviolet photolysis waste gas treatment equipment. First of all, the main function of the washing tower is dust removing and collecting. After the gas outside the tower body enters the washing tower, the gas goes to the packing layer. There is spray liquid from the top and spray liquid on the front of the packing layer, and a liquid film is formed on the packing. When the gas flows through the empty space of the packing, it contacts with the liquid film of the filler and carries out absorption or neutralization reaction. The filler layer can provide a large enough surface area, which does not cause excessive resistance to the gas flow. After the absorbed or neutralized gas is collected by the demister, the air is discharged outside the tower. Next, the waste gas moves to the low-temperature plasma waste gas treatment equipment. After it entered the equipment, when the exhaust gas enters the equipment through the filter cotton of the current distribution plate, the high-pressure discharge of the equipment is stabilized by the high voltage of the equipment, and a high voltage of 15,000 volts to 20,000 volts is instantaneously generated, which breaks down the exhaust gas. At this stage, long-chain and multi-chain exhaust molecules have weaker binding energy and less binding force. It is easy to be broken by the breakdown chemical bond, thus becoming a small molecule compound. Then, water molecules and oxygen molecules that enter the equipment along with the exhaust gas are broken by high pressure, generating strong oxidizing groups such as hydroxyl and ozone molecules. These strong oxidizing groups are in full contact with the exhaust gas molecules to oxidize and accelerate the reaction process. The whole reaction is clean and thorough, the energy utilization rate is high, and the purification efficiency is very high. Finally, the exhaust gas will go to the ultraviolet photolysis waste gas treatment equipment. Its main function is to remove odor. The special high-energy ultraviolet light beam is used to irradiate the malodorous gas and TiO2 photocatalysis to catalytically crack the malodorous gas. It makes the molecular chain of organic or inorganic high molecular odor compounds degraded into low molecular compounds such as CO2, H2O, etc. under the irradiation of high-energy ultraviolet light beam, thereby removing the odor.

Comparing with another type of exhaust gas purifying method, the LTP+UVP purifying system is non-toxic, safe, good stability, high catalytic activity, fast effect, low power consumption, reusable, and do not generate secondary pollution. In contrast, in the direct combustion method, the odorous substances are thoroughly oxidized and decomposed. The equipment is easy to corrode, consume fuel and has high processing costs, and it is easy to form secondary pollution. Also, the activated carbon adsorption method is expensive and difficult to regenerate. The odorous gas required to be processed has a lower temperature and dust content, which is likely to cause secondary pollution. With regard to the Biological decomposition method, it is renewable and environmentally friendly. However, it covers a large area, the deodorization process is not easy to control, the operation is complicated, and it is prone to failure after a period of operation.

**Current operational issue: poor employee protection from VOCs in job site**

As it is defined in the impact analysis in the tire manufacturing industry, the volatile organic compound is causing a high health risk to employees who work in the job site, especially in the vulcanization section. Among the company’s first-line workers, there are employees who have long-term exposure to VOC, already have chronic diseases, such as memory loss, neurasthenia, and asthma.

In the benchmark analysis, the hermetic production line developed by the Bridgestone Corporation is high technology required and costly. It takes many years to do the research & development, and the production line and equipment are fully redesigned to reach the status of full hermetic. This initiative does not match the Fenyang Huarui Rubber Product Company’s current ability. Regarding the other benchmarking companies, in the Michelin Group and Linglong Tire Company, the ventilation system is installed. In order to find out the feasible solution, the author has contacted the Dezhou Guangyuan Environmental Protection Technology Co., Ltd., the ventilation system provider of the Linglong Tire Company. According to the consultation given by the salesperson, Mr. Zhang (762594832@qq.com) of the Dezhou Guangyuan Environmental Protection Technology Co., Ltd., the sidewall negative pressure ventilation system is relatively simple and with low investment and low use cost, and it is suitable in factories where the temperature requirements of the workshop are not too high, like the production plant of the Fenyang Huarui Rubber Product Company. The total cost is about 300,000 yuan. Hence, the author suggests the company install a ventilation system in the production plant.

In detail, it needs to use the sidewall of the plant to install a negative pressure fan, which is designed according to the number of air exchanges in the workshop more than 40 times. Then the door and the opposite window of the workshop are naturally replenished to achieve airflow so that the high temperature and VOCs produced in the workshop can be discharged to the outside, and the outdoor fresh air is naturally replenished into the workshop. This initiative can significantly reduce the health risk caused by the VOCs produced in the job site, thereby increasing the trust of employees. Comparing with other methods, the recommended type of ventilation system is less costly and has stable effectiveness. Taking an example of the roof negative pressure ventilation system, it is needed to open the roof of the production plant to install electromechanical fiberglass roof fan, for the middle and large companies, more than 1 electromechanical fiberglass roof fan should be installed. It is much more costly.

In addition, studying from the Linglong Tire Company, the author suggests the company provide better protective gear as an additional initiative to protect the employees from the VOCs produced in the job site. It contains a half-face mask (mask & goggle) and glove. All protective gears are provided by the Guozhitai Labor Insurance Products Co., Ltd, with the price 28 yuan per half-face mask, 12 yuan per pair of gloves, and 2.6 yuan per mask filter (filter cotton in the mask). As the information was given by the company, on average, the filter should be changed every day, due to the product life of mask fitter under high VOC condition is 9 hours. Also, according to the data given by the representative of the Huarui Rubber Products Company, among all employees, there are around 200 people are working in the high VOC section in the production plant. Hence, the cost for mask is 28\*200 = 5600 yuan, cost for mask filter is 2.6\*300d\*200 = 156,000 yuan, and the cost for glove is 12\*200 = 2400 yuan. The total cost for purchasing protective gear is 5600+156000+2400=164,000 yuan. This initiative is reducing the health risk of the employees, thereby enhancing the trust of them.

**Current operational issue: large consumption of fossil energy (coal)**

At present, the energy source of the Fenyang Huarui Rubber Products Company is coal. It is generating a negative impact by consuming fossil energy. However, in the benchmarking analysis, only the Michelin Group has initiative addressing the problem that is using bioenergy. The source of the biomaterial is from the company’s guayule planting program. Hence, it is a by-product of the guayule planting activity. In other words, to have the source of biomaterial, the company needs to start the rubber yielding plant planting first. This is too costly for the company to adopt, considering that the revenue of the Huarui Rubber Products Company is 1 billion yuan, which equals 140 million dollars. In comparison, in 2018, the revenue of Michelin Group and Bridgestone Corporation is 26 billion dollars and 28 billion dollars relatively.[[60]](#footnote-60) Taking the average of 27 billion dollars, they are more than 192 times larger than the Huarui Rubber Products Company. Such a large difference in scale reflects the fact that the Huarui Rubber Products Company currently cannot afford to make merge or input large capital into research and development activity. As it is mentioned in the benchmarking analysis, all international companies are using natural gas as the main energy source. It is considered a clean energy source that can reduce greenhouse gas emissions. Nevertheless, it still belongs to fossil energy. Therefore, currently, there is no suitable energy source to substitute fossil energy. The only thing the company can ensure to minimized the negative impact is the first initiative mentioned in the company operation section, which is to install a new purifying system to make sure that the exhaust gas emission can meet the national standard.

**Current operational issue: insufficient cooling water recycling system**

One of the problems of the Fenyang Huarui Rubber Products Company in the company operation section is the large consumption of clean water. As it is explained in the value chain analysis of the company, the company’s current cooling water system is not efficient enough. Considering the cooling water is free from any contact of the products, it is as clean as when it is inputted. Moreover, the current water consumption for a cooling function is 500 tons per hour, by using the cooling water recycling system, the annual water consumption is 141,000 m³. Relatively, the water bill generated is high. In the benchmarking analysis, international companies have integrated the water-recycling system. It can circulate the cooling water, at the same time purifying the wastewater and reuse it as cooling water. This type of integrated water recycling equipment is the high technology required and costly. Also, considering that currently the wastewater produced by the company is treated by the municipal sewage treatment plant, it is better to refer to the Linglong Tire Company to install a cooling water circulatory system. Therefore, the author recommends the Fenyang Huarui Rubber Products Company install a closed-type water-recycling system to recycle the cooling water.

To ensure the initiative is feasible and suitable for the company, the author has contacted the Shandong Aorui Environmental Protection Equipment Co., Ltd. The Aorui Company is the largest comprehensive enterprise mainly producing cooling towers in North China. It has established a domestic first-class comprehensive laboratory and comprehensive research center for the research and development of heat exchanging equipment.[[61]](#footnote-61) From the consultation conducted with the company’s Sales Manager, Mr. Wang (e-mail: [359770180@qq.com](mailto:359770180@qq.com)), the closed water cooling system is most water-saving and suitable for large waster flow. As it is offered by the Aorui Company, the closed water-cooling system is consisting of one closed cooling tower (outdoor) and water circulation pipeline (indoor) connected to the production line. Regarding the cost, the price for the cooling tower is about 880,000 yuan, and the water circulation pipeline construction fee and the installation fee is about 100,000 yuan. In total, the cost for the closed cooling water system is 980,000 yuan, almost one million yuan. The installation process takes 13 working days.

The reason why the author has chosen the closed water-cooling system is that the closed-type cooling system is more water resource and energy-saving than the open-type. In comparison, the biggest difference between the open-type and closed-type cooling system is the structure and performance of the cooling tower. Firstly, the maintenance cost of open-type is higher. To build an open-type cooling tower, it is needed to build a water pool under the tower. After months of operation, there will be sludge and moss grass appear in the pool, results in the cooling tower padding is completely scaled, and water cannot flow through. Therefore, the cooling tower filling material must be replaced and the pool cleaned regularly, and the cost increases accordingly. In contrast, the closed-type water cooling system will not cause equipment maintenance and corresponding cost investment due to the formation of scale. Moreover, the water consumption of the closed-type cooling system is much smaller. Taking an example of the Fenyang Huarui Rubber Products Company, its cooling water flow is 500 tons per hour. According to the data provided by the Sales Manager of the Aorui Company, for the open-type cooling system, the drifting rate of the spray water used in the open cooling tower is 2% -3%, and the evaporation rate is 2.7-3.3%. The annual drift loss of an open cooling tower is 500t/h\*2% (minimum ratio) \*20h/day (according to the company’s production plan) \*300days/year (according to the company’s production plan)=60,000 tons (minimum volume). In addition, the annual water evaporation loss is 500t/h\*2.7% (minimum ratio) \*20h/day\*300/day=81,000 tons (minimum volume). In total, the annual water consumption of the open-type cooling system is 60,000+81,000=141,000 tons. As for the closed-type cooling system, according to the information provided by the Fenyang Huarui Rubber Products Company, the drifting rate of spray water used in the closed cooling tower is 0.1%-1%, and the evaporation rate is 0.5%-0.83%. It is worth noticing that in the north of China, in autumn and winter the temperature outdoor is cold enough, so there is no need to turn on the sprinkler, but the draught fan. Hence the working time of the sprinkler system is only 150 days. The annual drift loss of the closed cooling tower is 500t/\*1% (maximum ratio) \*20h/day\*150day/year=15,000 tons. Next, the annual water evaporation loss is 500t/h\*0.83% (maximum ratio) \*20h/day\*150day/year=12,450 tons. In total, the annual water consumption is 15000+12450=27,450 tons. In comparison, the ratio of the annual water consumption between two types of a cooling system is 141,000/27,450=5.137. Thus, the closed-type cooling system is five-time more water-saving than the open-type cooling system. As for the benefit the company can get from installing the closed water-cooling system, the current annual cooling water consumption is 141,000m³. Considering the price of the water for industrial manufacturing usage in Fenyang City is 3.4yuan/t[[62]](#footnote-62), the annual cost of cooling water is 141,000\*3.4=479,400 yuan. As it is mentioned above, the annual water consumption of the closed water-cooling system is 27,450 tons, and the annual water cost will be 27,450\*3.4=93,330. Hence, the annual water cost saved by installing the closed water-cooling circulatory system is 479,400-93,330=386,070 yuan. Known the cost of the full installation of the closed water-cooling system is 980,000 yuan, the payback period is 980,000/386,070= 2.54 year. Hence, the initiative of installing the cooling water recycling system is a mid-term initiative for the company.

According to the information provided by the Fenyang Huarui Rubber Products Company’s representative, the company’s waste gas flow is 5000m³/h. Accordingly, the total cost, including the washing tower, the low-temperature plasma waste gas treatment equipment, the ultraviolet photolysis waste gas treatment equipment, and the installation fee are 2,200,000. The installation takes around 16 working days, and 5 days for equipment commissioning. Accordingly, the benefit is that the air emission of the company will meet the standard of “Emission standard of pollutants for the rubber products industry”. Thus, it can help the company to solve the problem, and resolve the conflict with the Beiguan Community. Moreover, by meeting the national air emission standard, the company has a high possibility to reopen the production facility in the nearest future. Thus, this initiative is the most important and urgent one for the company to adopt.

**Current operational issue: landfill solid waste**

Regarding the solid waste, currently, the company’s solid waste is collected and processed by the municipal landfill services. This practice is complying with the law, however, it is not sustainable. In other words, it is creating land pollution and occupation that negatively affects all stakeholders. In the benchmarking analysis, all three benchmarking companies have zero waste to landfill programs by establishing a partnership with solid waste recycling companies. As for the Fenyang Huarui Rubber Products Company’s solid waste, the main solid wastes generated during the production process are unqualified tire, waste rubber, dust ash, scraps, and waste packaging materials. Most of it is valuable for waste recycling companies. Therefore, the author recommends the company to establish a partnership with waste recycling enterprise to process its solid waste. In order to propose a feasible initiative, the author has contacted the Guangzhou Valuda Group Co., Ltd. It is one of the largest waste recycling group in China. Even though the company has only one production plan, the reason why the author as contact the largest waste recycling group is that in the product end life section, the company can corporate with the Valuda Group to recycle waste tires. After the consultation with the Guangzhou Valuda Group, all of the company’s solid waste can be sold to the Guangzhou Valuda Group Co., Ltd. By sending the solid waste to the waste recycling company, the monetary compensation will be received. The cost will be the transportation cost of solid waste. This initiative is reducing the pollution to the land, the effect on all stakeholders.

**Current operational issue: lack of specialized safety training**

Finally, the company should focus on product safety. In 2019, there are 41 work injuries and one death occurred. Addressing the problem. At present, the company has only general training for newcomers. It covers safety training, however, its effect is too limited. In benchmarking analysis, all three benchmarking companies have provided specialized safety training. By purchasing the training program from a training institution, it is not very costly and easy to adopt. Therefore, the author recommends the Fenyang Huarui Rubber Products Company to organize safety training. Considering the fact that currently due to the epidemic of coronavirus, it is prohibited in China to have gathering activity, such as lectures.[[63]](#footnote-63) Thus, the safety training will be taken place on the internet. The author has contacted the safety training provider of the Linglong Tire Company - Yanlian International Enterprise Management Consulting (Beijing) Co., Ltd.[[64]](#footnote-64) The Yanlian International Enterprise Management Consulting (Beijing) Co., Ltd. is a professional online education platform committed to corporate training.[[65]](#footnote-65) As for the content, it should include safety production thinking training. It mainly includes safety policy training, legal training, typical experience, and accident case training. The second is safety production knowledge training mainly includes general production technology knowledge training, general safety technology knowledge training, and professional safety technology knowledge training. Regards the cost, the online safety training program will be paid annually for 300,000 yuan. It is worth to notice that with this cost, the company can provide customized training content and test content according to the company’s production operation’s features, such as precautions when using chemicals, safe oil operation methods. As for the benefit, according to the company’s working experience with its partners, for example, Royal Dutch Shell, Mercedes-Benz, after the implementation of online safety training, the average company’s work injury has decreased 68% within a year. Therefore, the company can have a possible benefit of 68% work injury reduction.

To summarize the recommendation provided above, the author would like to construct a table:

1. Recommendations to the company operations section

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Installation of air purifying system** | | | | | |
| **Company’s issues** | **Cost** | **Benefit** | | **Impact on stakeholder** | **Stakeholder** |
| Excessive exhaust emissions | 2,200,000 RMB | Make exhaust gas emission meet the national standards | | Reduce exhaust gas emission | Government, community |
| **Installation of a ventilation system** | | | | | |
| **Company’s issues** | **Cost** | **Benefit** | | **Impact on stakeholder** | **Stakeholder** |
| Health risk of employees caused by VOC | 300,000 RMB | Can quickly remove the VOCs generated | | Reduce the health risk of employees | employees |
| **Installation of the closed water-cooling circulatory system** | | | | | |
| Vast water consumption for cooling operations | 980,000 RMB for full installation | Reduce water consumption 5 times more than current equipment, saves 386,070 RMB/year | Reduce clean water consumption (natural resource depletion) | | All stakeholders |
| **Sell solid waste to recycling station (Guangzhou Valuda Group)** | | | | | |
| Solid waste emission without proper recycling | Solid waste transportation | Monetary compensation | Reduction of environmental pollution caused by solid waste | | All stakeholders |
| **Organization of safety training with Shanghai Times Glory Company (additional initiative)** | | | | | |
| 41 work injuries and one fatal case by 2019 | 300,000 RMB/year | Up to 68% of work injury reduction | Reduce injury rate | | Employees |
| **Safety gear (additional initiative)** | | | | | |
| Health risk of employees caused by VOC | 164,000 RMB/year | Enhance trust of employees | Reduce health risk | | Employees |

Source: made by the author

From the table, it can be seen that the author has proposed the recommendation focused on the environmental protection performance of the company to prevent the future shut down of the production plant. Then, the author has given suggestions regarding the insufficient resource usage of the company’s current equipment. Finally, the author has proposed practices that can reduce the health risk of the employees in order to help the company to decrease its turnover rate and keep skillful employees to ensure its product quality.

### Product use

**Current operational issue: Lack of tire usage knowledge sharing with customers**

As it is identified in the impact analysis in the tire manufacturing industry, many customers do not know the proper use of tire resulting in a traffic accident. In the benchmarking analysis, the international companies all have a digital scanning service that can acquire the information of the current status of the tire by scanning the QR code on the tire. This initiative is high technology required, due to the fact that the information is collected by the chip put into the tire. Moreover, this technology is developed by the company itself. Therefore there is a high technical barrier to adopt such practice. Then, regarding the free lectures of proper tire usage to the public, it is a common initiative of all three benchmarking companies. This initiative is less costly and has a human resource to adopt it (due to the fact that the company has professional engineers). Thus, the author recommends the Fenyang Huarui Rubber Products Company to organize free lectures to the public. The lectures will be taken place in communities, universities, and so on, in different cities. Its content should cover the topics of common knowledge of tire structure, safe use of tire and maintenance, identification of common tire failures, etc. For example, insufficient or excessive tire inflation pressure will accelerate tire wear; improper assembly and disassembly of tires will also lead to bead damage, bead bulging problems, identification of common tire failures, etc. In addition to safety lectures, the company can arrange engineers to demonstrate the standard safety operations tires installation during the lecture, allowing everyone present to understand the importance of tire safety in theory and practice. Considering the lecturer will be the employee of the company when organizing free lectures, the cost would be possible transportation cost and time cost for the lecturer. At the same time, this activity can help the company enhance its brand image and reputation. Also, it can increase the company exposure to the public leading to higher brand awareness.

To summarize the recommendation provided above, the author would like to construct a table:

1. Recommendations to product use section,

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Organize free** **lectures of proper use of tire to the public** | | | | |
| Company’s issues | Cost | Benefit | Impact on stakeholder | Stakeholder |
| Improper usage of the tires (tire puncture) | Possible transportation cost and time cost | Brand exposure, enhancement of the brand image and reputation | Increase customers’ awareness of the proper usage of the tires | Customers |

Source: made by the author

From the table, it can be seen that the author has proposed initiatives that can help the customers to get knowledge about the proper usage of the tire. The author did not give any recommendations regarding the issue of petroleum consumption during the product usage, because the company is currently 3 million yuan annual input to the R&D section, mainly improving the product performance, including rolling resistance reduction.

### Product end life

**Current operational issue: Limited area coverage of waste tire recycling service**

As it was mentioned in the company analysis, the Fenyang Huarui Rubber Products Company has a waste tire collecting service only in the Fenyang City and one waste tire processing company as its partner. In the benchmarking analysis, all three benchmarking companies have widely provided a waste tire collecting service in the market where it operates. Moreover, in order to cover the area where it operates, all three benchmarking companies have set their retail stores as the waste tire collecting point. This practice is less costly and easy for the company to adopt, considering that the company currently has more than 100 retail stores in the whole China. Therefore, the author recommends the company to expand the area coverage of the waste tire collecting service. To do so, the company can establish a collecting point in its retail stores and make an agreement with the distributors as they can to establish a collecting point in the distributor’s stores. The possible cost is the coupon offered to customers who bring the waste tire to the store.

Regarding the treatment of the waste tires collected, in benchmarking analysis, the Michelin Group has acquired a rubber-recycling group to process the waste tire collected. As for the Bridgestone Corporation, it has built its own waste tire processing plant to treat the waste tires collected. Both of these two initiatives are too costly for the Fenyang Huarui Rubber Products Company at present. However, the Linglong Tire Company has established a partnership with a rubber recycling company. This initiative fits the company’s current ability. As it is mentioned in the company operation section, the author suggests the company establish a partnership with the Guangzhou Valuda Group Co., Ltd. The Valuda Group is one of the biggest waste recycling company in China. Its main business is integrated services for industrial waste recycling and regeneration processing. At present, the company’s annual waste treatment capacity is 1 million tons. Moreover, the company has a well established waste recycling network that covers most of the regions (excluding Xinjiang, Tibet, Qinghai, Taiwan, Hong Kong, and Macao) in China. Currently, the company has a partnership with top automobile manufacturers, including Dongfeng Motor Corporation, Changan Automobile, and FAW Group. When sending the waste tires to the partner, the company can receive monetary compensations for 1160 yuan per ton of waste tires. The only possible cost is the transportation cost of waste tires.

To summarize the recommendation provided above, the author would like to construct a table:

1. Recommendations to product end life section

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Expand waste tire collecting service + establish a partnership with Guangzhou Valuda Group** | | | | |
| Company’s issues | Cost | Benefit | Impact on stakeholder | Stakeholder |
| Environmental pollution caused by waste tires (black pollution); generation of waste tire | Discount offered to customers that bring waste tire; the possible cost of waste tire transportation | Monetary compensation for 1160 RMB/ton of waste tire | Reduce environmental pollution caused by waste tires; reduce the number of waste tires, make value from collected waste tires | All stakeholders |

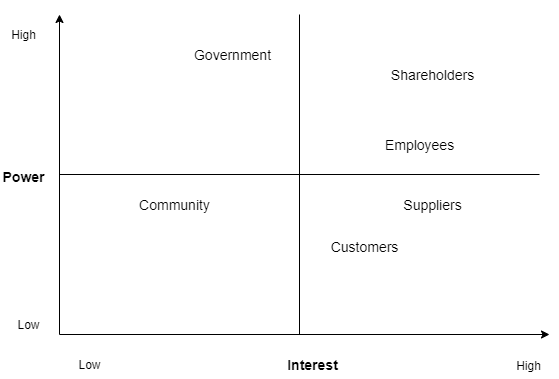
Source: made by the author

From the table, it can be seen that the author has proposed initiatives addressing the waste tire generation and waste tire treatment. This initiative can be a good supplement to the initiative proposed in the raw material section – usage of recycled rubber. Due to the difference in the treatment process, the content of recycled rubber produced from different waste recycling companies is rather different. In order to ensure the new formulation of using recycled rubber does not affect much on the final product quality, it is important to have a stable source of recycled rubber supply. Then in the R&D process, the experiment will be made based on the recycled rubber provided by Guangzhou.

## 3.2 Prioritization of the recommended practices

After the detailed introduction of the recommended practices, it is necessary to prioritize them for the company to understand the importance level of each initiative to better adopt it. Firstly, it is important to recognize the stakeholder prioritization for the company to understand the importance level of the recommended practices.

1. Power-interest matrix for stakeholder prioritization of the Huarui Rubber Products Company



Source: made by the author

As it is shown in the graph, among all stakeholders, the government, shareholders, and employees are the ones who have high power or influence on the company. Relatively, initiatives involving the government, shareholders, and employees should be at the most urgent level. It is because the government has the power to regulate the enterprise and can shut them down if any violation of the law or regulation is discovered. About shareholders, they have voting rights related to the shares owned, thereby can affect on the business decision. As it is mentioned, in the stakeholder involved, the author will not mark the stakeholder, due to the fact that each of the recommended practice is sustainable oriented, and it is increasing the investors’ confidence. Regarding the employees, they are directly affecting the production process and thereby affecting the final quality of the products produced. Moreover, it is important for the enterprise to keep skilled employees to ensure product quality and increase the company’s competitiveness. Hence, the company should pay attention first to the initiatives that effecting relationships with the government, shareholders, and employees. Next, the suppliers and customers are the stakeholders who have high interest and relatively lower power. Because the business performance and strategy of the enterprise are related to their interests, and they do not have much power to influence the company. Regarding the supplier, the company’s main raw material is a synthetic rubber. Comparing with the supply of natural rubber, in 2017, the production volume of synthetic rubber is three times higher than the production volume of natural rubber globally. Relatively, the bargaining power of the supplier is weak. As for the customers, they differ from the internet company or platform, the customers do not join the production process. The channel for customers to effect the product is to give feedback and suggestion. Hence, the power of customers is also relatively weak for the company. Thus, the company can put the recommendation regarding the customers and suppliers to the secondary impotence level. Finally, regarding the community, the company should ensure that it could meet its minimum requirement, to prevent the community move from the lower-left corner to the upper left corner. Then, the company can put the community at the least important level, meaning that the company can implement some supportive initiatives if the company still have the ability.

1. Prioritization of the recommended initiatives

|  |  |  |
| --- | --- | --- |
| Degree of urgency | Initiative | Stakeholder involved |
| High | Install air purifying system | Government, all other stakeholders |
| Install ventilation system | Employees |
| Safety training | Employees |
| Protective gear | Employees |
| Middle | Establish Supplier Code of Conduct and supervision team | Supplier |
| Fair supplier selection | Supplier |
| Organize free lectures of proper use of tire to the public | Customers |
| Low | Adaptation of Intelligent Transportation Optimizing Software | All stakeholders |
| Installation of new cooling water circulatory system | All stakeholders |
| Usage of recycled rubber | All stakeholders |
| Sell solid waste to a recycling station | All stakeholders |
| Expand waste tire collecting service | All stakeholders |
| Establish a partnership with waste recycling group | All stakeholders |

Source: made by the author

As it is shown in the table, the Huarui Rubber Product Company needs to install the waste gas purifying system urgently. Because it can solve the conflict with the highest power stakeholder – government. Then the company can apply for the resumption of the production activity. Its cost is 2,200,000 yuan. Next, the company should adopt safety training and protective gear for the employees, in order to reduce its high health risk and the production safety risk. This initiative can enhance the employees’ trust in the company, thereby ensuring the product quality and reducing the employee turnover rate. The cost for safety training is 300,000 yuan and the cost for purchasing protective gear is 164,000 yuan. Moreover, the cost of installing a ventilation system is 300,000 yuan. In total, the cost for initiatives at a high urgent level is 2,964,000 yuan. According to the interview conducted with the Huarui Rubber Products Company’s representatives, the company’s budget for the short-term initiative is 3 million yuan. Thus, the recommended initiatives can be afforded by the company.

As for the middle urgent level initiatives, it is connected with the suppliers and customers. As high interest and low power stakeholders, they are in the secondary prioritization. In this section, the initiatives’ monetary cost is rather small. Hence, it is no financial difficulty for the company to adopt the initiatives. However, its time cost is relatively high. After the implementation of the high urgent level initiatives, the company should consider establishing a Supplier Code of Conduct, fair supplier selection, and tire safe use lecture to the public. Overall, these initiatives can be implemented within a year.

In the low urgent level section, the impact of the initiatives is more board and general, mostly related to the reduction of greenhouse effect and consumption of non-renewable natural resources that effecting on all stakeholders. While the effect on all stakeholders, these initiatives are least urgent, because the impact created toward environmental change effecting on all stakeholders equally, thus the impact on every single stakeholder is not significant. Regarding the installation of a new cooling water recycling system and adaptation of Intelligent Transportation Optimizing Software, its cost is 980,000 yuan and 800,000 yuan relatively. The total cost is 1,780,000 yuan. Taken the information given in the interview conducted with the company’s representative, for the less urgent stage, the company’s budget is 1.5 million yuan. As for these two initiatives, there is a mature technology and successful examples from other enterprises that already adopted the same equipment/software. Hence, the risk of such an investment is low. Therefore, the author suggests the company to increase the budget for 18.7%, to be 1.78 million yuan. As for the usage of recycled rubber, it is considered as a long-term R&D project. As a green innovation, meaning that this initiative is environmental protection and reduce the cost at the same time, is the innovation can bring the company core competitiveness in the future. Concerning the high cost, the author suggests the company raise funds from investors for 3 million yuan. due to the fact that this initiative is sustainable oriented, it can increase the investors’ confidence and in line with investors’ investment values. As for the rest three initiatives, selling solid waste to the recycling station, expand waste tire collecting service, and establish a partnership with the recycling group, are more time consuming than the monetary cost. These initiatives can be implemented in the middle-term, from one to two years, after implemented the high and middle urgent level initiatives.

Overall, the author has prioritized the recommended initiatives based on the power level of the stakeholders involved. The installation of new air purifying equipment is the most urgent one, due to its stakeholder involved in the government, which has shut down the company production plant. At the same time, the initiatives involve employees are also at the high urgent level, considering the fact that the company’s production performance is highly related to the employee. Then, the initiatives that involve suppliers and customers, including establishing Supplier Code of Conduct and supervision team, fair supplier selection, and organizing free lectures of proper use of tire to the public, are at the middle urgent level. However, all initiatives are with low monetary cost but with relatively high time cost, so that the company can adopt it within the middle term. Finally, there are initiatives generating border impact on all stakeholders, such as reducing the contribution to the greenhouse effect and depletion of natural resources. They are in a low urgent level, considering that the impact generated itself is relatively insignificant, and most of the initiatives are long-term oriented. It needs to note that in the table, the shareholder did not appear once. This is due to the fact that all the recommendations proposed are sustainable oriented, hence all the initiatives can increase the investors/shareholders' confidence in the company’s future development.

## 3.3 Conclusion

In the 3rd chapter of the paper, the author has proposed the recommendations for the company’s operational practices modification, that are directly addressing the managerial problem stated such as unsustainability of the current operational activities of the company and inefficiency of the air purifying system that resulted in the temporary shutting down of the production plant, thereby help the company to achieve its short-term and long-term strategic goal. Moreover, the author has prioritized the initiatives recommended for the company to have a better understanding of the adaptation of the suggested practices.

# Conclusion

In the first chapter of the paper the author has introduced a profile of the Fenyang Huarui Rubber Products Company, briefly described its main business and operational peculiarities. Moreover, the author has also proposed a managerial problem statement that is describing a main goal of the paper: resumption of production operations (that came from the inefficiency of the air purifying system and caused the production plant closures) and current unsustainable operational orientation of the company (which creates obstacles to company’ long-term strategy of launching an IPO). Additionally, the author has proven the correlation between the decision of proposing sustainability enhancements of the company and Fenyang Huarui Rubber Product’s strategy of launching an IPO (long-term perspective), as well as the importance of company’s sustainability to the customers, so by adopting sustainable-oriented practices, it can increase company’s competitiveness in the global and local arenas.

In the second chapter, the author has examined a theoretical tool that has significance and relevance to the paper such as the stakeholder relations approach, triple bottom line approach, ESG investing (sustainable investing), green competitiveness, and value chain framework proposed by United Nations in SDG Compass Guide. The value chain framework as selected as the main one for analysis of the industry, benchmark, current company performance, and recommendation proposals, due to its clear structure and transparency of the segments. These frameworks and approaches were used in a paper to examine the impact produced by the tire manufacturing industry, for defining the main negative impact creating activities and positive impact creating activities as well. It was important for the paper due to the reason, that it provides a basement for the defining common problems that are present for the manufacturers in the industry that will be used in the benchmark section and Fenyang Huarui Rubber Product company as well. The industry analysis helped to understand how exactly and what specific type of the negative impact the companies produce, so the author can use it for comparing the benchmark companies’ performance and has a clear understanding of the source of the adopted programs and initiatives. After an industry analysis, the author has conducted a benchmark analysis. The benchmark analysis was crucial for the paper because it can help to build the complex overlook of the practices that are implemented by international and local rubber products companies, for applying it for the value chain operation’s modification of the Fenyang Hurarui Company and enhancing its sustainability based on the discovered practices. After the benchmark analysis, it was crucial to define the current value chain operational practices that are implemented in the company, the positive and negative impact creating ones. It was important for having a basement for the recommendations proposals and linking it better with the company’s strategies and mentioned managerial problem statement.

In the third chapter, the author has proposed practical recommendations to the company based on the defined managerial problem statement and company’s strategies (short-term: reopen production plant, long-term: launch IPO). The recommendations were proposed by using the SDG value chain framework. Moreover, the author has prioritized the recommended initiatives for the smooth adaptation of the suggested action plan according to the prioritization of the stakeholders involved in each recommendation, positive impact generated, and company’s benefit from implementing these initiatives.

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# Interview structure

Respondents: Li Jie (117560956@qq.com) operation manager, and Liu Wei procurement senior manager (117440324@qq.com)

Conducted by: Ma Yifan, 4rd year bachelor student of International Management

Format of the interview: online

**Raw materials**

* What are the main raw materials that are required for the tire production?
* Which raw material can be considered as a largest in terms of the consumption?
* The consumption of water is required for the cooling process or takes part in the tire production s well?
* How much water is consumed for the production of tire and can this number of clean water consumption be considered as significant one in comparison to the amount of water used for the cooling operation?
* Does Fenyang Haurui Rubber Products Company has installed any water recycling system currently?

**Suppliers**

* Does Fenyang Haurui Rubber Products Company have management and supervision of the supplier’s business activity?
* Are there established criteria for the supplier checking developed by the company?
* What are the aspects that company is monitoring in the supplier section?
* Does the company consider a possible establishment of the supplier supervision mechanism or policies that might be applied in the current operations?

**Inbound logistic & distribution**

* As for the logistics and distribution segment, how does the company transport the products and necessary raw materials?
* What type of the transportation is used most often by the company?
* Does Fenyang Haurui Rubber Products Company have route optimization algorithms for reducing the petroleum consumption?
* Does Fenyang Haurui Rubber Products Company work with the logistics operators that are using the route optimization methods for reducing the greenhouse gas emissions?

**Company operation**

* What was the reason that caused company to stop the production operations?
* Does the company has already installed air purifying system?
* What might be a possible problem with currently installed equipment that resulted in high content of air emissions?
* Does the purifying system that is currently installed at the production plant meets the standards proposed by the government about the air emissions and, most importantly, the current production volumes of the factory?
* What is the other waste-related emission the factory produces?
* What are the major pollutants that are generated during the production process of the tires specifically at the company’s plant?
* How does Fenyang Haurui Rubber Products Company treat it solid waste?
* What is the energy source of the factory: does the operations are powered by the electricity or the other materials?
* Is the emissions of coal consumption, as the energy source of the company, can be considered significant in relation to overall air pollutants produced by the factory?
* How does the company work with the wastewater emission?
* Does the wastewater system that is currently installed at the production plant meets the standards proposed by the government and, most importantly, the current production volumes of the factory?
* Does Fenyang Haurui Rubber Products Company provide a safety training program to its employees?
* What is the data ratio, by any recent year available, about the work injuries and fatal accidents (if present of course)?
* Can be this number of work injuries considered as possible reason of having lack of safety programs organized for the employees?
* Does the company provide some health management programs to its employees like health checks?

**Product use**

* Does Fenyang Haurui Rubber Products company have some initiatives established in the product use segment?
* What is the rolling resistance reduction program is about?
* What is the positive impact it can create it its potential user?
* Are there any other initiatives launched by the company in this segment (not finished or in plot status are also included)?

**Product end life**

* Does Fenyang Haurui Rubber Products company have some initiatives established in the product end life segment?
* Where the tire collecting service is established (cities)?
* How does the used tire collecting is conducted, by related partners or the company itself?
* Who are the partners of the company in tire collecting?
* How many of them are working with Fenyang Haurui Rubber Products currently?

**Other**

* What would be the company’s budget for the short-term initiative?
* What is the annual budget for middle and long-term initiative?

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