

RESEARCH ON THE INDEPENDENT INNOVATION PATTERN OF ENTERPRISES IN CHINA'S TOBACCO INDUSTRY

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ABSTRACT. *Enterprises in China's tobacco industry play a major role in the domestic economy. However, due to their own unsustainable and weak competitive situation, they urgently need to boost competitiveness through independent innovation. In this paper, the author sets about current situation of enterprises' independent innovation activities, to discuss the necessity and possibility of independent innovation for enterprises in China's tobacco industry and to analyze independent innovation pattern of enterprises in China's tobacco industry. Finally, mixed independent innovation pattern is addressed.*

Keywords: Enterprises in China's Tobacco Industry; Independent Innovation Pattern; Technology Innovation

1. Introduction. In the socialistic market economy system, enterprises in China's tobacco industry play a key role in the domestic economy, and its rapid development has contributed greatly to national finance. However, the enterprises are disturbed by their own unsustainable and weak competitive situation at present. So, independent innovation is the only way to cure the problem.

In recent years, many domestic scholars have done a lot of valuable researches on relationship between innovative pattern and innovative activities in tobacco industry. Wang Lianhua (2001) discussed the connotation of technical innovation capacity of cigarette enterprises, and put forward index system to evaluate technological innovation capacity from eight aspects, such as technical innovation awareness capacity, research and development capacity, technical progress capacity, production capacity, investment capacity, marketing capacity, financial capacity and products effect capacity. Based on demonstration research, ways for enterprises' independent innovation were put forward. Zheng Wei and Li Zhicheng (2004) thought that during the construction of core competitiveness, key cigarette enterprises shall fully realize that what their own core technology is and then carry out research, development and transformation on specific technology and key technology by gathering manpower, material and financial resources to form characteristic core technology with their own intellectual property rights. And products with strong competitiveness shall be produced on this basis. Lv Zhongxin (2005) addressed that strong efforts should be made to improve scientific and technological progress, and transform tobacco economy growth mode in real earnest. Lin Muxi, Zhang Tingting (2007) expounded that all cigarette enterprises shall do research on developing new technology and process from lowering tar content and reducing harm, and develop Chinese style cigarette to improve scientific and technological level and innovation capacity of the enterprises. Chen Junsong (2008) described technological innovation progress from



“Integration” of the enterprises, which provided a powerful technological support for “Integrated” consolidation of cigarette enterprises. Tian Wei (2009) put forward that independent innovation is the precondition for sustainable development of tobacco industry due to the importance of independent innovation for the enterprises. However, these researches are not conducted from aspect of independent innovation pattern of enterprises in tobacco industry. This paper will discuss construction and operation of independent innovation pattern of enterprises in China’s tobacco industry from independent innovation theory, and put forward relevant policy proposals.

2. Necessity of Independent Innovation of Enterprises in China’s Tobacco Industry.

2.1. Sustainable Development of Enterprises in Tobacco Industry. Sustainable development of tobacco industry means that in order to realize the growth of economic profits for industrial and commercial enterprises in tobacco industry, factors such as scientific and technological progress, environment quality standard and resources conservation are brought into economic development plan to achieve sustainable development of tobacco enterprises. Sustainable development for the industry is mainly from independent innovation, and key factor of independent innovation is independence of creation. Core competitiveness of the enterprises is improved by developing new technology and new products independently. If core technology is not owned by the enterprise, then there will no core competitiveness. Therefore, independent innovation is the inevitable choice in sustainable development.

More and more enterprises put selection of competitive strategy on the basis of owning and exerting independent innovation core specialty. Because only through core specialty can we produce sustainable competitive edge. Although core specialty can consists of other factors, technological innovation capacity is obviously taken as the most important source and content for core specialty. It is difficult to imitate and learn technological capacity, because the capacity is integration of different knowledge and skills, and it has close relationship with organization and culture of the enterprises.

2.2. Pressure from Competition of Foreign Tobacco Enterprises. Quality extent of tobacco products has directly influence on the consumers’ health. So tobacco enterprises must reduce harm by scientific and technological innovation to guarantee sustainable development of tobacco enterprises. International *Framework Convention on Tobacco Control* enters into force, which establishes international standards for tobacco prices and increases in taxes, limitation to advertisement, industry label, illegal trade and passive smoking, etc.

Meanwhile, on the whole, the scale and output of cigarette industry in developed countries is decreasing with the decrease of market demand of their parent countries. However, in developing countries, especially the developing countries in the process of economic transition and of low-income, scale and output is increasing gradually with the development of economy, the increase of demand for cigarettes and the opening up to outside world. On the other hand, with gradual growth of global economic integration and world anti-smoking campaign, tobacco industry of developed countries faces trouble of



tobacco lawsuit, high production cost, so international competitiveness of tobacco industry is greatly influenced. Under this condition, tobacco industry in developed countries speed up its course of internationalization. While they expand the export, their producing and manufacturing centers for cigarettes are transferred to the developing countries to adopt cheap natural resources (tobacco leaf) and labor of the developing countries for local production and sales. They even export the products to adjacent markets after they are produced in the developing countries (Wang Shigui, 2001).

2.3. Development Routes for Independent Innovation of Tobacco Enterprises is better than Policy Protection. According to regulation of Article 2 in *Law on Tobacco Monopoly*, tobacco monopoly owns the position of national monopoly. National monopoly does not have the three characteristics like common monopoly, such as regional, partial and temporary features. It shows an administrative and protective monopoly governed by the government, monopoly position of tobacco monopoly. This protective monopoly may not improve the development of independent innovation, while it has a passive influence on it. Therefore, it is also one of the causes that our tobacco industry can not fit for external market law, and has little capacity to withstand the pressure from international competitiveness.

3. Problems for Independent Innovation Pattern in China's Tobacco Industry. Independent innovation strategy carried out in China's tobacco industry is an inevitable choice for the development of enterprises in tobacco industry, and it also impetus to improve sustainable development in the industry. Independent innovation pattern is detailed independent innovation strategy. Although overall level of independent innovation in China's tobacco industry has greatly improved, many conditions inconsistent with sustainable development for the industry still exist, which restrict the independent innovation capacity and independent innovation pattern to improve.

3.1. Independent Innovation System of the Industry to Be Perfected. At present, most of the enterprises in China's tobacco industry have not strictly established modern property right system, and not followed strict corporate governance in modern enterprise. Therefore, the so-called modern enterprise system is not strict. Many enterprises in China's tobacco industry have changed their operational mechanism, fulfilled the independent rights, conducted shareholding system transformation, and implemented corporate system, but most of them only remain on the surface and turn out to be a mere formality. The function of the government and enterprises is mixed up and lack a set of scientific and effective incentive-restraining mechanism, which is very distant from strict modern enterprise system. Therefore, independent innovation capacity of the enterprises is weak, and ways of resources distribution and evaluation system can not meet the demands of independent innovation situation. System of attracting and cultivating excellent talents shall be further perfected. The consequence is that enterprises competitiveness lacking innovation impetus and pressure is decreased.



3.2. Obvious Disjoints among Production, Learning and Research of Enterprises in China's tobacco industry. There are many scientific and research institutes in China, but most of the institutes just hit the "edge ball" of tobacco enterprises. It is not good for a joint among production, learning and research. Meanwhile, research funding and scientific research strength can not be concentrated, which wastes science and technology and education funding. This causes many key basic and common technology problems can not be dealt, which directly constrain the independent innovation speed and progress of tobacco enterprises. Trouble of administrative relationship by sector and industry at the core, has set some obstacles for construction of optimization grouping and modern enterprise system in innovation system structure. This brings about great system difficulty in the combination of research institutes and enterprises.

3.3. Enterprises in China's Tobacco Industry Still Imitate Innovation. At present, the basic research of enterprises in China's tobacco industry is still very poor. They own fewer achievements with independent intellectual property rights, less academic paper and the quoting rate is low. Scientific innovation activities are limited to imitating innovation in the whole China tobacco enterprises.

Because the establishment of research institutes, personnel training, equipment arrangement, energy and raw material supply, scientific and technological services guarantee of enterprises in tobacco industry are carried out slowly, and measures and policies are not in place. Thus, research achievements are focused on imitating innovation, and independent innovation is auxiliary, "bottleneck" problem for transformation of the achievements is still prominent.

3.4. Less Investment is in Scientific & Technological Configuration and its Structure is Unreasonable. Currently, average R&D investment in China tobacco enterprises is less, and the investment is not reasonable, R&D institutes are small with simple organizational forms, so there is no innovation organizational form. A report from 2006 showed that R&D investment intensity (the proportion between R&D input and sales income) in tobacco industry is just 0.83%. Globally, if R&D investment from the enterprises is less than 1%, the enterprises can not survive due to weak innovation capacity. The rate of 2% can just survive the enterprises, and only enterprises above 5% have vitality and competitiveness. Viewed from the whole tobacco industry, independent innovation of the enterprises is not optimistic. Technical development funding and depreciation rate of quite a few enterprises are still very low. Even some enterprises can not depreciate, especially, the enterprises in tobacco industry. Therefore, independent technology development and innovation is rather difficult.

3.5. Overall Quality of R&D Personnel in the Industry to be Improved. Compared from number, quality and level of research staff, there is certain difference between science personnel of enterprises in China's tobacco industry and advanced tobacco enterprises in the world. There are not enough academic leaders and technical talents, so the requirement for scientific independent innovation can not be satisfied. It is manifested mainly in that some technical personnel from tobacco enterprises are often busy in daily skilled work, so



it is difficult for them to develop their own independent innovation work. Meanwhile, affected by different subjective and objective factors, input into technological innovation from major tobacco enterprises is far from the level suitable for their development. Therefore, technological innovation of China tobacco enterprises is badly restricted. According to the statistics, proportion of personnel devoted into scientific activity in cigarette enterprises was 2.89% in 2003, but during the period, proportion of personnel devoted into scientific activity in large and medium-sized enterprises accounted for 5.2% in China. Statistics from 2002 showed that proportion between advanced technicians and technological personnel from enterprises in tobacco industry accounted for 3.18%, but during the period in the whole country, the proportion in 301 scientific and technological centers approved by the country was 10.32%. According to statistics from 2006, each enterprise own 129 R&D personnel in technological centers above national tobacco industry in average. But during the period, the number is 1033 in 360 technological centers of the enterprises approved by the country. The small data is unfavorable for technological progress and independent innovation of enterprises in tobacco industry.

4. Content of Independent Innovation Pattern of Enterprises in China's tobacco industry.

4.1. Introduction. Independent innovation pattern of enterprises in China's tobacco industry is divided into three different types: original innovation pattern, integrated innovation pattern and import-digestion re-innovation pattern. Production of enterprises in China's tobacco industry has applied above-mentioned innovation patterns, which have produced a certain result. But in order to gain maximum effect, the author thinks that independent innovation pattern of enterprises in China's tobacco industry shall be combination of diversified (mixed application of above three independent innovation) innovation pattern with independent innovation pattern.

4.1.1. Original Innovation Pattern. Original innovation means that enterprises overcome technical difficulty not conquered before by relying on their own resources and abilities, and finish other innovation activities to realize the commercialization of technology and gain profit. In the three technological innovation patterns, original innovation is the most important pattern. Important condition for enterprises to conduct original innovation is that the enterprises shall have strong technological accumulation and R&D capacity. Technological accumulation refers to knowledge accumulation and technological capacity progression gained by the enterprises in the process technological activities. During the technological innovation, technological accumulation plays an important role in problem finding, innovational source forming, technological problem resolving, innovation cost reducing. Especially to original innovation, because its innovation extent is basic innovation, the enterprises need to skillfully master relevant technologies, and the enterprises are also required to have rich technological accumulation. R&D capacity refers to the ability that the enterprises put new products and new process into use from the idea through low investment. From the definition, it is easy to find that R&D capacity places emphasis on actual results and efficiency in the process of research and development. For



example, Honghe Tobacco had started 13 technologies, products and projects in total, which are badly needed by the enterprises as major special projects in 2007. Up to now, 4 scientific projects has passed verification and acceptance, among which, the project “Research on Compatibility Feature of Grade III Blending Tobacco” has occupied domestic leading level in research and application of tobacco compatibility feature. In the project “Research on the Development and Application of Paper-making Process Reconstituted Tobacco in Honghe Products”, some research content is innovational, and its comprehensive technology takes a leading level in the same field. “Research and Application on Tar-reducing Project of Honghe Cigarette” is innovational, and its comprehensive technology integrated application has reached the domestic leading level.

4.1.2. Integrated Innovation Pattern. Integrated innovation refers to optimize different innovational factors (technology, strategy, knowledge, organization and so on), and combine them reasonably together to form an organic whole with double function and evolutionary adaptation. And then innovation activities with new products, new process, new mode of production, or new service mode can be provided. Concept of integrated innovation is originated from technology integration put forward by Iansiti and system integration addressed by Best. Technology integration is defined by Iansiti as set of investigation, evaluation, and refinement activities aimed at creating a match between technological options and application. System integration defined by Best refers to “a basic principle of production and organization that plays roles in technology and organization level”. Integrated innovation requires the enterprises to have strong innovation management capacity, and rich construction knowledge in the field concerned. Innovation management capacity refers to the ability that the enterprises arrange technological innovation and organize to conduct technological innovation in the whole. Innovation management capacity can be understood as the ability that the enterprises find innovation opportunity, evaluate exactly innovation opportunity and organize to carry out technological innovation. Innovation management capacity is reflected from three different aspects, namely, innovation strategy, innovation mechanism and innovation speed of the enterprises. Since the 1990s, informationization construction of China’s tobacco industry developed from single automation, integrated automation, LAN integration to overall informationization, and a considerable scale of informationization integration innovation in cigarette enterprises has formed. Informationization of cigarette manufacturing industry is developing from single manufacturing enterprise to group manufacturer. Business optimization of cigarette production and management is taken as the main line. MES and logistics automatic system are brought into full play. Both of them are integrated all round, so automation of logistics management and information management is effectively promoted.

4.1.3. Import-Digestion Re-innovation Pattern. Import-digestion re-innovation means the innovation activity that based on technology introduction, the enterprise master core technology by digestion and absorption to imported technology, and develop next-generation technology in light of market demand, and finally the imported technology is surpassed. Under the pattern, the enterprises do not need to have technology accumulation, abundant R&D personnel and resources, rich experience in innovation



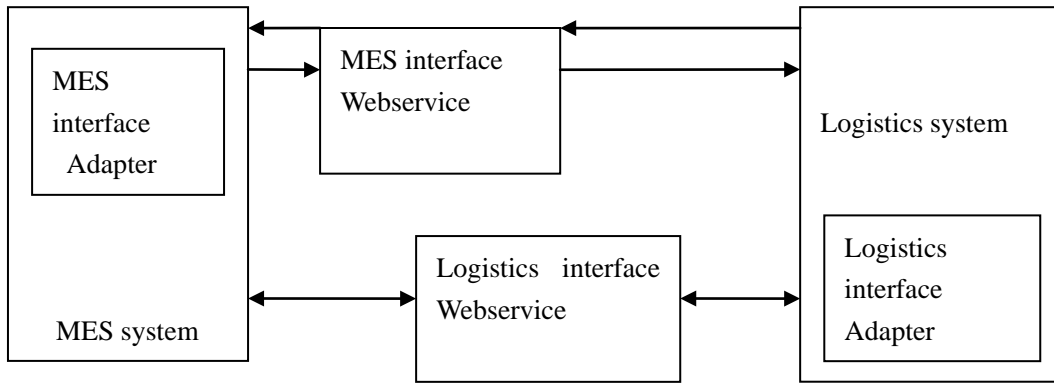


FIGURE 1. Automation system of logistics management and information management in cigarette enterprises

management, so it is important choice for innovation enterprises and big enterprises devoted into new industry to conduct independent innovation. As for enterprises with low technology, import-digestion re-innovation is a main way for technology catching-up and technology leapfrogging. Basic process of import-digestion re-innovation includes four stages: idea import, technology import, digestion and absorption, re-innovation. Tobacco primary processing technology is progressing based on the improvement of the innovation. From the beginning of reform and opening up in the 80's, foreign advanced equipment and technology was constantly imported, digested and absorbed, so tobacco primary processing technology was also improving, such as, slicing and conditioning, tube-style conditioning (HT), downstream (upstream) tobacco drying and expanding tower cut stalk expansion, STS+FBD cut stalk expansion and duct type cut rag expansion (DCC+HXD).

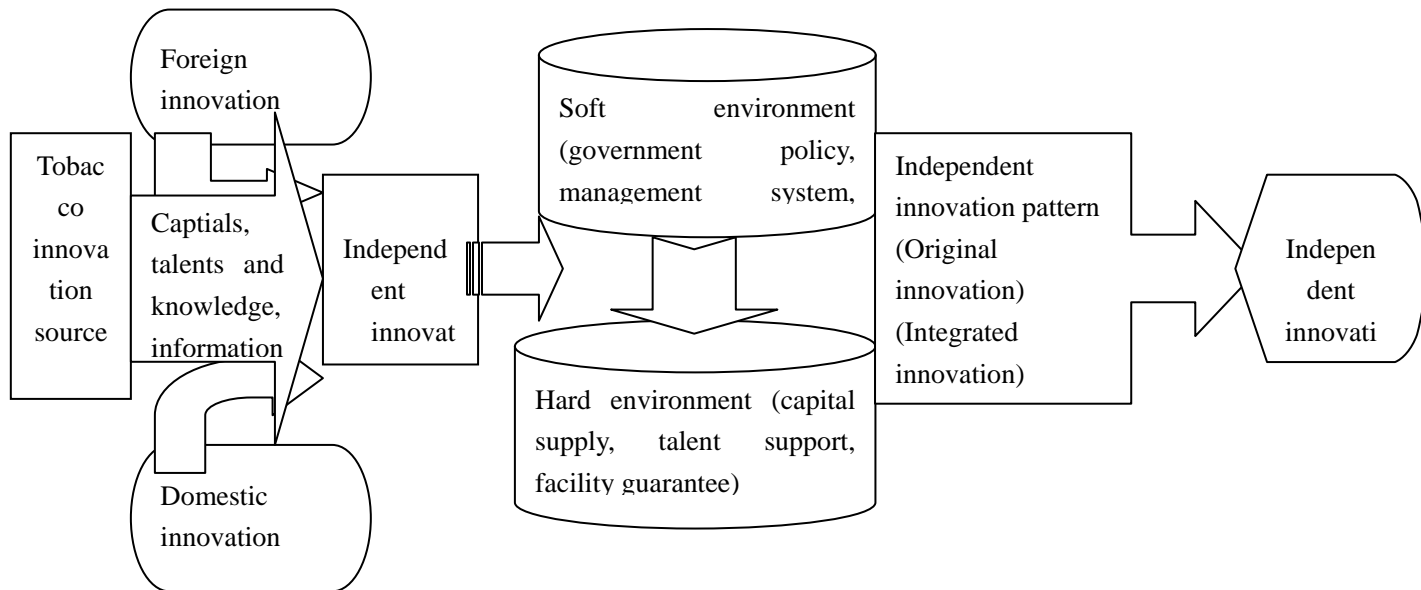


FIGURE 2. Independent Innovation Pattern Drawing for Enterprises in China's tobacco industry



4.2. Content of Independent Innovation Pattern.

4.2.1. Improving Development of Enterprises in Tobacco Industry by Fully Using Favorable Soft Environment. Soft environment consists of government policy, management system, and innovation-oriented culture. Overall direction affected the development of independent innovation model provides a good space of development for independent innovation of the enterprises. Government policy is one of important influence factor. In 2003, it is addressed in *Outline for the Development of China Science and Technology of Cigarettes* issued by State Tobacco Monopoly Administration that development direction of China science and technology of cigarettes is: taking market as the orientation, maintain and develop characteristic of Chinese cigarettes, strive to develop Chinese style cigarettes. It has set target for tobacco industry and tobacco scientific and technological personnel to work towards key technological breakthroughs, and has stipulated detailed measures for advancing scientific and technological innovation. National Outlines for Medium and Long-Term Planning for Scientific and Technological Development (2006-2020) and Notice on Some Supporting Policies for Implementing the Outlines for Scientific and Technological Development were issued in February, 2006. The Outlines have listed sharing mechanism for establishing diversified scientific and technological investment system, strengthening platform construction of basic technology condition, and constructing of basic technology platform. The *Notice* has listed policies to urge the enterprises to carry out technology innovation by fully using revenue, financial support, and education, standard of protection technology by intellectual property rights law, import quotas etc. With the guidance of the *Outlines* and *Notice*, State Tobacco Monopoly Administration is working to make supporting policies for improving independent innovation in the industry. All prevailing policies and measures to be issued will greatly boost independent innovation. Establish cultural atmosphere suitable for the development of innovation mechanism, namely, encouraging innovation, tolerating mistake, eradicating corruption and advocating independent innovation.

4.2.2. Abundant Resources for Development of Enterprises in Tobacco Industry (Hard Environment). Hard environment includes scientific achievements innovation environment and scientific and technological achievements transformation environment, which are interdependent and indispensable. ①Scientific achievements innovation environment mainly consists of providing plenty of starting funds, enough scientific and technological innovation talents and entrepreneurs, research place and facilities and complete-function scientific and technological information network. ②Scientific and technological achievements transformation environment mainly includes developed capital market, especially, securities market with adequate entrepreneurs, and many venture capitalists and complete-function technology transfer institution. ③Scientific and technological personnel with creative spirit is basic guarantee for independent innovation, and R&D level of the personnel is directly concerned to realization of independent innovation of the enterprises. Therefore, enterprises in tobacco industry must focus on long term development of tobacco industry and cigarette manufacturing machine industry. Basic ability and talent team shall be improved by increasing planning and investment intensity, and strive to train a quantities of excellent talent tem with international advanced level.



4.2.3. Gaining Development by Drawing Experience from Excellent Foreign Tobacco Enterprise. In recent years, tobacco industry is constantly drawing experience from excellent foreign tobacco enterprises, and positively importing advanced foreign technologies, so great achievements have been made in speeding up scientific and technological upgrade in the industry and economy development. It can be said that without experience from excellent foreign tobacco enterprises, there are no basis and condition for scientific and technological innovation at present. But we shall also realize that only import without innovation, we are always just imitating. It will result in dependence. Scientific and technological innovation not equals to innovation behind a closed door, and also not means to totally reject and deny external scientific theory and technological achievements. However, it shall stress that keep our own innovation as the base and adopt what is useful from others. Domestic and foreign resources shall be fully exploited to execute innovation, and independently develop core technology or famous-brand product with distinct Chinese characteristics finally.

5. Measures for Improving Independent Innovation Level.

5.1. Strengthening Cooperation and Communication with Foreign Tobacco Companies to Boost R&D Level. International technological cooperation policies shall be stipulated and perfected to establish partnership with international big tobacco companies, and technology for product development shall be introduced. As to key technology and intermediate products, we can cooperate with foreign counterparts to do joint research and development. Based on continuing to import key facilities, independent R&D level of our tobacco facilities shall be improved to form our own intellectual property right. Complete cooperation with international tobacco field shall be strengthened, to enhance overall R&D level and capacity in China's tobacco industry from all directions by technology import, R&D cooperation, dispatching personnel for abroad training and study.

5.2. Increasing Investment on Science and Technology, Speeding up the Cultivation of High-level Talents. As to less research fund for China's tobacco industry, the cigarette enterprises shall invest more on R&D and talent training. Scientific and technological development fund shall allow to be listed as normal expenditure from the policy, so as to promote R&D strength, technological innovation capacity and quality of the personnel. Meanwhile, financing mechanism shall be perfected, and strengthen the intensity to collect research fund from financial institutions to make up for short research funds. At the same time, the government shall issue policy to attract and train high-level talents. Talent training for advanced technology, management, trade and market development shall be paid more attention, especially for high-level management talents expert in international trade and WTO rules. Introducing talents from abroad into Hunan Tobacco (Group) Company and key cigarette factory shall be taken into consideration. Marketing capacity and market exploration level in the whole industry shall be improved as soon as possible to provide strong base for maintaining domestic cigarette market, expanding tobacco export and realizing international development strategy, and then make up for the problem of short for technological researchers in tobacco industry.



5.3. Speeding up the Construction of Technological Innovation System, and Perfecting Technological Supervision System for Products Quality. Quality of technological innovation system establishment shall be promoted as soon as possible. Complete R&D and technology innovation system with different levels, such as long, medium and short term research and development, basic research and popularization and application, present and future research work shall be formed to make the development of new products and new technologies meet the present and future market demand. Technological supervision system for product quality shall be perfected as quickly as possible, so that our quality supervision and inspection will satisfy the requirement after entering WTO, and product quality and competitive capacity of “Cigarette and tobacco” will be improved.

5.4. Improving Marketing Capacity by Marketing Change and Innovation. Improving marketing capacity is a major way to help the enterprises control market, retain customers and realize sustainable development. To improve marketing capacity of China tobacco enterprises, on the one hand, we should get close to the customers to conduct SPT marketing (market segmentation, targeting market and positioning), and low tar products shall be supplied. On the other hand, the cigarette whole-sale network system shall be perfected to speed up modern construction of cigarette distribution.

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