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The Chinese Way Quality Revolution - Why Is the Technological Development

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Abstract: *The rise of the Chinese society in the past 100 years from the colonial powers and aggression, the eight-year war of resistance, the civil war between the Kuomintang and the Communist Party, and the confrontation between the two sides of cross-strait (the war is still latent), to the Asian four small dragons as the emerging industrial countries and the rise of the China mainland. The Chinese society has gradually caught up with advanced countries such as Europe, U.S., and Japan, from the viewpoint of food and clothing, social stability, political harmony, economic development, and scientific and technological progress, and come to a well-being society.*

However, the ensuing collisions in the Sino-US trade negotiations, the impact of the COVID-19 Pandemic, the boycott of China's 5G communications, and the "Made in China 2025" vision were suppressed. Since China's reform and opening up, has also risen in economic, political, military and other comprehensive strengths, and the "China Threat" has also been wildly expended in Europe, the United States, and Japan. At this moment (around 2020), it is time to discuss this topic, and the media is reporting on the economic war and technological war between countries. Even academia uses a specious historical law "Thucydides Trap" to predict that a newly rising power will inevitably challenge the existing powers, and the existing powers will inevitably respond to this threat, so that war seems inevitable.

*From the standpoint of Chinese society, discussing the issue of economic and social development of a country, with quality as its topic, it will get less controversy in ideology. The quality of the subject to the "essence of substance" requirements are precise and accurate plus reliable; to the "process of business" focus on efficiency and effectiveness plus value; to the "conduct oneself" emphasis on words and deeds should be consistent; to the "quality of life" pursue the balance of production, ecology, life; to the society "Datong (The Ideal World)" is our dream. In terms of economic and social development, the Chinese community in Singapore, Hong Kong, Macao, Taiwan and Mainland China promotes "**The Chinese Way TQM**" in order to avoid internal friction and carry out the quality revolution of technological development. Technology can compete with other powerful countries and even surpass it to resist foreign aggression.*

Keywords: *The Chinese Way TQM, quality revolution, Made in China 2025, 8341 Project.*

I. Introduction

From March 2018 to January 2020, the China-US trade negotiations went from have gone from raging swords, repeated ceasefires and recurrence, stagnation for a time and silence before signing the first phase agreement. It was like sitting in a big ups and downs roller coaster. The trade war has negatively affected the economic growth of both China and the United States.

In December 2019, a new coronavirus-infected pneumonia broke out in Wuhan, Mainland China. The WHO named it COVID-19 on February 11, 2020. Due to the large number of people moving from Wuhan to other areas during the Chinese New Year, a large number of confirmed cases began to appear in Shanghai, Guangdong, Beijing, and even other countries and regions. The COVID-19 Pandemic has spread all over the world, as of the day of writing (2020/10/1), the number of confirmed cases has exceeded 30 million, and the death toll has exceeded 1 million. The global spread of the COVID-19 is the largest global Pandemic that has ever been experienced in human history and affected the world. In human history, even the two world wars have never affected such a wide geographical range. Under the influence of the above-mentioned events, the universal value thinking has a certain influence and should be adjusted. For example, the social development of an open, prosperous, and free and democratic country; globalization, international mobility, and the trend of international activities in the global village; the positive and negative influence of mainland China in the world is more significant; and the "Chinese Way Series", which I have been writing in recent years, is at the right time.

[1]

What is going on here is the quality revolution of technological development. In 2018, China's mainland telecom manufacturer ZTE was in a production dilemma due to its violation of transaction prohibitions with Iran and North Korea, and the United States completely blocked and ruined its core chip technology. What's more, the United States first banned ZTE and Huawei, followed by music and video related streaming media TikTok, and then Alibaba's e-commerce, these are all suppressions against China's technological development. This force not only indirectly stifled the future of China's 5G communications and the vision of "Made in China 2025", it also caused the collapse of Chinese Internet media! There is an ancient motto: "People are more self-aware then more self-conscious," this kind of introspection ability, from the development of personal career to the governance of the state, is very important. If without knowing the strengths and weaknesses of the self and the external opportunities and threats, how to provide the effective strategies.

Among the current strategic planning tools, SWOT analysis should be considered one of the most widely used tools, which was established by McKinsey & Company. [2] Including analysis of the company's internal strengths and weaknesses; analysis of the company's external opportunities and threats, through SWOT analysis, will analyze all aspects of the internal and external conditions of the enterprise, and then summarize the organization's strengths, weaknesses, opportunities and threats. Systematically focus resources and actions on their strengths, invest in the opportunities; and allow companies to strengthen or avoid weaknesses, control or reduce the risk of external threats.

On April 25, 2018, the heading of Yanhuang Chunqiu Newspaper (炎黃春秋報) [3] "In addition to the core chip, China's 24 core technologies are not mastered." Reporting as follow: China's core technology is subject to others for a long time! The first step in solving this problem is to find out exactly which China is behind others and in which areas, seeing the direction can be stable and far-reaching. The core pain point of China's communications industry - the problem of "the lack of core and less soul" is once again severely placed in front of China." Table 1 shows the 24 core technologies listed in the article except the core chip.

Table 1: In addition to the chip, China's 24 core technologies are not mastered

1. Semiconductor processing equipment, Semiconductors	13. Large industrial water pump
2. Ultra-high precision machine tool	14. Enterprise scanner
3. Industrial robot	15. Blood diagnostic equipment
4. The world's top precision instruments rankings	16. Global zinc oxide arrester
5. Global engineering equipment rankings	17. Photovoltaic inverter
6. Global bearing rankings	18. HF-23 Decomposition recovery unit
7. Global carbon fiber rankings	19. Ultra-pure seawater desalination
8. Optics	20. Powder processing machine
9. Gas generator wheel for power generation	21. Coke generator
10. Denitration catalytic device	22. Powertrain precision test equipment
11. Waste incineration equipment	23. Special type steel
12. Petrochemical PP / PE large extrusion granulator	24. Battery

II. Technological Revolution

In fact, compared with developed countries, there is still a clear gap between China's manufacturing industry's innovation capability, overall quality and competitiveness. It is big but not strong.

China tries to take the efforts of three decades to achieve "Three Transformations:" **"the transformation from China Speed to China Quality, from Made in China to Created in China, and from Chinese Products to Chinese Brand,"** to complete the Chinese manufacturing from "big" to "strong" strategic task. Made in China 2025 focuses on economic and social development and major national security needs, selects 10 major advantages and strategic industries as breakthrough points and strives to reach the international leading position or international advanced level by 2025. Ten key areas are: a new generation of information technology industry, high-end CNC machine tools and robots, aerospace equipment, marine engineering equipment and high-tech vessels, advanced rail transport equipment, energy saving and new energy vehicles, electrical power equipment,

agricultural equipment, new materials, biomedicine and high-performance medical equipment.

ANQ Congress 2015 Taipei, Professor Tony Chen invited a group of Professor Zhang Genbao from the School of Mechanical Engineering of Chongqing University to attend the conference. After the Congress, "ANQ 2015-Reliability Seminar on Digital Machine Tool of Cross-Straits" was held. On the seminar, Professor Zhang Genbao gave a speech on the topic: "The current status and development of the reliability of the machine tool in China,"which mentioned that the quality of the domestically produced machine tools made author impressed. And put forward the countermeasures of the 8341 projects, as shown in Figure 1 and Figure 2. The following is the summary of what he said:

Figure 1: ANQ 2015-Reliability Seminar on Digital Machine Tool of Cross-Straits

Most people think that the main reason why the quality of China's machine tool problem is the design ability not strong! I don't think so! The crux of the problem is that if the same process file is handed over to our machine tool companies and German machine tool companies at the same time, the appearance of the products can be similar, the functions can be the same, the structure can be similar, but stability and reliability are completely different!

Therefore, we are not afraid of innovation, because:

The appearance can be imitated! (strong imitation ability)
Functions can be copied! (strong plagiarism)
The structure can be reversed! (reverse engineering)
Design drawings can be purchased! (rich in funds)
Process files can be purchased! (rich in funds)
Millet phone is typical!

But what's worse is that reliability and stability can't be imitated; it's impossible to copy; it's impossible to reverse; it can't be bought by spending money! Only by our own efforts, we will explore ways to improve reliability and quality stability! In addition, regardless of product, quality and reliability must be high!

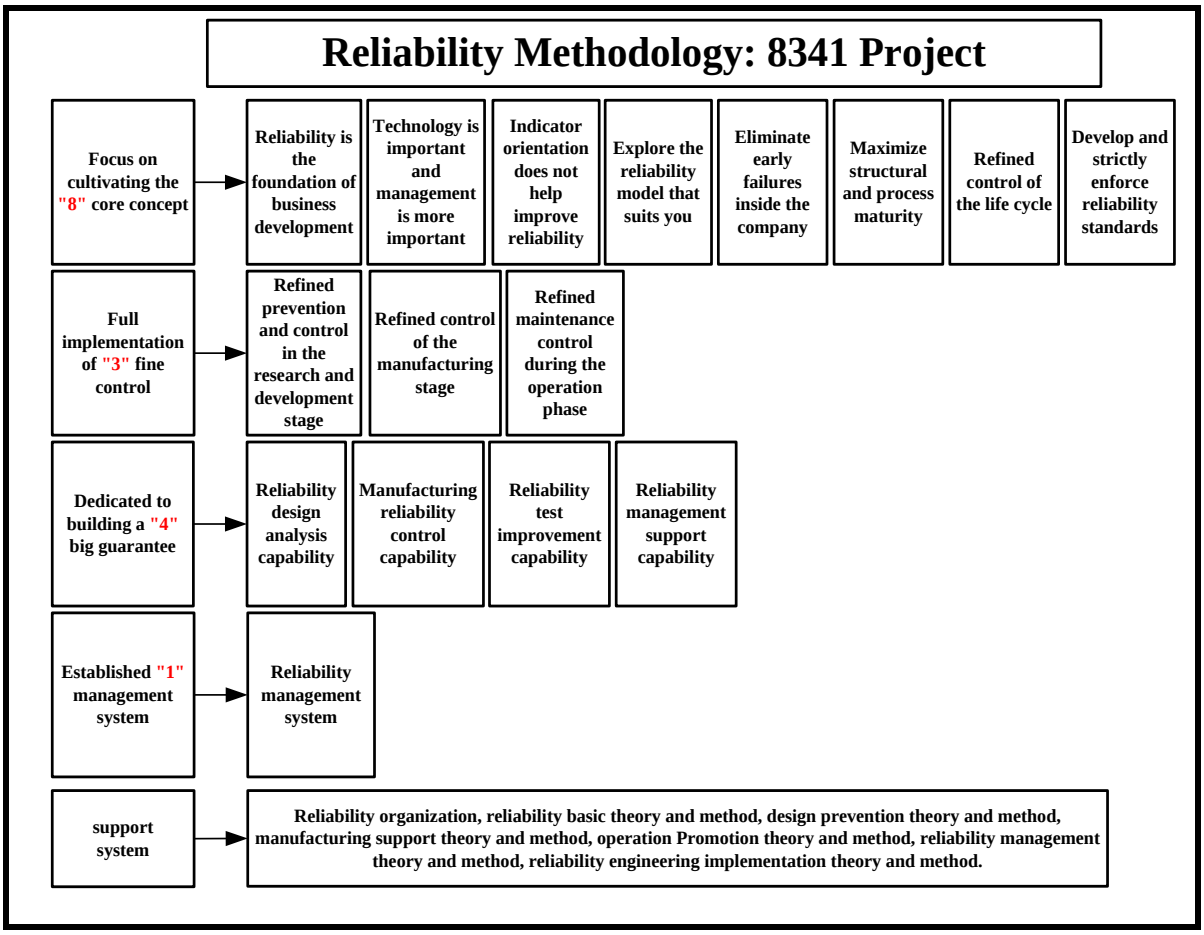

Figure 2: 8341 Project

According to Professor Zhang Genbao's so-called "8341 Project" [4], there seems to be no shortcut to the quality revolution. It must be based on the development of the quality professional field. After years of professional integration in different fields, gradually formed as multi-value organization team operation mode, such as continuous improvement, leadership, consistent goals, full participation, common language, technology sharing, and change management. An organization can be able to operate sustainably, in particular, the commitment, knowledge and active participation of high-level leaders are the key. First, they must be established a business philosophy from high-level leaders, integrate ideas within the organization, form a consensus, and then can be able to build up sustainable operating mechanism.

Back to the source, W. A. Shewhart has an example in his masterpiece, **"The Economic Control of Quality of Manufactured Products"** p.326, which explains the quality of a telephone. It refers to a carbon-grain microphone that converts sound into electronics. The sensor of the signal consists of two separate foils and carbon particles between them. The piece of metal foil facing outwards acts as a conductive diaphragm. When the sound vibrates the foil, it changes its pressure on the carbon particles, which further changes the voltage between the two foils. Three factors affect the quality of the carbon-grain microphone, carbon particles, foils and assembly, as shown in Figure 3. If the variation of the carbon particles is σ_1, the variation of the metal foils is σ_2, and the variation of the assembly is σ_3, the variation of the carbon-grain microphone is σ.

$$\sigma = \sqrt{\sigma_1^2 + \sigma_2^2 + \sigma_3^2}$$

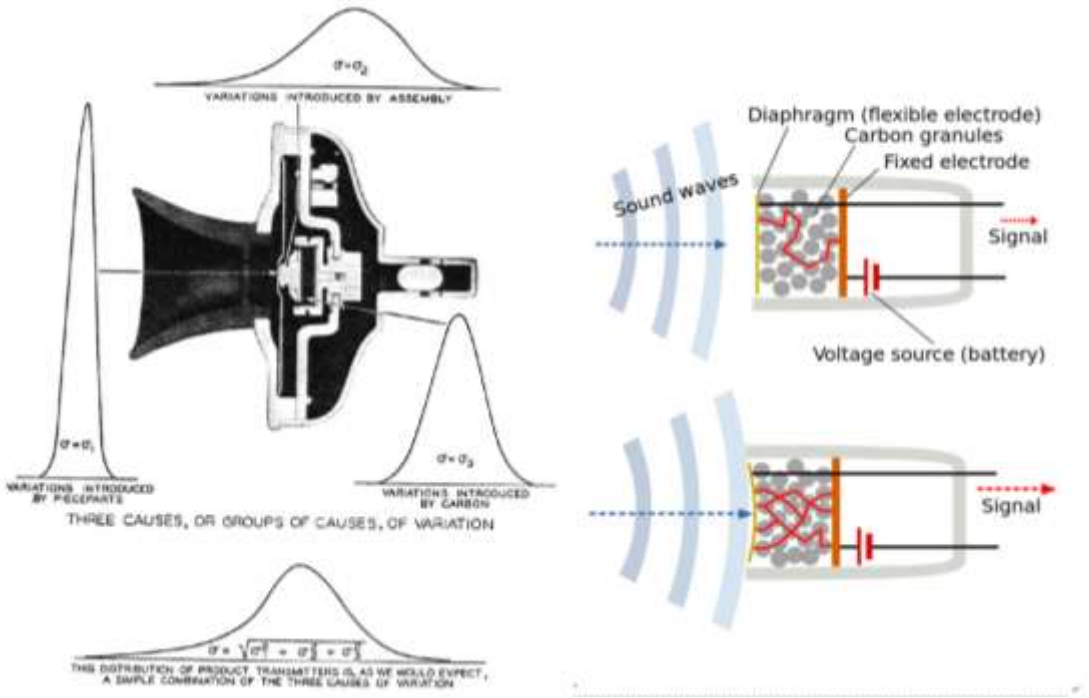

Figure 3: variation of the carbon-grain microphone

"Close to Academician": Liu Yuanzhang: China's "factory doctor." [5] In the article, Liu Yuanzhang, the father of Chinese quality, told a story:

His first test was completed in 1957 at the Shanghai State-owned Second Textile Machinery Factory. The main product of this factory is the textile machine, one of which is the key component of the fine grinding process. Liu Yuanzhang saw in the workshop that the operator who worked on the grinding machine was an old master. Every time he finished grinding one piece, he handed it over to the young master. After the young master accurately measured the product size, he told the old master whether it was thick or thin. Liu Yuanzhang draws the data measured by the young master into a trend chart according to the processing order, and then asks the old master to process it alone without the help of the young master, and then draws the finished product data into a trend chart. It is clear from the charts that the data of both processing fluctuates around the standard size. However, the fluctuation of the processing time of the old master alone is obviously much smaller than when they cooperate. The reason is that the old master is rich in experience, when the young master is on the side, he tampers with the old master's operation. This is an example about "Funnel Experiment" [6]. We simulate Rule 1 as without tampering and Rule 2 as with tampering of "Funnel Experiment", then we can get the same result as the story told, as shown in Figure 4.

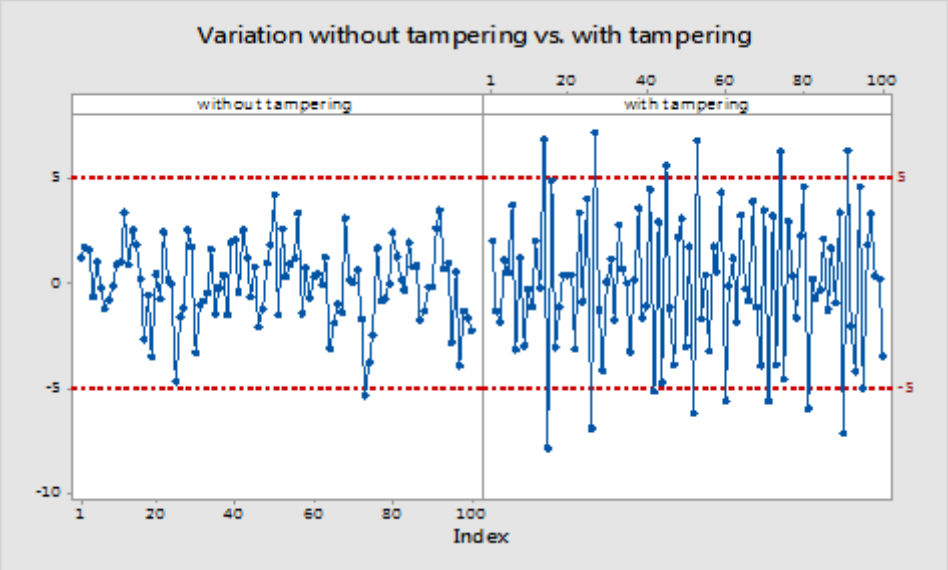

Figure 4: Variation Rule 1 as without tampering and Rule 2 as with tampering

Liu Yuanzhang explained through this small example that quality control is not a traditional simple statistical test. Instead, it controls the factors affecting product quality in the production process through the principle of mathematical statistics, so as to make the product quality fluctuate in every link as much small as possible. Ultimately achieve stable, high-quality production on the whole.

Design and development of various new products, in particular Original Equipment Manufacturers (OEM) or Original Design Manufacturers (ODM) of design manufacturing parts, the product and process quality planning must be established and maintained a series documents to control and validate the product. And the planning process must be ensured that the requirements of the customer to be satisfied. APQP is generally used as a reference for designing manufacturing parts.

APQP divides planning process into planning and evaluation phase, product design and development phase, process design and development phase, product and process validation phase and mass production phase. The quality related methodologies Inter-relationship diagraph of each phase are shown in Figure 5. The new Global Automotive Quality Management System standard was released by IATF (International Automotive Task Force) in October 2016 and renamed IATF 16949: 2016. This will replace the current Quality Management System (QMS) requirements defined in the ISO / TS 16949 automotive industry. For its evolution, please refer to Figure 6. It is related five core tools: APQP / FMEA / MSA / SPC / PPAP, and APQP is one of the most important core tools.

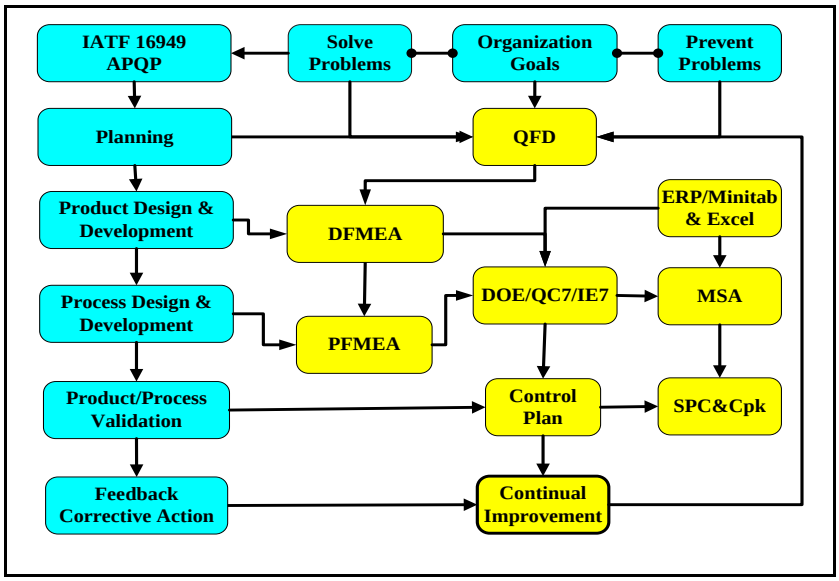

Figure 5: APQP planning process and quality related methodologies Inter-relationship diagraph

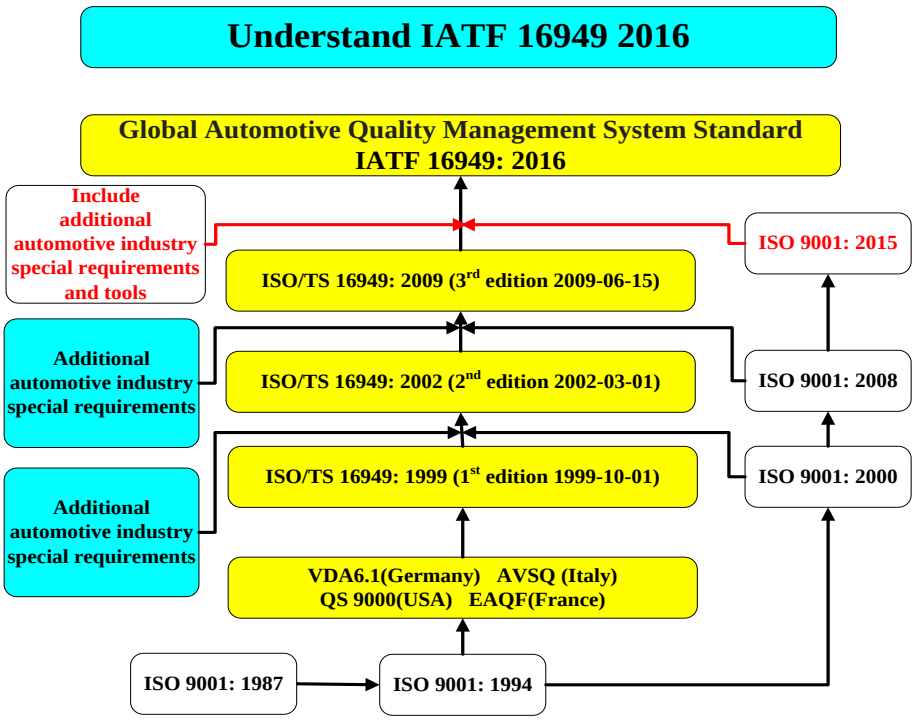

Figure 6: The evolution of IATF 16949: 2016

The title of the quality revolution of technology development is to remind design engineers that quality is designed. Whether you are doing research, technology transfer, or mass production, finally, it is necessary to communicate via a documented system, such as the APQP system. The so-called "Do not do evil things though it may be insignificant, do not give up good things though it may be minor matters;""small things are not small;""the devil always hidden in the details." That is to say, there is no shortcut to technological development, only the implementation is in place. Taking the ideas of quality gurus W.A. Shewhart and Liu Yuanzhang as examples, they also informed design engineers to solve quality problems from the source of the quality that affects quality.

III. Conclusion

The Chinese community, Singapore, Hong Kong and Macao regions are well-established in the financial and service industries, and its service quality have reached the world's advanced level; ICT industry is the most complete in Taiwan; and the rise of mainland China. Just as the Chinese community has entered an unprecedented glory in the past 500 years, the term "China threat" is no longer an academic discourse, but a war of trade and technology. At this moment, the Chinese community should review the history of the past few hundred years, why Chinese rulers have not been able to govern in the current realm of prosperity, in author's opinion, there are two major factors. First, the internal friction of the society, in the Ming and Qing Dynasties, the internal friction of maintaining the imperial power; the internal friction of the warlord after the Revolution of 1911; the internal friction of the civil war between the Kuomintang and the Communist Party; and the contradictions between the two sides of the strait each have ideological internal friction. The other is the invasion of the external powers induced their own internal friction, including their war of aggression and the compensation paid by China, as well as compulsive and unfair economic competition, and even the orientalism under the strong western influence, which has caused China to fall into political chaos, economy extreme poverty and cultural identity difficulties.

When we discuss the issue of economic and social development of a country, with quality as its topic, it will get less controversy in ideology. The quality of the subject to the "essence of substance" requirements are precise and accurate plus reliable; to the "process of business" focus on efficiency and effectiveness plus value; to the "conduct oneself" emphasis on words and deeds should be consistent; to the "quality of life" pursue the balance of production, ecology, life; to the society "Datong (The Ideal World)" is our dream. In terms of economic and social development, the Chinese community in Singapore, Hong Kong, Macao, Taiwan and Mainland China promotes **"The Chinese Way TQM"** in order to avoid internal friction and carry out the quality revolution of technological development. Technology can compete with other powerful countries and even surpass it to resist foreign aggression.

Countries would enhance their national strength; political stability is more important than economic development. National Strength can refer to such hardware power as military affairs, economy, diplomacy, science and technology, and resources as well as software power such as information network infrastructural and cultural level. Among these, military strength, economy, diplomacy and science and technology can all easily enhance the national strength of the country, and political stability plays an important role in elevating the power at these levels. More importantly, the people of the country must unify their opinions so that their power can be concentrated, and rely on the baptism of culture to decide on and strengthen their political direction, keep high economic level to ensure the quality of nationals, take advantage of science technology to ensure a strong state. The people's spiritual needs should also be uniformed by integrating values, integrating knowledge, integrating ideas and integrating wisdom. The so-called **"The Chinese Way Total Quality Management"** [7] under the theoretical basis of new structural economics, gradually sort out a specific architecture as follows:

1. TQM with the party leading the government;
2. Establish a constitutional level of roadmap, principle and policy;
3. Macro-control and micro-correction under country governance with PDCA;
4. Launch the ministry, province, city and autonomous region with the vision, goals and strategies formed by the Party Central Committee;
5. Combination of government, industry, and research institute, government support for research, universities focus on theoretical research, institutes focus on experimental research, and enterprises focus on realizationally research;
6. From the Party Central Committee, the State Council, the Military Commission, the Disciplinary Committee, and the legislators to the ministries, provinces, municipalities, autonomous regions, counties, cities, towns and peoples, the people's ideas are consistent;
7. People-centered socialist comprehensive modernization;
8. The continuous improvement of bottom-up self-discipline should be the first priority.

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[2] The world's largest strategic consulting company http://mckinseychina.com/zh

[3] This site has been blocked and replaced by this site https://kknews.cc/zh-tw/tech/v65abj2.html

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