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Hochstein, Axel and Zhu, Yan, "ICT Transformation in China After Its WTO Entry: Lessons from the Tobacco Industry" (2008).
AMCIS 2008 Proceedings. 345.
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ICT Transformation in China after Its WTO Entry: Lessons from the Tobacco Industry

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ABSTRACT

This study examines ICT's impact in meeting the challenges, Chinese tobacco companies are facing in the context of an open door policy as well as the WTO entry. The analysis is based on an in-depth study of the ICT evolution in Chinese tobacco companies. For our conclusion we use Nolan's stage hypothesis and the strategic grid model. We show that, depending on a company's strategic grid cell, different behavior patterns can be observed in terms of Nolan's stage model. We conclude that a fast transformation of ICT plays a major role for Chinese tobacco companies in order to face the challenges entailed by the WTO entry.

Keywords

WTO, China, ICT transformation, open door policy, tobacco industry

INTRODUCTION

Since the introduction of economic reforms and an open door policy in 1978, China has emerged as a key player in the global economy. The pace of the internationalization of the Chinese economy is very impressive. The Chinese economy has undergone extensive transformations during the last two decades. The economic reforms introduced in 1978 have resulted in high economic growth and rapid industrialization in China. With gross domestic product (GDP) growing at nearly 10 percent a year, China is the fastest growing economy in the world. High economic growth has transformed China into the world's seventh largest economy.

There is no question that there will also be a significant impact on the Chinese economy as a result of trade liberalization under WTO. China has agreed to significant reductions in tariff and non-tariff barriers over the coming years. The majority of studies conclude that China's economy will benefit from its accession to WTO, though conclusions differ with respect to the size of economic gains. Most studies conducted, indicate that there will be an increase in China's GDP and economic welfare as a result of its accession to the WTO (Anderson, 1997; Ianchovichina and Martin, 2001; Taylor, 2003; Yang, 1996).

Although GDP and economic welfare have been increased, and are expected to increase further, China's open door policy and the WTO entry entail comprehensive challenges for Chinese companies. These challenges have already been analyzed for many industries (Chen and Shih, 2004; Liang, 2004; Lin, 2004; Nie and Zeng, 2003; Sun, 2003; Yeung and Mok, 2004). However, the impact of these challenges on companies' ICT has not further been addressed. Research has been undertaken for Internet diffusion in China (Guo and Chen, 2005; Zhu and Wang, 2005), whereas this research is focused only on end users. China's ICT usage has also been analyzed (Reimers, 2003; Reimers, Li and Chen, 2004), but this research was not put in context with the WTO entry of China. Therefore, this study aims to analyze the impact of China's open door policy and the WTO entry on ICT in Chinese companies. Due to industry specific challenges, our analysis is focused on one industry, whereas we chose the tobacco industry. Compared with the telecommunication, insurance or banking industry the tobacco industry's supply chain is not steeped in ICT. Thereby, factors, specific for industries that are steeped in ICT are eliminated.

After introducing into China's tobacco industry and its challenges, this article describes the ICT transformation of Chinese tobacco companies. Through these studies we address the following research question: do the challenges, Chinese tobacco companies are facing regarding the open door policy and the WTO entry, have an impact on ICT in Chinese tobacco companies? We use Nolan's stage hypothesis (Gibson and Nolan, 1974; Nolan, 1973; Nolan, 1979; Nolan, Croson and Seger, 1993) to analyze differences to typical ICT transformations. Additionally, by using the strategic grid model (Applegate, McFarlan and McKenney, 1996; McFarlan and McKenney, 1983) we get further insights in our observations. Finally, we summarize our findings and draw conclusions, thereby offering new insights and extensions to guide further research and practice.

BACKGROUND

Tobacco Industry in China

The tobacco industry is a state monopoly in China, organized under the China National Tobacco Administration, now known as the State Tobacco Manufacturing Administration (STMA) which falls under the Ministry of Economic and Trade. The China National Tobacco Company, part of the STMA, oversees about 180 factories across China, situated in almost every province and the four major cities (Shanghai, Beijing, Tianjin and Chongqing). There are more than 2,000 cigarette brands in China. Even though the China National Tobacco Company is a monopoly, it has numerous branches that compete with each other within several major tobacco leaf producing provinces, such as Yunan, Henan, et cetera. These branches are organized as profit centers and operate self-sufficient. In some instances, provincial tobacco companies even set trade barriers for out-of-province cigarettes, in order to promote their local products (Tuan, 2000). In contrast to the United States, England, or Japan, no dominant market players with market shares of more than 10 percent exist. The largest tobacco manufacturers in China are Hongta with a market share of 6.5 percent, Yizhong with a market share of 4.5 percent, Shanghai with a market share of 3.5 percent and Kunming with a market share of 3.0 percent (see Table 1).

Table 1. The tobacco market structure of different countries

China		U.S.		England		Japan	
Manufacturer	Market Share	Manufacturer	Market Share	Manufacturer	Market Share	Manufacturer	Market Share
Hongta	6.5%	Philip Morris	49.5%	Gallaher Group	39.5%	Japan Tobacco	75%
Yizhong	4.5%	R.J. Reynolds	24%	Imperial Tobacco Group	38%	Philip Morris	17%
Shanghai	3.5%	Brown and Williamson	15%	Philip Morris	6%	Brown and Williamson	6%
Kunming	3.0%	Lorillard	9%	British American Tobacco	8%	British American Tobacco	1%
Total	17.5%	Total	97.5%	Total	91.5%	Total	99%

China's tobacco industry produced 15.2 million cases of cigarettes in 1980 (each case contains 2,500 packs or 50,000 cigarettes). By 1990, production increased to 32.6 million cases, an increase of 114 percent (China Statistics Bureau 1980-1990). In 2000 33.3 million cases were produced, an increase of two percent (Wang and Li, 2002). In other words, short after the announcement of China's open door policy in December 1978, the cigarette production more than doubled. Likewise, short after China's first application for a WTO membership renewal in December 1986, the cigarette production almost stagnated.

Implications of WTO Entry

Beginning in 1986, the China National Tobacco Company started joint ventures with foreign tobacco companies such as R.J. Reynolds and the British American Tobacco Company. With the decline of cigarette sales in the United States, major U.S. tobacco companies have increased their investments in cigarette manufacturing in China. China has welcomed these joint ventures in order to improve the quality of Chinese-produced cigarettes, as well as to increase the volume of cigarette exports to foreign countries. It has been estimated by the China National Tobacco Company that the total production from joint ventures is limited to no more than one percent of the total domestic market, about 300,000 cases. These joint venture products were subject to a higher tariff ex-factory, set at about 200-250 percent of the world market price. Foreign tobacco companies welcome the tax relief required as a condition of WTO membership.

As a condition of China's WTO entry, two major changes will be made. One is to reduce the import tariff on cigarettes from 65 to 25 percent, which will enhance the competitiveness of imported cigarettes in the Chinese market (Nie 2000). In 2000, the price of foreign brands was slightly higher than the most popular domestic brands, such as "Hong-Ta-Shan" which were about 1 USD, but much lower than other upper-class brands, such as Zhong-Hua, which were about 2 USD per pack.

The second change is to gradually relax and then abolish the non-tariff barriers such as quota and license controls. Without the protection of tariff and non-tariff barriers, and given foreign cigarette marketing tactics (i.e. advertisement and other brand promotion) as well as their tar-nicotine content, it is most likely that within a short time after China's entry to the WTO, imported cigarettes will attract a large portion of Chinese smokers. Domestic cigarettes could lose ten to twenty percent of the market share within a few years (Hsieh, Hu and Lin, 1999), as happened in other Asian markets (Chaplouka and Liaxuthai, 1996).

The Chinese government, particularly the China National Tobacco Company, has begun to worry about the impact of WTO. In recent years, the government has seriously enforced the anti-smuggling law, removing fake brands, improving the quality of domestic brands and implementing a ban on tobacco advertisement. The Chinese government has organized an inter-departmental committee (e.g. consisting of the National Economic Planning Commission, Ministry of Finance, Ministry of Health, Ministry of Agriculture, et cetera) to participate in the negotiations for an international framework convention on tobacco control, which is likely to include provisions on smuggling.

Such changes are a great challenge of Chinese tobacco companies. They must adjust themselves to adapt the environment and competing in the global markets. How ICT can support this process of adaptation and how ICT systems are transformed in the course of companies' adaptation process, is analyzed by studying the ICT transformation in Chinese tobacco companies, described in the following section.

ICT TRANSFORMATION IN THE CHINESE TOBACCO INDUSTRY: ANALYSIS 1

Nolan's Stage Hypothesis

Stage models offer insights into how strategies evolve over time (Lyytinen, 1991). According to stage models, organizations progress through a number of successive, identifiable stages. Each stage reflects a particular level of maturity for example in terms of the use and management of ICT in the organization. One such stage model is Nolan's stage-hypothesis (Gibson and Nolan, 1974; Nolan, 1973; Nolan, 1979). Nolan's stage-hypothesis has become the best known (for a discussion of similar stage models, see Galliers and Sutherland, 1991), but also one of the most debated and controversial models of ICT penetration in organizations (Benbasat, Dexter, Drury and Goldstein, 1984; King and Kraemer, 1984; Lucas and Sutton, 1977; Lyytinen, 1991; Zuurmond, 1991). Nolan's model postulates that the general pattern of ICT penetration and use in organizations, can be roughly approximated using the pattern of growth of the organization's ICT budget curve. This pattern manifests itself as a crude S-shaped curve and the points of inflection of this curve provide the basis for identifying the different stages of organizational learning (Nolan, 1973). Nolan's original model (Gibson and Nolan, 1974; Nolan, 1973) comprised of four stages. These are (with the budget growth pattern in brackets): Initiation (slow annual increases after ICT acquisition), Contagion (high annual increases), Control (declining annual increases) and Integration (slow annual increases). Nolan's stages of organizational learning are summarized in Figure 1.

Later Nolan expanded the model by introducing the concept of 'eras' reminiscent of the notion of 'technological waves' in the field of innovation studies (Nolan, 1979). These are marked by technological discontinuities through the introduction of micro-computers and the deregulation of the telecommunication industry (leading to the widespread creation of internal and external networks linking computers). In each era, companies have to go through all four stages of organizational learning and learning is cumulative over all eras as depicted in Figure 2.

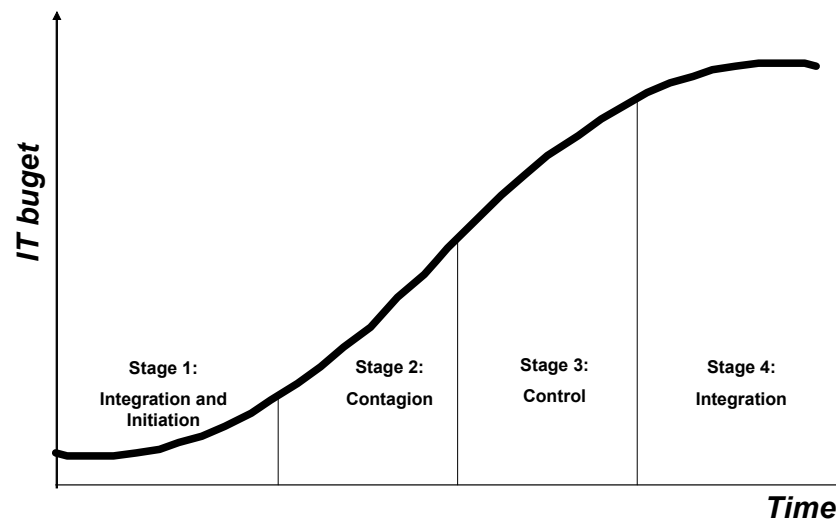


Figure 1. Nolan's stages of organizational learning

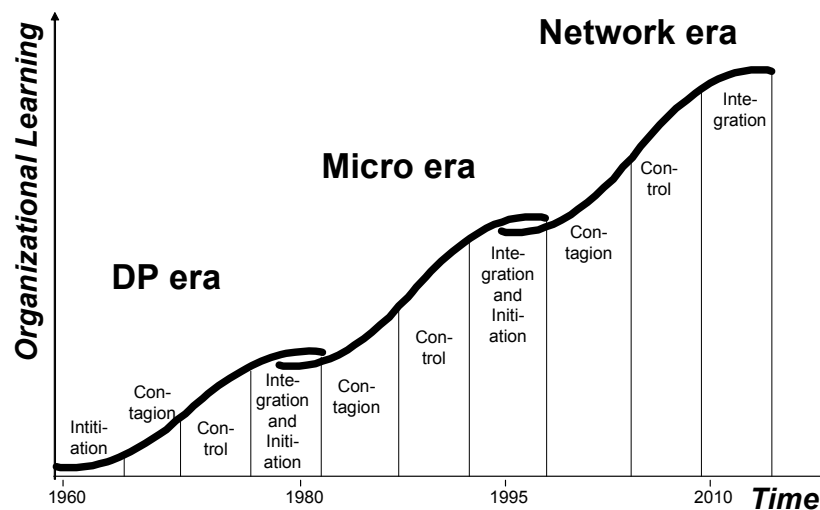


Figure 2. Nolan's eras of organizational learning

In order to get insights on any influences of the open door policy and the WTO entry, the ICT transformation processes of Chinese tobacco companies are analyzed according to Nolan's stage model. Thereby the stages of organizational learning as well as the ICT eras are studied. Deviations from Nolan's stage model indicate an influence of China's historic development on the ICT transformation in Chinese tobacco companies.

Stage Model of Hongta Tobacco Group

ICT had been introduced into the company at the very beginning of 1990. Hongta Tobacco Group skipped the data process era, and went directly into the micro-computer era. Thenceforward, the ICT transformation at Hongta is summarized as follows:

- 1993: *Initiation stage of micro era:* Hongta invested 300 million Yuan (approximately 36.5 million USD) in Technology Center.
- 1993-1995: *Contagion stage:* Several separate systems had been developed including the automatic manufacturing system and the finance system. The IT department was puzzled because the low reward of IT expenditure.
- 1995-1996: *Initiation stage of network era:* The company established the biggest local networks in Chinese tobacco companies.

1997-2002: *Contagion stage*: The infrastructure was transferred into the ATM system and separate network applications had been developed. Additionally, the SAP R/3 system and mySAP.com were implemented all over the enterprise.

Figure 1 shows the stage model for Hongta Tobacco Group. After skipping the DP era, Hongta run through the initiation and contagion stage of the micro era. Then, Hongta skipped the control and integration stage and jumped to the network era directly, catching up the ICT budget as well as the ICT penetration proposed by Nolan's stage model.

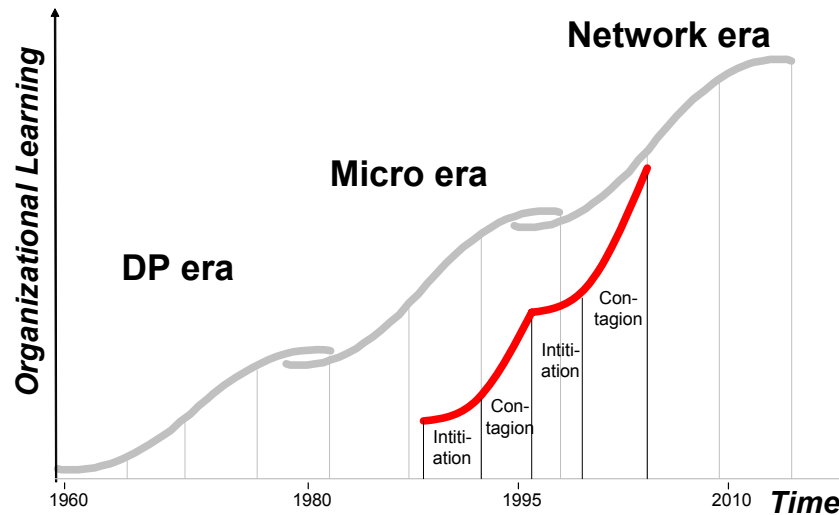


Figure 1. Stage model of Hongta Group

Stage Model of Baisha Group

Similar to Hongta, Baisha also skipped the data processing era. Their ICT transformation process started in 1992 and is summarized as follows:

- 1992: *Initiation stage*: Baisha started to invest in ICT infrastructure.
- 1992-1995: *Contagion stage*: Baisha developed several ICT systems, such as a contract management system (sales department), a MRPII system (manufacturing department), and an accounting support system (finance department).
- 1996-1998: *Initiation stage of network era*: The implementation of an SSA ERP system did not succeed.
- 1998-2002: *Contagion stage*: The BPR project and the implementation of ERP were successful.

Figure 2 summarizes the stage model of Baisha Group, which is similar to Hongta's stage model. After skipping the DP era, Baisha run through the initiation and contagion stage of the micro era. Then, Baisha also skipped the control and integration stage and jumped to the network era directly, also catching up the ICT budget as well as the ICT penetration proposed by Nolan's stage model.

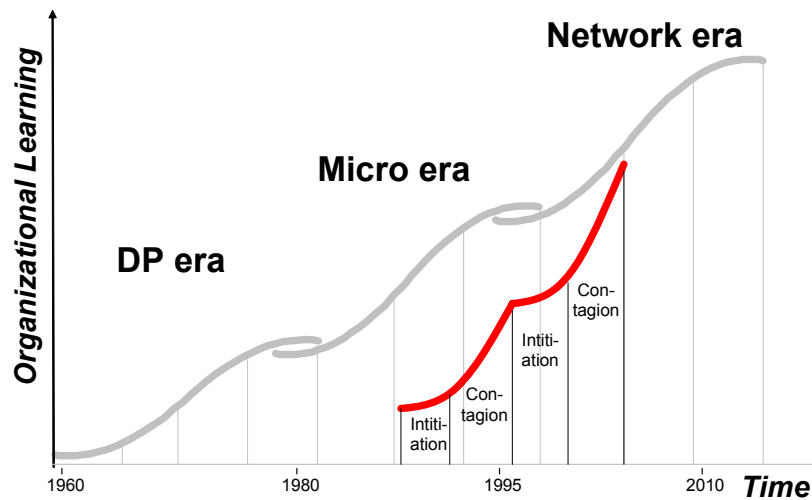


Figure 2. Stage model of Baisha Group

Stage Model of Other Chinese Tobacco Companies

Until 2003 the other Chinese tobacco companies did not regard ICT as a strategic factor for their business. Therefore, ICT was only enforced by doing small, separate projects starting in the 1990s. According to these companies' ICT budget, the groups were still in the initiation stage of the micro era. After recognizing ICT as an important factor for a successful business, the organizations are now initiating the network era without running through the three other stages of the micro era.

Figure 3 shows the stage model of the other Chinese tobacco companies. Still in the initiation stage of the micro era, they initiated the network era directly.

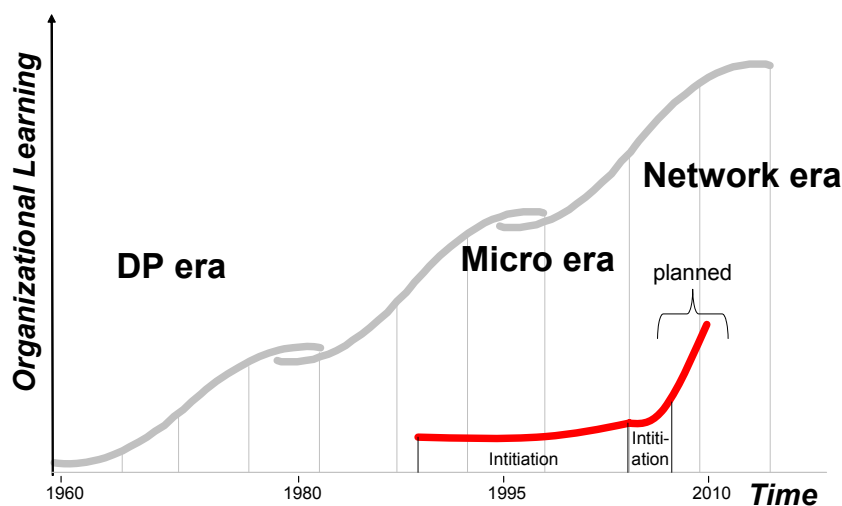


Figure 3. Stage model of the other Chinese tobacco companies

Cumulative Stage Model of the Chinese Tobacco Industry

By adding up all ICT investments made within the Chinese tobacco industry, one gets the stage model of the entire Chinese tobacco industry (see Figure 4).

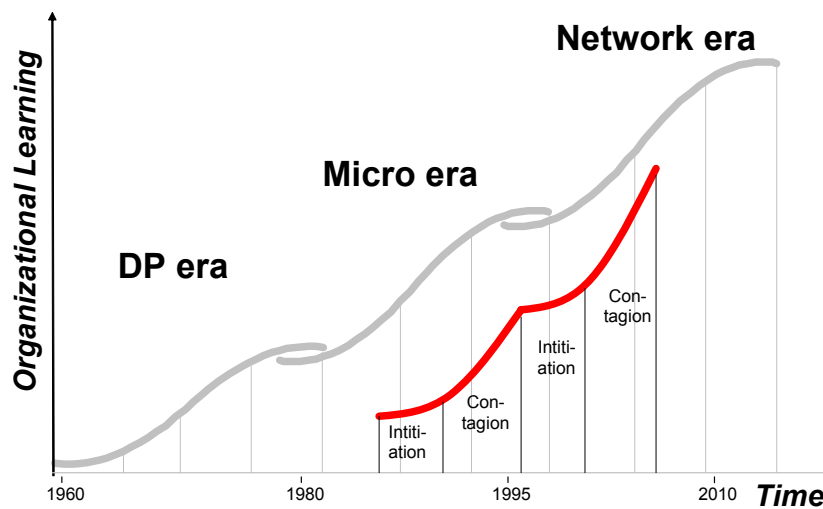


Figure 4. Cumulative stage model of Chinese tobacco industry

This stage model looks similar to the stage model of Hongta and Baisha, whereas the forming of the curves is more flat. The ICT investments of the other companies are almost irrelevant for the shape of the stage model, but flatten the curves of the stage model.

Summary

The stage models of Hongta and Baisha appear very similar. In the beginning of the 1990s, the two companies initiated the micro era by investing in ICT infrastructure and insular, ICT-based applications. Subsequently Hongta's, and Baisha's ICT budgets increased highly. By the end of the 1990s these two companies initiated the network era, whereas Hongta as well as Baisha skipped the control stage of the micro era. More and more, ICT budgets as well as ICT penetration of Hongta and Baisha adjust to Nolan's eras and stages.

The other Chinese tobacco companies' stage model looks different. These organizations also initiated the micro era in the beginning of the 1990s, but they did not progress to the contagion stage, as Hongta and Baisha did. Instead, they initiated the network era by 2003 at the same time skipping three stages of the micro era.

In the following section reasons for the differences between Hongta's and Baisha's stage model and the stage model of the other tobacco companies are analyzed.

ICT TRANSFORMATION IN THE CHINESE TOBACCO INDUSTRY: ANALYSIS 2

The Strategic Grid Model

The strategic grid framework (McFarlan and McKenney, 1983) has been one of the most widely quoted and frequently discussed frameworks for the assessment of the strategic significance of ICT to an organization (Ahituv and Neumann, 1990; Applegate et al., 1996; Davis and Olson, 1985; Ives and Learmonth, 1984; Ragunathan, 1999; Revenaugh, 1994; Zwass, 1992). There have also been undertaken many empirical tests of the strategic grid model (Premkumar, 1992; Pyburn, 1983; Raghunathan and Ragunathan, 1990; Tukana and Weber, 1996).

The strategic grid model assumes that variations in ICT planning practices should exist across organizations based upon the levels of two dimensions: first, the strategic relevance and impact of the existing ICT for the organization's survival; and second, the strategic relevance and impact of future ICT for the organization's survival. Along both dimensions, the strategic relevance and impact of ICT for a firm can be positioned anywhere on a continuum ranging from low impact and relevance to high impact and relevance. The combination of future/current portfolio with high/low impact presents four types of ICT environments and is represented by the four cells (strategic, turnaround, factory, and support cells) of the strategic grid (see Figure 5). The following is a brief description of each cell.

Strategic (Cell 1): Organizations in this cell are critically dependent on the smooth functioning of ICT activities. This dependence relates to existing ICT as well as to ICT under development, i.e. to both the current and future portfolios.

Turnaround (Cell 2): While existing ICT may provide operational support for organizations in this cell, it may not be critical to the organization's current operations. However, the impact of ICT under development is considered vital to achieving the organization's strategic objectives.

Factory (Cell 3): These firms are heavily dependent on their existing, day-to-day ICT operations and even a temporary disruption in service could have severe operational consequences. However, ICT projects under development are not critical to the firm's ability to compete successfully and are mostly maintenance projects.

Support (Cell 4): In these firms, neither current nor future ICT activities are critical to the smooth operation of the firm. ICT is viewed as playing the traditional back-office-support role without any potential for dramatically altering an organization's current or future operations and/or direction.

		Strategic impact of future ICT	
		Low	High
Strategic impact of current ICT	Low	Support	Turnaround
	High	Factory	Strategic

Figure 5. Strategic Grid Model

Positioning of Chinese Tobacco Companies

According to the companies' characteristics, Hongta and Baisha are located in the same cell of the strategic grid model. Although in the beginning of the 1990s, ICT of the two companies had no impact on the organization's survival, they realized that their future ICT will have an impact on the companies' survival. After highly investing in ICT, Hongta and Baisha are now hardly able to survive without ICT anymore. Further on, these companies still recognize ICT also as an important success factor for their future survival.

Until 2003 the other Chinese tobacco companies did consider neither their current nor their future ICT as strategic relevant for the company's survival. These companies, their ICT still having almost no relevance, now realize that their future ICT is strategic relevant for the company's survival.

Based on this analysis, Figure 6 depicts the historic development of Chinese tobacco companies regarding the strategic grid model.

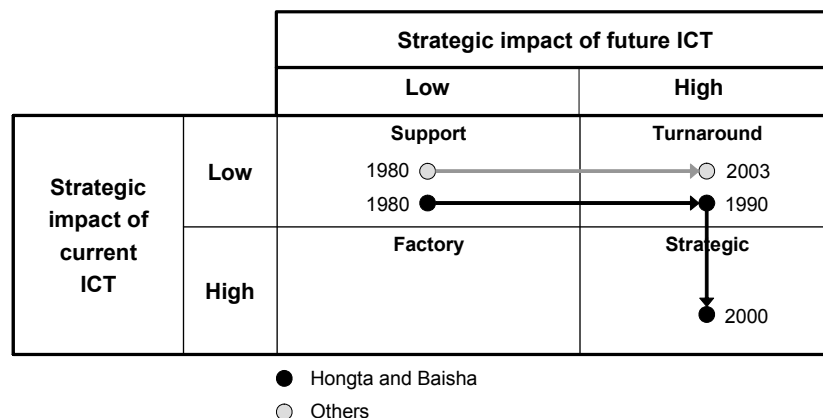


Figure 6. Strategic grid model for Chinese tobacco companies

FINDINGS

By conducting and analyzing studies on the evolution of ICT in Chinese tobacco companies the following findings can be stated with simultaneous consideration of China's historic development in the last 30 years:

Before 1978 – China was politically and economically insulated: Chinese tobacco companies did not use ICT.

1978 – China's open door policy was announced: The tobacco market grew by over 100% in the next ten years. Chinese tobacco companies did not use ICT.

1987 – China applied for renewal of WTO membership: The tobacco market grew further and Chinese tobacco companies still did not use ICT.

October 1992 – China and the United States signed the memorandum of understanding concerning market access, including regulations on tariff reduction: The tobacco market stagnated. Hongta and Baisha considered their future ICT portfolio as strategic relevant for their survival. These companies invested heavily in ICT, whereas they skipped the data processing era, directly initiating the micro era. In order to prepare for foreign competition Hongta and Baisha accelerated their ICT transformation process by skipping the integration stage and partly the control stage of the micro era. These companies jumped directly into the network era. ICT budgets as well as ICT penetration are adjusted to those proposed by Nolan's stage model. Other Chinese tobacco companies did not consider their future ICT portfolio as strategic relevant for their survival and did not invest in ICT transformation.

2001 – China's WTO entry: Tobacco market grew slowly the next years. Two years later also other Chinese tobacco companies than Hongta and Baisha, recognize their future ICT as strategic relevant for the organization's survival and follow the accelerated ICT transformation path.

These findings show, that ICT helps Chinese tobacco companies to face the challenges entailed with China's WTO entry in the way, that ICT is strategic relevant for the survival of Chinese tobacco companies. Otherwise, foreign companies would replace domestic tobacco firms. Findings also show that it is possible to accelerate the ICT transformation process compared with Nolan's stages of organizational learning.

CONCLUSION AND FURTHER RESEARCH

To show ICT's impact on the challenges faced by Chinese tobacco companies in the course of China's open door policy and the WTO entry, we studied the ICT transformation process of Chinese tobacco companies. Based on this research we found out, that initially ICT was not used to meet the challenges entailed by China's open door policy. After its announcement in 1978, studied companies did not change their behavior regarding ICT investments, which means almost no investments in ICT were made. Also China's first application for the renewal of the WTO membership at first had no impact on ICT investments. Just by the time, the memorandum of understanding for regulations on tariff reductions was signed in 1992, according to the Chinese tobacco industry stage model (see Figure 4), Chinese tobacco companies started to invest in ICT heavily. Tariff reductions meant growing competition of foreign tobacco companies. To prepare for the changing conditions, Chinese tobacco companies went through Nolan's organizational learning stages and eras in an accelerated way. Two companies skipped the entire DP era as well as one or more stages of the micro era, with a continually increasing ICT budget. The other companies did not regard their future ICT as strategic relevant for the organization's survival until 2003. Therefore, no significant ICT investment was made. These companies, just starting to realize ICT's impact on the survival of the organization, now also begin to transform their ICT in an accelerated way.

By studying the ICT transformation process of Chinese companies, we also found out, that it is possible to accelerate organizational learning according to Nolan's stage model. Entire eras as well as single stages of organizational learning can be skipped in order to transform a company faster. The decision to do so is dependent on the company's position within the strategic grid.

Findings are based on studies of Chinese tobacco companies. Further research to test findings within other industries has to be done. Also, consequences of accelerating a companies ICT transformation process have to be analyzed. Recent research has shown, that a lack of well-trained employees, a lack of information technology as well as unready corporate cultures in Chinese companies complicate ICT transformation (He, 2004). Correlations between these factors and the accelerated ICT transformations have to be analyzed.

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