Risk of reverse logistics in petrochemical enterprises

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Abstract. With the enhanced awareness of environmental protection and sustainable development, deepen, which produced great benefits temptation and global integration aggravating, the reverse logistics has become an urgent research topic in-depth business and related academic fields. Has the great significance of reverse logistics risk evaluation of petroleum enterprise. Can make the petroleum enterprises fundamentally improve business to reverse logistics risk management level; promote the sustainable development of enterprises; to summarize the related methods and a series of measures to prevent and control the risk of reverse logistics, avoid the major losses of enterprises; promote the enterprise risk management effectiveness. This paper aims to analyze and understand the basic principle of reverse logistics on the petroleum enterprise faced in the implementation of inquiry reverse logistics problems and risks, and based on the AHP of the risks to make corresponding evaluation. This paper will also pass through the corresponding instance more risks facing vivid research of petroleum enterprises, the use of reverse logistics, and in the use of AHP to get the causes of risk and the related solution method to construct the evaluation system, the ultimate goal of this thesis has been reached.

Keywords: Petroleum enterprise; reverse logistics; risk factors; risk.

1. Introduction

Along with the social progress, the continuous development of economy, the amount of oil enterprises has increased constantly. In recent years, with the economic environmental fluctuations and competition intensifies, more and more oil companies recognize the importance of logistics management, the logistics management referred to a higher level, or even to design as the core competence of enterprise, but most enterprises ignore such a reverse logistics has been the existence of logistics activity. With the enhancement of people's awareness of environmental protection, reverse logistics reflected the economic benefits of the drive and the development of global economic integration, the related research of reverse logistics has attracted extensive attention of more and more enterprise managers and related academic subjects.

By use of reverse logistics in petroleum enterprises can effectively improve the rate of enterprise resources, promote the enterprises to set up the scientific development concept, contributes to the sustainable development of enterprises, and improve the economic efficiency of enterprises and competitiveness. At the same time, reverse logistics can also reduce the environmental pressure, promote the development of harmonious society.

However, enterprises can not only see the benefits of the reverse logistics, and ignore its negative influence. Because of having the characteristics of reverse logistics uncertainty, complexity, difficulty, petroleum enterprises in the process of the implementation of the reverse logistics will bring certain risk, so the oil enterprises must be included in the enterprise risk management system, the importance of reverse logistics in the process of implementing the risk and control.

As the modern society dominated by the oil companies, how to reduce production costs, maximize the use of limited resources to create the greatest social value, enable enterprises to embark on a road of sustainable development, has become a very realistic and urgent problem. And with the decrease in Recyclable goods increased and natural resources, processing of petroleum enterprises must take

seriously the reverse logistics. Because both the process and the results of reverse logistics, whether of social or on oil companies, both the economic benefits is of concern for sustainable development, has the vital significance. However, the development of reverse logistics in petroleum enterprises and the use will inevitably encounter many difficulties and risks, if not very good attention and resolve the difficulties and risks of petroleum enterprises, then not only will not get good benefits and achievements, otherwise will have a large amount of manpower, material and financial resources waste. So the research and evaluation of petroleum enterprise reverse logistics risk factors is very necessary. This paper is the risk in view of petroleum enterprises in the process of the implementation of reverse logistics because of kinds of uncertain factors caused as the background. In this context, conducts the research to the petroleum enterprises reverse logistics risk factors.

2. Cause of reverse logistics of the

With the development of economy, the human society demand for natural resources grow with each passing day, but the earth's natural resources, especially the exploitation quantity of non-renewable resources are gradually reduced, but after 100 years of exploitation, many important natural resources are already facing depletion crisis.

Human society creating a one-way economic mode of "resource 、 product 、 waste.” The depletion of resources, environmental degradation has become a bottleneck for the sustainable development of the economy of our country seriously endangers our living environment, endangers public health.

In addition, along with the progress of science and technology and the improvement of people's living standard, the consumer to the diversification and individuation of products have become increasingly demanding, resulting in product life cycle shorten, the renewal speed, be people out there are more and more waste materials. On the other hand, the enterprise in order to survive and develop in the fierce competition, to expand their market share, to take various means of competition, and liberal return policy. This policy can really increase sales, expand market share, but also led to the emergence of a large number of return. In this case, to strengthen the management of reverse logistics enterprises, in order to cope with the large number of returns challenge. At the same time, along with the growing public awareness of environmental protection, many countries have increased the intensity of legislation of environmental protection requirements of petroleum enterprises, began full responsible for production, especially the recycling of waste products. Thus, recycling of waste products and re utilization is a form from the consumer to the appendages logistics producers, which is reverse logistics.

But for a long time, the managers to return the goods and products to the customer after the use of waste materials, has been to exclude them in business outside, to collect, and transport these goods along the supply chain reverse channel distribution process is almost no attention to reverse logistics. Until the last century, the late 90's, reverse logistics gradually by domestic and foreign logistics scholars and business manager’s attention. This is because the effective management of logistics can not only protect environment, for enterprises to bring obvious economic benefit, but also can strengthen the competition advantages of enterprises, improve the overall performance of the supply chain.

3. Petroleum enterprise reverse logistics characteristics and necessity

3.1 Analysis of the characteristics of reverse logistics in Petroleum Enterprises

Petroleum enterprises is different from retail enterprises or other enterprises, as the product of the producers, it has the following characteristics itself:

First of all, the oil business as producers, his reverse logistics includes not only the product recovery; reuse also includes its own waste. Product recovery mainly refers to expire, the reasons for the quality and technical problems such as back or recall products and processing enterprises; its

waste utilization is the reuse of wastewater, the enterprise in the production process of waste and other waste.

Secondly, the petroleum enterprises more complexity compared with other enterprises, the main activities and the function of reverse logistics include: re manufacturing, dressing, recycling, landfill, repackaging and re treatment and so on, these aspects of petroleum enterprises are included, while other enterprises only includes part of it, the relative social responsibility and environmental liability is less petroleum enterprise.

Once again, the difficulty of marketing, petroleum enterprise is the product of the producers, rather than the middlemen and retailers unsalable products can discount returned to the first tier supplier, and petroleum enterprises as the first class products supplier, we must increase the propaganda of product marketing, to expand product visibility and influence that better sales products, reduce the return.

3.2 The necessity of implementing reverse logistics in Petroleum Enterprises

The implementation of reverse logistics in petroleum enterprises has its necessity of potential, mainly has following several aspects:

First of all, from the current development situation of reverse logistics decision, the development of reverse logistics in China is basically in a state of disorder. Over the years, because people sense of reverse logistics is weak, has been the lack of sufficient attention, recycling and disposal of waste products is completely spontaneous in driving the economic interests of the.

Secondly, because of the international and China's emphasis on environmental protection, it should through legislation to drive the implementation of reverse logistics in petroleum enterprises. At present, the international society is more and more strict laws and regulations of environmental protection and pollution charge system, provides a new constraint standard for the environmental behavior of enterprises. In the international society of environmental protection requirements of the environment, China is paying more and more attention to the disposal of waste products. In recent years, the country's new developed 170 environmental protection of national standards and industry standards, the new promulgated more than 500 local environmental protection laws and regulations. State Environmental Protection Bureau put forward "plan" control the total discharge of pollutants and the "cross century green project plan" is being implemented, and has gradually achieved results. The State Economic and Trade Commission will also have "renewable resource recycling management regulations" in the legal planning promulgated by the State Council, is currently work with the departments to study and draft.

Once again, the most important point, is that petroleum enterprise economic value driving. This includes two aspects, one is to reduce the cost, and one is to improve the quality of.

In order to increase profits, petroleum enterprises must try to reduce logistics cost. With the development of economy, the shortage of resources is increasingly serious, recycling of used product and material recycling, is a petroleum enterprises to meet market demand, reduce the production cost of the practical way.

The successful implementation of reverse logistics is beneficial to the petroleum enterprise product quality improvement. The ISO9001-2000 quality management system standard edition enterprise quality management activities of enterprises will be summed up as a closed-loop PDCA activities (planning, implementation, examination, improved), to the requirements of the ISO9001 is to control the unqualified products, take effective corrective measures for continuous improvement, at the same time make preventive measures to prevent unqualified happen again. Reverse logistics in the closed-loop activities, runs through each link. Oil companies also received a lot of information on the recovery and return of products at the same time, such as the actual service life of the statistical information of products, product quality information feedback and customer satisfaction information and so on. Through the information system of reverse logistics, the problem of product quality and service quality of goods produced in continuously delivered to the management of the enterprise, increase the transparency of the potential accident, managers can according to these information, advance in design and quality of the continuous improvement of products, product defects similar to

avoid production in the future, the eradication of the hidden troubles on the system, and finally reach the purpose of improving product quality.

Finally, the implementation of reverse logistics in petroleum enterprises is requirement and embodiment of social value, with the living standards and cultural quality enhancement, people's environmental awareness is also growing, the concept of consumption has changed dramatically, the customer more and more high expectations, not only to consider their current life situation and conditions, but also begin to pay close attention to the sustainable development of human descendants. At the same time, due to depletion of nonrenewable resources, and scarcity and environment pollution is serious day by day, resources and the environment has become a major problem facing the sustainable development of human society. Therefore, to evaluate a business indicators have not been limited to profit and sales and other economic indicators, people are concerned with the enterprise bear the social responsibility in the range. In short, the implementation of reverse logistics in petroleum enterprises, not only help to enhance the public image, maintain and improve the environmental quality, is the social responsibility of the enterprise itself embodies the requirement of moral and ethical behavior.

To sum up, the oil companies want to get long-term development, the implementation of reverse logistics is very necessary.

4. Petroleum enterprise reverse logistics risk identification

4.1 The principles of risk identification

Risk identification of reverse logistics in petroleum enterprises is the premise of risk management, only the first to put the risk factors of project fully revealed, through further evaluation to determine the risk and severity of occurrence probability, and then find out the key risk factors, in order to put forward the corresponding risk countermeasures. The main principles and methods of risk identification are:

(1) Focus on projects with uncertainty and potential losses, is the basis of risk identification.

(2) Risk factors concern exists in different stages of the project.

(3) Focus on risk factors in different projects has particularity, emphasis on risk identification.

(4) Analyzing the basic form of risk factors, risk source clear.

(5) Note that draw lessons from historical experience, the use of "reverse thinking method to examine the project", to find factors may lead to the project risk.

4.2 The internal and external factors prompted the risk of reverse logistics in petroleum enterprises produce

There are many foreign scholars on the impact of enterprise reverse logistics factors studied, there are different points of view. By reading literatures and domestic logistics development, the author thinks that the influence factors of reverse logistics chain of petroleum enterprises can be roughly divided into two types, namely, external factors and internal factors.

(1) External factors

Any activities of the enterprise, all cannot do without it the external environment. The managers in the formulation of reverse logistics development plan, must understand what external factors affecting reverse logistics activities, and then produce the relevant risk. Only for the specific factors, formulate according to the development plan, may make the enterprises concentrate their limited resources to actively respond to the external environment. The analysis can be found in the petroleum enterprise; outside there are three basic forces in affecting the reverse logistics activities of the enterprise: the macro environment, financial environment, the market environment. The reason that the three factors as the external influence factors of reverse logistics activities of petroleum enterprises, because for these factors, enterprises can actively respond to, but can't change fundamentally. Understanding of reverse logistics to the petroleum enterprise external environment conducive to the management according to the specific environmental factors more efficient allocation of resources, to take measures.

(2) The internal factors

External factors directly affect the reverse logistics in petroleum enterprise existence, construction and reverse logistics activities effectively depends on enterprises, reverse logistics management so to be very fruitful should also start from the enterprise interior. The impact of internal factors of enterprise reverses logistics mainly in management decision, the reverse logistics system two aspects:

Decision: top management support for enterprises to the successful implementation of reverse logistics is very necessary. Top management level of knowledge, moral standard, social responsibility influence he treats the reverse logistics attitude. If he did not give enough attention to reverse logistics, could not form any objective management plan. If senior managers always think reverse logistics enterprises have to face the waste, then, it can never become available to explore the source of profit, become the powerful means to improve the competitiveness of enterprises.

Reverse logistics system settings and incentive mechanism: in addition to the support of senior management, the enterprise must also have a set of effective reverse logistics management system. It includes the specialized management, professional management personnel, appropriate information support system. Reverse logistics is a complex activity, cannot do without the coordination and management of professional personnel, must be built and equipped with professional management staff to manage the independent logistics management department. At the same time, also need to have an effective incentive system to improve the enthusiasm of the staff engaged in reverse logistics. Otherwise, the reverse logistics will become a burden. Study two important technical factors and evaluation system of reverse logistics management system.

The external factors of reverse logistics enterprises, is also in the works, they are driving the development of reverse logistics in an enterprise, the lack of any one aspect of reverse logistics and is unlikely to produce real success. If there is no external pressure, I'm afraid there are few enterprises are willing to actively engage in reverse logistics. On the contrary, only the external pressure, without the support of senior managers and effective management system, enterprises will only on external pressure to make the minimum reaction, the reverse logistics system there will be only one exist, but cannot produce the real effective reverse logistics management.

4.3 Classification and influencing factors of reverse logistics risk in Petroleum Enterprises

We can know from the above analysis, risk, there are a variety of reverse logistics in petroleum enterprises for the sake of convenience, the risk can be divided into three categories, one category is the risk in transportation, one is because of the risk of environment produce, one kind is the place of risk.

4.3.1 Transportation risk

The transport risk mainly refers to risk appearing in the transport process of reverse logistics in the. According to the statistics of large quantities of goods transportation accidents, after screening the widespread investigation and study and the relevant experts, identified the main causes of the risk of transport:

(1) The transport of hazardous wastes. Risk and the amount of hazardous waste transport factors include hazardous waste two factors. Hazardous waste different caused by different mechanism of personnel injury, property damage, produce accident consequence is also a form of different. And the same type of dangerous goods due to temperature, pressure, and phase is different; produce accident consequence size is different.

(2) The transport vehicle. Transport vehicle factors include the vehicle itself conditions, tank condition and safety accessories three influence factors. Among them, main factors affecting the vehicle itself condition are engine, brakes, steering wheel, tire, trailer connection and other factors affecting the status of the main tank body; a safety valve, insulation / thermal protection device, welding and corrosion factors; influence factors of safety accessories are for emergency cut-off device, static elimination device, safety valve, liquid level gauge, pressure gauge, thermometer, tank binding status and other factors.

(3) The transport personnel behavior factors. Human factors including dangerous goods handling, transport personnel mental state, the driver's driving skills, safety quality transport personnel and vandalism and other factors. Among them, the existence of excessive filling situation of the loading and unloading of dangerous goods, the goods is not firmly fixed, improper stowage, packaging lax or

packing method is undeserved, container not tighten the valve and other unsafe behavior; transport personnel anxiety, tension, fatigue driving will increase the transportation accident frequency, consequences of freight transport accident size; drivers driving level affects the occurrence probability of traffic accidents; safety quality transport personnel including compliance, safety awareness of dangerous goods, cognitive factors.

4.3.2 Environmental risk

Environmental risk refers to the risk due to environmental factors related to the causes, mainly the following reasons:

(1) The surrounding environment. The surrounding environment factors include the surrounding personnel density and density along the property, the surrounding ecological environment, social importance along the periphery, road accident conditions, weather conditions and other factors.

(2) Safety and rescue facilities shall be. Safety and rescue facilities should be equipped with factors including emergency rescue equipment, emergency handling ability of relevant personnel, refuge and rescue plans and exercises, rescue lines and ability and other factors.

(3) The social environment. Social environment factors mainly include the enterprise own economic philosophy, the environmental protection departments and the public on environmental protection requirements. Recycling capacity of enterprises, depth of the idea of sustainable development, the support of relevant laws and regulations, public awareness will play a very important role for this factor.

4.3.3 Place the risk

The risk of fixed processing places is the main risk which produced in the process of waste disposal in the fixed processing places. Can be divided into:

(1) The risk of dismantling / disposal sites

In the dismantling and disposal sites, dismantling, crushing the enterprise in the operation process of the surrounding residents will produce noise, grease and dust flue gas pollution, pose health threat to the crowd, and destroy the growth of crops. Dismantling industry to open operation, disassembly origin did not establish a separate oil pool, sewage ditch, the waste products from the rain washed away the greasy dirt, cross flow, thorough ground, contaminated soil, river, causing river oil tumbling, irrigation, deposited in soil, affect crop growth. This requires managers to strengthen control and management, the establishment of intensive dismantling, sewage ditch, the pool that lie between oil, improve the dismantling facilities, is strictly prohibited waste cable, solid waste incineration unified treatment, can greatly reduce the dismantling industry and the degree of environmental pollution.

(2) The risk of reusing places

Reverse logistics is to reuse, more than shelf-life, style obsolete waste products, through the effective recovery and recycling process. However, if some products in more than shelf-life after continued use, because of its insulation performance, reduced parts damage degree deep, toxic and harmful substances containing radiation to the human body, such as the increase, to human health, safety of life constitutes a potential threat. There are some over the shelf life of the old electrical appliances into the countryside, cause fire, explosion accident in use situation is occurred.

(3) The risk of storage places

Reverse logistics storage object is mainly some of the waste products, toxic and harmful substances in these waste products, these substances leakage or combustion and explosion, leakage and explosion products into the environment caused by environmental pollution.

(4) The risk of the destruction of places

The destruction of places is also safe waste landfill and incineration places. The basic structure of security landfill waste acceptance system, including storage and pretreatment system, seepage control system and leachate collection system, covering system and landfill gas drainage system. A major risk in the landfill sites: due to the presence of flammable and explosive substances in the waste, which triggered the explosion; because of the earthquake, storm and other irresistible natural factors cause hazardous waste seep into ground water, or come into contact with the surface water; landfill waste is not caused by compaction or geological structure of unstable collapse; landfill gas leaks caused by landfill gas explosion in case of fire. Facilities usually include hazardous waste

incineration system, feeding system, air system, combustion heat energy utilization system, flue gas purification system, the processing system of hazardous waste incineration residue. Incineration of toxic and harmful substances in flue gas facilities normal emissions also contains a certain amount of. When purifying system failure, incinerator flue gas by the emergency exhaust cylinder is directly discharged into the air, flue gas in short time high concentrations of toxic substances into the atmosphere. Fan for outage interruption or equipment failure, the pressure inside the precipitator, dust increased, exhaust gas overflow, cause harm to surrounding air environment. Reduction and oxidation of hazardous waste and burning furnace produce a violent chemical reaction under high temperature, burning furnace wall, resulting in hazardous waste leakage and explosion accident. Hazardous waste mixed with high acid and alkali substances, the burning of serious corrosion of the furnace wall and lead to leakage accident.

According to the analysis of petroleum enterprise reverse logistics risk classification above; we can briefly summarize the influence factors of reverse logistics risk in petroleum enterprises are:

Risk factors for transport in the affected are: the number of transport routes, transport of dangerous waste potential, the possibility of accident, and the route effect of population.

Environmental risk factors affected: along the surrounding personnel density and density along the property, the surrounding ecological environment, social importance along the periphery, road accident conditions, weather conditions, emergency rescue equipment, emergency handling ability of relevant personnel, and rescue plans and exercises, evacuation, rescue lines and ability and other factors, the construction of the enterprise itself, the degree of concern to the government, the public's own quality.

Risk factors of fixed processing sites affected are: the quantity of waste, the disposal sites potential risk, possibility of accident, and the site effects of population.

5. Conclusions

Reverse logistics activities of petroleum enterprises mainly concentrated in the product recovery and re-use, so risks and influence factors in the process of generating and oil enterprises must face and solve the problem. The use of reverse logistics is not only a direct impact to improve the economic efficiency of enterprises and sustainable development deeply; will be the development of rational and effective utilization of national resources and modern industry to promote and push the protective effects on the ecological environment and the public and enhance the environmental awareness of produce far-reaching influence. Research and evaluation of reverse logistics associated risk factors for oil enterprises of petroleum enterprises, reverse logistics activities and the influence factors of reverse logistics in petroleum enterprises in-depth analyzed, and get some control measures and precautions against the risk of reverse logistics. How to play the role of reverse logistics in petroleum enterprises to maximum effect, be the first to bear the brunt of which petroleum enterprises, but also the need for the government to strengthen the support of the relevant laws and regulations and consumer awareness of environmental protection. Petroleum enterprises should do a good job of reverse logistics, then must control to risk from three aspects of transportation risk, environmental risk and risk of reverse logistics in place, let the real economic activity to oil companies to create efficiency, create value for society.

References

[1] Choudhary D, Shankar R. Joint decision of procurement lot-size, supplier selection, and carrier selection [J]. Journal of Purchasing and Supply Management, 2013, 19:16-26.

[2] Arroyo5Guyton,J.and de Boer,L. (2006),"A survey of third party logistics in Mexico and a comparison with reports on Europe and USA, International Journal of Operations and Production Management,Vol. 26 No. 6,pp. 639-67.

[3] Jing yani, Chen yuelong. Study on Application of Data Mining in Selection of Supply Chain Partners [J] . Logistics Technology, 2013,(7):310-312.

[4] Wang bangzhao, Liang kali. The entropy and selection method of the supply chain partner based on risk assessment [J]. Technoeconomics & Management Research.2013,(7):21-27.
[5] Yingxue Zhao.Coordination of supply chains with bidirectional option contracts [J].European Journal of Operational Research (S0377-2217).2013, (3):375-381.