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# Strategic Research of Xinjiang Forestry and Fruit Industry Based on "Smile Curve"

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**Abstract** Based on theory of "Smile Curve", this paper analyzes industrial composition and current development situation of Xinjiang forestry and fruit industry. The "Smile Curve" theory indicates that research development and marketing sections have advantages of high added value, while processing and manufacturing sections have lower profitability. In line with these situations, strategic countermeasures are put forward for improving competitive power and increasing values of Xinjiang forestry and fruit industry. Countermeasures include seeking balance of ecological, social and economic benefits, and guiding investment in science and technology; energetically developing refined and deep processing through building industrial bases by leading enterprises; energetically developing informationization and logistics construction and catching major points of forestry and fruit industrial construction; stressing regional characteristics and implementing independent brand strategy from the "Green" concept.

**Key words** Smile Curve, Xinjiang forestry and fruit industry, Value-adding strategy

Xinjiang has always enjoyed its laudatory title of home of fruits and melons. Appropriate climate, long-time sunshine, rich sunshine and heat resources, large day-and-night temperature difference, and substantial water resource provide favorable conditions for making and accumulating sugar of melon and fruit. Therefore, melon and fruit from Xinjiang are sweet and refreshing. With an area of 3.31 million  $\text{hm}^2$  cultivated land and over 10  $\text{hm}^2$  million arable waste land, Xinjiang is one of the largest areas planting melon and fruit in China, type and quality of melon and fruit are in front rank, and the annual output of fresh melon and fruit is over tens of thousands Dan (1 Dan is about 50 kg).

In recent years, Xinjiang speeds up implementation of transformation of superior resources through effectively utilizing western development and favorable policies of Xinjiang, and have made significant achievement in forestry and fruit industry. According to statistics, the area of forest and fruit in Xinjiang has an increase of 66 700  $\text{hm}^2$  annually. In 2010, total area of characteristic forest and fruit exceeds one million  $\text{hm}^2$  in Xinjiang. At present, it has Circum-Tarim Characteristic Forest and Fruit Producing Region, Eastern Xinjiang Tu-ha Basin Quality Forest and Fruit Base, Characteristic Forest and Fruit Base in North Xinjiang Yili Valley and at North Slope of Tian Mountain. In whole region, there are over 130 fruit storage and fresh keeping and processing enterprises. In the autonomous region, there are over 30 leading agricultural industrial enterprises, including Tunhe Fruit Product Company, Guannong Fruit and Antler Company, Bergamot pear Stock Company, Xiangdu Wine, Tazao Company, Hualong Scientific and Technological Company, Top Agricultural Product Company, Suntime Wine, Nongfu Spring, Huiyuan Juice, Yilite, Xin'ao Juice and Sunyard Wine, forming the industrial development model connected

with multiple industrial chain. In the course of brand construction, 11 forest and fruit production counties (cities) have been named as homes of characteristic forest and fruit<sup>[1]</sup>. The forestry and fruit industry has become new strategic industry of Xinjiang, and will take up important position in future economic pattern of Xinjiang. Therefore, the benefit level of forestry and fruit industry development is of great significance to promoting socio-economic sustainable development of Xinjiang.

## 1 Composition of value chain of product (industry) from the perspective of Smile Curve

Firstly introduced by Shi Zhenrong, founder of Taiwan Acer Computer, the Smile Curve came into being from IT industry in Taiwan. Now, it has been successfully applied and generally recognized by all circles of life. In the entire international industrial chain, the value of industrial chain takes on a V-curve. The added value is high for research, part production, modular part production, sales, and after-sale service of products at both ends of industrial chain, and their profit margin is wide, while the added value is low for assembly section in the middle part of industrial chain, and the profit margin is narrow (shown in Fig. 1).

The development course of scientific and technological industry in developed countries undergoes a series of long term accumulation of resources, from basic research, application research, technological innovation, establishing specifications and standards, manufacturing process innovation, to service system, and brand image. At early stage of industrial development, added value of research, development and marketing are equivalent and take on a horizontal line. When the industry forms global competitive situation, the reduction of added value is relatively great due to low obstacle to system assembly and manufacturing function. For such resource as key technological

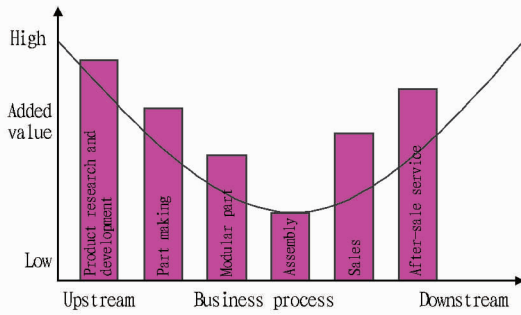


Fig. 1 Industrial chain based on Smile Curve

research and development, and brand marketing, it requires long time of accumulation, so the barrier is high and added value is also higher, consequently forming the Smile Curve.

The Smile Curve fully explains significance of "technological and brand" innovation to increase of added value. Therefore, to walk out the lower part of Smile Curve, an industry, a region or a country should insist on autonomous innovation, strengthen introduction, absorption and re-innovation of technologies, expand scale of technological development, and promote transformation of technological achievements. In addition, it is required to enhance construction of marketing channel and cultivate self-owned brand with wide popularity and better reputation, to push forward gradual upgrade of industry toward both ends of Smile Curve, obtain more profits and higher added value, and provide powerful and lasting motive force for local economic development.

## 2 Analysis of Xinjiang forestry and fruit industry based on Smile Curve

**2.1 Composition of vale chain of forest and fruit from perspective of Smile Curve** Phenomenon of Smile Curve not only exists in IT industry, but will enlighten strategic selection of medium and long term development of Xinjiang forestry and fruit industry. From the viewpoint of value chain, the forestry and fruit industry is oriented towards market, integrates research and development, planting, processing, storage and transport, and marketing, so as to form a complete industrial chain, including better seed cultivation, production technological research and development, product supply, forest and fruit planting, storage and transport, fine and deep processing and packaging, brand marketing, and international trade. Based on theory of Smile Curve, value chain of forestry and fruit industry can be divided into following sections: upstream section (including fine seed cultivation, production technological research and development), midstream section (including forest and fruit planting, storage and transport, fine and deep processing and packaging), and downstream section (including brand marketing, and international trade). In added-value of processing and manufacturing fields, there exists unbalanced state, showing half-smile characteristic. Traditional forest and fruit planting industry stays at the lowest part, while the storage and transport, fine and deep processing and packaging remain in the higher added-value part (shown in Fig. 2) [2].

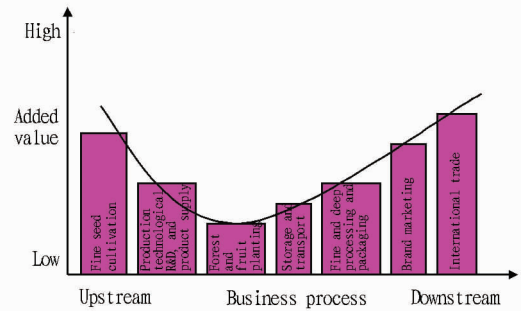


Fig. 2 Composition of forestry and fruit industry based on Smile Curve

Obviously, in current economic situation of industrial division of labor and constant thinning and diversity of labor division, only paying attention to the extension of industrial chain before and after the production is undoubtedly a complacent and conservative action. Therefore, from the perspective of industrialization, the development of forestry and fruit industry should start from concept of modern value chain (Fig. 3) [3], center on market, fully understand consumer preference, build reasonable marketing channel and brand image, develop quality and diversified products and services, and increase investment in research and development relying on unique natural advantages of Xinjiang, to build its own new core ability.



Fig. 3 Modern value chain

**2.2 Current situations of value chain of Xinjiang forestry and fruit industry** Along with rapid economic development Xinjiang, frequent external contacts and gradual improvement of marketization level, yield and volume of exports of forest and fruit also rise rapidly and substantially, and the forestry and fruit industry has become new pillar industry of Xinjiang. Currently, the overall added value of Xinjiang forestry and fruit industry is low for following reasons.

**2.2.1 Weak support of forest and fruit science and technology.** Science and technology constitute a primary productive force, and forestry and fruit industry is a technology-intensive industry, so increase of scientific and technological content is a powerful guarantee for raising productivity, and also key measure for industrial structural upgrading and fighting for higher end section of the value chain. At present, market advantages of Xinjiang forestry and fruit depend on natural barrier formed by natural environment and resource, so support ability of scientific and technological innovation is limited, which is obviously not favorable to maintenance and expansion of industrial advantages. Survey report of development of forestry and fruit industry in South Xinjiang in 2010 indicates that support of science and technology for forestry and fruit industry is weak mainly in following aspects: construction of standardized system lags behind industrial development; application level of many conventional technologies is to be improved, including high yield culti-

vation, dwarf culture and compact planting, and plant disease and insect pests; the popularization and application process of new type and technology are slow in development of forestry and fruit industry; fruit farmers lack relevant professional knowledge; and science and technology are disconnected with production<sup>[4]</sup>. These factors restrict increase of value of forest and fruit product and improvement of market competitiveness.

**2.2.2** Production scale effect of forest and fruit begins to show, but the management level is low. During energetic development of forestry and fruit industry, Xinjiang takes planting area and output as key indicators for evaluating its development, but neglects internal quality and package. On one hand, the forest and fruit planting area increases rapidly, the scale of bases constantly expand, and the scale effect begins to show. On the other hand, capital and talent factors limit popularization and application of such advanced and practical technologies as variety improvement, water-saving irrigation, and prevention and control of harmful organism, and construction of standardization system lags behind expansion of industrial scale. Weak ability of production management is manifested in following aspects. Firstly, planting management is extensive. Currently, except plant protection having higher level of mechanization, cultivation, field planting, management and plucking are mostly manual operation with high production cost and low labor productivity. For example, apricot and walnut mainly adopt planting manner of natural production and not pruning, and plucking just adopts rod to hit, easily leading to damage of fruit and reduction of quality. Secondly, packaging and management are extensive. Most fruits are not packaged or simply packaged when it enter market. In addition to bad conditions of transport, it is hard to enter market with high quality, but the commercial value is low, putting great pressure on sales of forest and fruit products.

**2.2.3** Leading enterprises develop rapidly, but the extension of industrial chain is not enough. In the agricultural value chain, the added value can increase several times, tens of times, or even hundreds of times from processing of primary agricultural products to fine and deep processing. The ratio of value added has reached 1:2 to 1:3 for agricultural product processing in coastal developed regions of China, the average level in the world is 1:3, and the ratio in developed countries is 1:7 to 1:8. It indicates that current ratio in Xinjiang forestry and fruit industry is difficult to reach this level. In addition to extensive processing, insufficient deep processing, low scientific and technological content and single variety, most are concentrated on food processing field, so the amplitude of value adding is limited. In recent years, Xinjiang carries out large enterprise strategy to introduce leading enterprises of agricultural product processing field. Industrial development has made preliminary achievements. In local areas of Xinjiang, such large leading enterprises as COFCO Tunhe, Suntime, Tazao Company spring up, but medium and small size enterprises still take up the majority, their operating and management ability is low, and their driving force is not strong for social economic and increase of farmers' income. Besides, due to unique natural and climatic conditions in Xinjiang, in some areas suitable for

planting forest and fruit, primary products can form effective entry barrier to obtain excess profit, which reduces enthusiasm for industrial extension to some extent. At the whole international market, the speed growth for consumption of processed fruit is greater than that of fresh fruit. Therefore, there is still a great space and potential for level of Xinjiang forestry and fruit industry.

**2.2.4** Forest and fruit circulation system tends towards perfection, but there are still many problems. In 2010, there are over 130 fruit storage, fresh keeping and processing enterprises in Xinjiang. The processing and delivery ability is further strengthened. In south and north Xinjiang, a batch of large wholesale market network is set up, including Urumqi Beiyuan-chun fruit and vegetable wholesale market, Korla Bergamot pear logistics and distribution center, and Aksu comprehensive fruit and vegetable wholesale market. These preliminarily form the market system with trade market as foundation, wholesale market as center and purchase and retail market as auxiliary, which will play active role in promoting circulation of fruit products. However, in the construction of circulation system, there are still such problems as low level of organization of forest and fruit product logistics, insufficient investment in circulation field; obsolete logistics facilities and urgent need of cold-chain logistics construction; unsmooth forest and fruit market information, and e-commerce sales channel not fully utilized; and lagging of construction of quality standard system. The ability of exploring foreign and domestic market is restricted from such factors as remote to domestic major consumption market, seasonal feature of forest and fruit production, and inconvenient mass transport.

**2.2.5** The risk of industrial market is high and we should shoulder heavy responsibilities for brand construction. Functions of existing forest and fruit associations are mainly concentrated on agricultural service, but inadequate in bringing into play intermediation and safeguarding market benefits of fruit farmers, and circulation of market information is not smooth, the response lags behind and transaction cost is high. Fruit farmers lack marketing knowledge and most of them still stay in the idea of "selling what they plant". After field planting, fruit trees need stable and high input every year. In addition to influence of fruit market and seasonable feature on price, off-season and in-season prices of forest and fruit products have a large fluctuation. High yield will not certainly bring high benefit, and there is higher market risk in production and operating. As to brands, along with development of new forestry and fruit industry in Xinjiang, a lot of famous brands spring up, such as Hongliu grape, Piyaman pomegranate, Hetian thin walnut, Shayidong Fragrant Pear, Hongqipo, Dixiate and Alimali quality apple, Gulibake and Shaana flat peach. Nevertheless, due to limitation of funds, scale and technologies, it is hard for them to expand their influence power<sup>[5]</sup>. Besides, in the brand construction, there are problems of eagerness for quick success, lack of awareness of long-term development, low level in brand operation and management, interactive effect not brought into full play between regional brand and corporate brand or product brand, not standard market

order, and inadequate brand protection.

### 3 Value-adding strategy for Xinjiang forestry and fruit industry

The competitive power of modern agriculture depends on quality of primary agricultural products, as well as development level of the entire industrial value chain. Without extension of agricultural industrial chain and multi-level value adding in production sections, it is difficult to raise economic benefits of agriculture fundamentally<sup>[6]</sup>. Therefore, on the basis of keeping midstream advantages of value chain, Xinjiang forestry and fruit industry should gradually expand towards both ends of Smile Curve. In addition, it is required to cultivate coordinating ability of the entire industrial chain, adaptability to changes, and innovation ability, in the hope of finding a development road with "famous brand, lead in the development of science and technology, characteristic of Xinjiang, and first-class in China".

#### 3.1 Seeking balance of ecological, social and economic benefits and guiding investment in science and technology

Firstly, with typical oasis ecological system, the ecological environment in Xinjiang is vulnerable and largely depends on resources. As to direction selection of forest and fruit science and technology, on one hand, it is required to focus on development trend of consumption market, and on the other hand, it is required to consider bearing capacity of environment<sup>[7]</sup>. Currently, Xinjiang forestry and fruit industry remains at early stage of industrialization. There are problems of huge scientific and technological investment, long period of cycle and high risk of forest and fruit, so autonomous region should provide guidance. Besides, it is proposed to implement joint key problem tackling and achievement sharing in different regions, industries and platforms in line with major difficulties and key fields of forestry and fruit industry development. Also, it is proposed to promote joint development of production, teaching and research of forestry and fruit industry, and gradually turn major scientific and technological supports to high added value fields in the value chain. Furthermore, it is required to pay attention to development of environment-friendly, resource-saving, yield-increasing and high quality forest and fruit, to highlight characteristic advantages of Xinjiang forest and fruit.

Secondly, along with prominence of social food security problem and limitation of green barrier in international trade, higher requirement is put forward for production of forest and fruit products. Harmless products have bright development prospect and price of harmless products are generally higher than ordinary fruit products. Therefore, Xinjiang should take full advantage of policies and favorable resource environment, increase financial investment, establish harmless forest and fruit demonstration base, aim at international green food consumption market, and create high quality, high efficient and export-oriented characteristic forest and fruit base, to constantly perfect construction of production base for green and organic fruit products.

In addition, it is required to stress application of originality in forestry and fruit industry, take such resources as science

and technology, culture, society and creativity as production factors and put them into sections of industrial chain, and create new development model and growth point<sup>[8]</sup>. For example, leisure agriculture is a new type industry formed on the basis of modern people's tense life, great pressure and eager for closing to nature, and combining traditional agriculture and leisure service industry. Another example is creative agriculture. As a new industry with high added value and high content of culture, creative agriculture centers on intellectual property right and bases on agriculture. Since Xinjiang is rich in cultural resource, the advantage in developing creative agriculture is gifted.

#### 3.2 Energetically developing refined and deep processing through building industrial bases by leading enterprises

Xinjiang forestry and fruit industry shall draw on experience of developed countries, to realize agricultural industrialization through planning with industrialization thought<sup>[9]</sup>. On the basis of bringing into full play and maintaining existing comparative advantages, Xinjiang forestry and fruit industry will expand from primary processing to refined and deep processing fields. Through extending process, increasing types and scientific and technologic contents in various sections, it is expected to realize value adding at many levels and in many fields. In refined and deep processing fields, since leading enterprises have comparative advantages in technological innovation, achievement conversion, market information, and resource management, it is required to bring into play integration of leading enterprises during industrialization. Leading enterprises should not only complete internal value operation, but also should take charge of value creation in value activities and strategic management for those parts that farmers and production enterprises fail to create<sup>[10]</sup>. Through deep communication, on the basis of understanding consumers' preference, it is proposed to design industrial value chain and corporate value chain oriented towards customers' demands. Besides, it is recommended to constantly optimize core business and recreate process. The autonomous region should energetically introduce and foster scientific and technologic processing enterprises with independent intellectual property, higher innovation ability and bright development prospects. In addition, it should pay attention to cultivation of incubator of scientific and technologic enterprises, build perfect industrial foundation, stress superior resource condition and regional cultural features of Xinjiang, and set up high quality forestry and fruit industrial bases with development model of leading enterprise → industrial chain → industrial cluster → industrial base.

#### 3.3 Energetically developing informationization and logistics construction and catching major points of forestry and fruit industrial construction

During energetic development of forestry and fruit industry, information and logistics are major points of industrial construction. With the aid of them, it is able to effectively improve efficiency and management level of industrial chain of forestry and fruit industry. Modern value chain starts from consumption market, so market information plays an important role in stable and efficient operation of the entire industrial chain, and determines business flow, logistics

and capital flow and efficiency of industrial chain. On the condition of low industrial organizational level, single enterprise or farmer hard to get information, difficult to timely and accurately adjust product and industrial structure, generally leading to out-of-balance of supply and demand and high market risk. Information construction and information management are helpful to individuals adapting to change of market structure, to avoid out-of-balance of supply structure and market structure, fluctuation of product price, and to effectively reduce market risk. Through information construction, farmers and enterprises can timely obtain service of information, including supply and marketing, transport, storage, and technical consultation. Then, it will change the original decentralized production pattern, form risk-pooling and benefit-sharing industrial organizations, which is favorable for improving industrial resource allocation and reducing transaction cost.

Logistics is always a bottleneck in development of Xinjiang forestry and fruit industry. On one hand, Xinjiang is vast in territory and remote from major domestic and foreign consumption markets, while refined and deep processing demands stable supply of primary products all the year round. On the other hand, forest and fruit are seasonable products; their quality guarantee period is short, and transport conditions and costs are high. Cold chain logistics is the key to solving this conflict. If without favorable cold chain logistics, it is difficult for forestry and fruit industry to achieve effective market expansion. Consequently, there will be cases of out of stock in slack season, overstock in rush season, and sales at fairly low price. Industrialized development also needs solving seasonable and periodic conflict of forest and fruit products. It can be seen that the cold chain plays a significant role in reducing costs and adjusting supply-demand of forest and fruit industry. All developed agricultural countries own advanced cold chain logistics service system. Along with socio-economic development, consumers' demand is growing for characteristic agricultural foods. Thus, it is required to ensure both quality and quantity of products at market, improve influence power and competitive power of the brand, so as to form effective ability of market exploit.

### 3.4 Stressing regional characteristics and implementing independent brand strategy from the "Green" concept

Brand innovation is an effective approach to differentiation competitive strategy, and also the most effective means of raising competitive power and added value of forest and fruit products. Green and organic foods are effective cutting points of brand construction of Xinjiang forest and fruit industry. Along with improvement of consumption level, consumers turn to quality from quantity. Especially in recent years, the issue of food security becomes more and more prominent, so people pay increasing attention to food security and health, then green and organic foods become popular with consumers. In main producing regions of Xinjiang forest and fruit products, there is little industrial pollution, long sunshine time, high seasonal temperature difference, few forest and fruit diseases and insect pests, and less consumption of pesticides. In these situations, it is of great significance to selecting brand construction of green foods

as starting point, echoing with development of green technical standard system in upstream of value chain, primary production and refined and deep processing of green fruit products in mid-stream, stressing "safe", "green" and "harmless" in brand marketing, and building reputation of Xinjiang forest and fruit products, to obtain higher brand added value and promote development of Xinjiang harmless forestry and fruit industry<sup>[11]</sup>.

For a long time, Xinjiang has built regional brands and batches of well-known primary product brands by taking advantage of its unique natural and climatic conditions. When mentioning Xinjiang, people can't help thinking "home of fruits and melons". Many primary products of Xinjiang are named by regions, for example, Korla bergamot pear, so regional brand greatly supports development of Xinjiang forest and fruit brand. Therefore, it is required to stress regional characteristics of Xinjiang, make people connect product quality with natural production conditions of Xinjiang, constantly expand coverage of branded products, and enhance independent brands and integrate other brands, to form regional brand cluster with higher influence power and widespread fame. In the course of brand construction, construction and protection shall be carried out simultaneously. Also, it is required to strengthen GI product certification and protection, and guarantee characteristics and quality of GI products.

## 4 Conclusions

In forest and fruit planting, Xinjiang has a long history. Fruits produced there are well-known at home and abroad. However, for many reasons, scientific and technological support is limited and marketing force is insufficient, while it enjoys comparative advantages in natural resources and production environment. Therefore, in certain period, concentration on production of primary fruits accord with theory of comparative advantages, but it is impossible to support long-term development of forest and fruit industry. Through analysis of Smile Curve, it is concluded that we should accurately orientate science and technology, increase scientific and technological investment, integrate and extend industrial chain, find out cutting point and support point of brand construction, and promote independent brand strategy. These are helpful to improvement of overall competitive power of Xinjiang forestry and fruit industry.

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in agricultural science and technology, accelerate the conversion and application of agricultural scientific and technological achievements, improve the rate of contribution of technology to agricultural growth, and promote intensive agricultural production, clean production, safe production and sustainable development.

### 3.1 Improve the construction of agricultural infrastructure and increase agricultural input

After the disintegration of the collective economy in the 1920s, irrigation and other agricultural infrastructure were destroyed, unable to adapt to the requirement of agricultural development. Meanwhile, in recent years, with hike in the price of fertilizers, pesticides, mechanized farming, irrigation and other agricultural input factors, some farmers reduce input in agricultural production and even abandon fields. Therefore, the government should strengthen the construction of irrigation and other agricultural infrastructure, enhance disaster-prevention ability of agriculture, expand the area of arable land, offer appropriate price subsidies for agricultural input factors, and reduce agricultural production costs.

### 3.2 Accelerate the project of extending agricultural technology into households and promote the conversion and use rate of agricultural scientific and technological achievements

Shaanxi Province has rich agricultural education and research resources, and outstanding agricultural production technology, but the scientific quality and cultural level of farmers in Shaanxi Province are very low, with not strong capacity of receiving science and technology. Therefore, it should rely on technological progress and innovation, and promote agricultural technology to households via many channels and forms. Meanwhile, we must fully rely on the agricultural research strength of the province, cultivate a number of specialized, sophisticated, sharp agricultural high-tech talents, promote and apply the research results to the actual production of agriculture, promote the conversion rate of agricultural scientific and technological achievements, and take the agricultural growth path relying on scientific and technological progress of agriculture.

### 3.3 Establish and improve industrial system of agriculture and speed up the building of various agricultural cooperative economic organizations

In accordance with the regional layout planning of preponderant agricultural products, we must rely on the existing central and local research strength and technology resources with innovative advantage, and take

agricultural products as unit and industry as the main line, to build modern agriculture technology system interlocking all links from the origin to the table, from production to consumption, from research and development to all aspects of market, serving national long-term goal. At present, the decentralized and small-scale mode of operation based on land contractual relations implemented in China is unable to adapt to the requirements of modern agricultural scale economy and externality. Therefore, it should promote the organizational degree of agricultural production through the construction of agricultural cooperative economic organizations in the fields of production and circulation.

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