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Using PEST Analysis as a Tool for Refining and Focusing Contexts for Information Systems Research

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Abstract

It is common for inexperienced researchers and research students to aim at investigating very wide contexts such as countries (e.g. China, India, UK), regions (e.g. the Arab Countries) or even continents (e.g. Africa). Such studies in Information Systems (IS) are not only unrealistic and potentially unfeasible, but may result in findings that are neither significant nor meaningful.

Research supervisors often face difficulties in explaining and resolving these common pitfalls in research proposals. This paper proposes the use of Political, Economic, Social and Technological (PEST, also often referred to as STEP) analysis as a tool to identify narrower contexts and focus research questions around feasible and meaningful regional contexts. It illustrates this process with the results of an analysis carried out as part of an ongoing PhD research project. The project aims to investigate the barriers and risks associated with the post-implementation of Enterprise Resource Planning (ERP) systems in Chinese companies. PEST analysis was used to define an appropriate region in China (i.e. Guangdong), as well as the type of company to be studied, namely State Owned Enterprises (SOE). This analysis was followed by a set of SWOT analyses in order to identify a suitable sector, namely the electronic and telecommunication manufacturing sector. The paper also shows how the researcher reviewed, compared and synthesised large amounts of literature and statistical data when constructing arguments and standpoints.

This approach helped to develop a profound understanding of the Chinese context and has proved to be a valuable decision-making tool when selecting an appropriate Chinese region, a type of company and an industry sector in which to conduct the research. It resulted in the redefinition of the research question and in data collection and analysis that is more likely to produce useful, meaningful and generalisable findings.

Keywords

PEST or STEP analysis, Information System, Enterprise Resource Planning (ERP) System, China, Chinese Companies.

1. Introduction

“La prima tentazione dello studente è quella di fare una tesi che parli di molte cose. Se lo studente si interessa di letteratura, il suo primo impulso è quello di fare una tesi dal titolo La letteratura oggi. Dovendo restringere il tema, vorrà scegliere La letteratura italiana dal dopoguerra agli anni sessanta.

Queste sono tesi pericolosissime. Si tratta di argomenti che fanno tremare le vene e i polsi a studiosi ben più maturi. Per uno studente ventenne si tratta di una sfida impossibile. O farà una piatta rassegna di nomi e di opinioni correnti, o darà alla sua opera un taglio originale e verrà sempre accusato di omissioni imperdonabili.^{1”}

Eco (1977)

The above quotation of the renowned humanist Umberto Eco reflects the general concerns of supervisors when having to guide their research students in focusing and placing boundaries on their research topics (Bell, 1993:15; Cornford and Smithson: 2006: 29-53) . Eco puts these concerns extremely elegantly. He states that inexperienced researchers and research students are always too ambitious and want to include a multitude of issues and topics in their studies. An ambition hat is well known by social sciences and humanities supervisors. He gives an example of an Italian literature research student. Eco suggests that such a student would first be tempted to choose a title such as: the literature today. When asked to focus, the student would probably choose something like: the Italian literature from the post-war to the

sixties. Similarly, information systems (IS) studies supervisors experience equally unrealistic ambitions from students, whose first temptation is to aim at investigating very wide contexts such as countries (e.g. China, India, UK), regions (e.g. the Arab Countries) or even continents (e.g. Africa).

As stated by Umberto Eco, such studies are “extremely dangerous” and the mere thought of such an endeavour would bring “palpitations and send waves of blood through the veins” of most seasoned researchers. For an inexperienced research student, Eco argues, these are impossible tasks fraught with unforgivable omissions and forgotten details. This is certainly very true in IS. For example a study of Enterprise Resource Planning (ERP) post-implementation in China would not only be unrealistic and potentially unfeasible, but may result in findings that are neither significant nor meaningful. IS researchers when engaged with such studies may overlook cultural, economic and even political factors affecting the implementation and use of IS, which can vary significantly in different regional contexts, as well as in diverse industrial and business sectors. Therefore, it is virtually impossible for a single study to cover all these variances and complexities. In the case of a PhD research this is an utterly impossible task due to inherent limitations of the study, which is, an individual endeavour, limited in time and academic in nature.

Despite the almost obvious nature of this problem raised by Umberto Eco, research supervisors often face difficulties in explaining and resolving these common pitfalls in research proposals. Furthermore, faced with the need to focus students often lack the rationale and the methodology to establish more delimited contexts, to choose a particular business sector or select a coherent set of case studies. This often leads to difficulties in the research design and ultimately in the dreaded question by the external examiner: But why did you choose your city as a context and the local factory as a case study?

This paper proposes the use of a Political, Economic, Social and Technological (PEST, also often referred to as STEP) analysis as a tool to identify narrower contexts and focus research questions around feasible and meaningful regional contexts. It illustrates this process with the results of an analysis carried out as part of an ongoing PhD research project. The project aims to investigate the barriers and risks associated with the post-implementation of ERP systems in Chinese companies.

2. PEST Analysis

PEST, as an analysis framework of macro-environmental factors, is also referred to as, STEP (Clulow, 2005), SEPT (Narayanan and Fahey, 1994: 199-202), or STEEP (Voros, 2001). The constituents of PEST can be considered as macro-environmental factors and its usefulness lies in the assumption that the success of a particular organisation or management solution cannot be understood without having the information relevant to the specific business environment (Buchanan and Gibb, 1998). Business environment could be defined as all relevant physical and social factors outside an organization that are considered into decision-making process (Duncan, 1972). According to Ward and Rivani (2005) PEST analysis assumes that specific external and indirect circumstances that characterize the business environment are able to influence organisational capacity to produce value. Hence, PEST analysis provides a “satellite view” to assess the external environment (Ward and Rivani, 2005). This is particularly relevant when trying to narrow very large business environments in order to study organisational information systems.

PEST has been conventionally used in two different ways: first, to analyse the position of a particular organisation (e.g. Vrontis and Vignali, 2001) or industry sector (e.g. McManus et al., 2007: 19-36) within a particular business environment; second, to analyse the viability of general management solutions in a business environment (e.g. ESCWA, 2005). This paper proposes to use PEST to analyse the study of a specific IS solution in a particular business environment. The purpose of the PEST analysis proposed in this paper is to develop an in-depth understanding on the context (e.g. a country) that is the original target of the study and subsequently identify a narrower context (e.g. a specific region and a type of company) in which the study can generate more in-depth and meaningful findings.

However, PEST is far from being a precise and clearly circumscribed analysis framework. There are an almost unlimited number of variables that may emerge from each dimension. Therefore there is the need

to prioritise those variables that have highest impact on the industry, sector, or country being studied. For the purpose proposed in this paper all these aspects of PEST will be considered having an IS lens and aiming at conclusions that will enable the narrowing of the context.

3. A Study of ERP in China

This paper illustrates the use of PEST as a context focusing method by presenting a summary of results of a study carried out in an ongoing PhD research project. The project aims to identify and investigate the barriers and risks associated with the post-implementation of ERP systems in Chinese companies. It also attempts to explore the causes, impacts, probability of occurrence and frequency of occurrence of identified risk events, and investigate the causal relationships between barriers and risks identified through the research project.

The first temptation of the student was to undertake a national study of the whole of China. This soon proved to be virtually impossible. The situation in China is fluid, there are important changes occurring in targeted regions, whereas other parts of the country are still very traditionally led by the central government. There are significant variances in uptake of technology and IS and specifically of ERP. There are also significant differences in organisational culture and information sharing in different types of organisations, namely between state-owned companies and newly created private organisations. Therefore, it became clear that such a complex and wide study would be impossible to undertake by a fairly inexperienced researcher, working individually and limited by a period of time of three years. Faced with the necessity of focusing the research, it was decided that a rigorous method was necessary in order to select an appropriate region and a suitable type of company to base the study on. A PEST analysis was therefore used to help the researcher to refine and focus the business context by defining an appropriate region in China (i.e. Guangdong), as well as the type of company to be studied, namely State Owned Enterprises (SOE).

4. Summary of results of the PEST analysis

As part of the base literature review for the PhD project, the researcher had reviewed and compared large amount of bibliographic sources (including journal articles, books, official statistical reports, market research reports, local news and online articles). This first set of secondary sources was then critically reviewed, synthesised and expanded to construct arguments and standpoints for the PEST analysis. Furthermore, grey literature, local news and statistical data were sought and found to be particularly useful for the researcher to understand the local context of the country and the different regions. It is important to note that, much of the latter information sources were actually written and presented in its original Chinese form, which is the mother tongue of the PhD researcher. However, these were translated into English whenever citing or quoting was necessary.

4.1 Political Dimension

China as it is perceived today, i.e. The People's Republic of China, was established in 1949 and ever since then the Chinese Communist Party (CCP) has been the dominating force and ruler of the country. From 1949 to 1978, the economic system adopted by China had been the Soviet-style central planning economic system (Shirk, 1994:9). This type of central control allowed the Chinese government to own and control the majority of resources of the country (Shirk, 1994:9). Most domestic enterprises in the planning economy were owned by the state and are usually denominated as state-owned enterprises (SOEs). These operated as social-economic entities, rather than profit making units, and aimed to fulfil production quotas assigned by the government and to provide lifelong employment to citizens (Sun et al, 2005; Zheng, 2004:129). In order to protect SOEs the central government, as the investor, had to fend off strong competition from foreign rivals. As a consequence, participation of foreign products and investors in the Chinese market had been strictly limited during the planning economic era. The Chinese government intended to establish a self-reliant industry and built an airtight wall between the domestic economy and the world economy by direct controls on imports and foreign investments and other foreign trade policies (Shirk, 1994:8). The centrally planned economy enabled China to achieve continuous economic growth for a few decades. The country's GNP grown at an annual rate of nearly 9 percent from

1953 to 1957 and above 4 percent from 1958 to 1976 (Perkins, 1997:30-32). However, despite the continuous economic growth, the central control actually caused crucial economic problems to China in the 1970s:

- Most SOEs were loss-making companies (Yusuf et al., 2006) and their workers and management had few positive incentives in their jobs (Perkins, 1997:34) and therefore became a significant burden to the country and the national economy.
- After closing the country from international contact for three decades, technologies and business practices adopted in China inevitably lagged behind those of developed countries.
- In order to cover the problem of production inefficiency, the state had to assign more and more capital and labour from other sectors into industry to sustain its growth (Shirk, 1994:10).

As a consequence, in 1978 a motion by Deng Xiaoping was approved aiming to reform China's economic system towards a modern market economy. The fundamental purpose behind the economic reform was to allow economic activities to be influenced by market conditions and therefore establish a stronger and more competitive economic system. At the same time, a set of SOE reform policies was launched. Thousands of SOEs have been reformed and restructured through selling or leasing to the public or employees, bankrupting, or merging with other companies (Garnaut et al., 2005). Although the state is still the owner or largest shareholder, the reformed SOEs are now run by their internal management organs (i.e. the board of directors) rather than the state, which has resulted in substantial performance improvements (Garnaut et al., 2005).

Economic, social and technological changes in an autocracy like China are typically associated with political aims and policies. The understanding of the current situation in China and associated changes in political ideology enabled the researcher to better interpret and understand the remaining dimensions of PEST. Furthermore, this dimension enabled the identification of SOEs as the main driving force in Chinese economic politics.

4.2 Economic Dimension

As a result of the national economic reform, China has experienced remarkable economic growth at an annual rate of over 9% during the last two decades (Keng, 2006). By the end of 2005, China's GDP had risen to US\$2.229 trillions (National Bureau of Statistics of China, 2006). According to the global GDP ranking provided by the World Bank in 2005, China is now ranked the fourth-largest economy in the world behind the US, Japan and Germany (The World Bank, 2006). China has also become the world's third-largest trading nation and the second-largest recipient of foreign direct investment (FDI) (Yusuf et al., 2006:3). This rapid economic growth and market competition have now created the need for the introduction and development of IS and IT strategies in Chinese organisations (i.e. ERP systems). Nevertheless, despite the rapid economic growth, China's economic development manifests significant inequality between different regions. As shown in figure 1, the seven regions (Guangdong, Fujian, Zhejiang, Shanghai, Jiangsu, Tianjin and Beijing) with the per capita GDP above US\$ 1,600 in 2002 are all coastal regions in eastern China. In contrast, the per capita GDP of most inland regions is between US\$ 400 to US\$ 800.

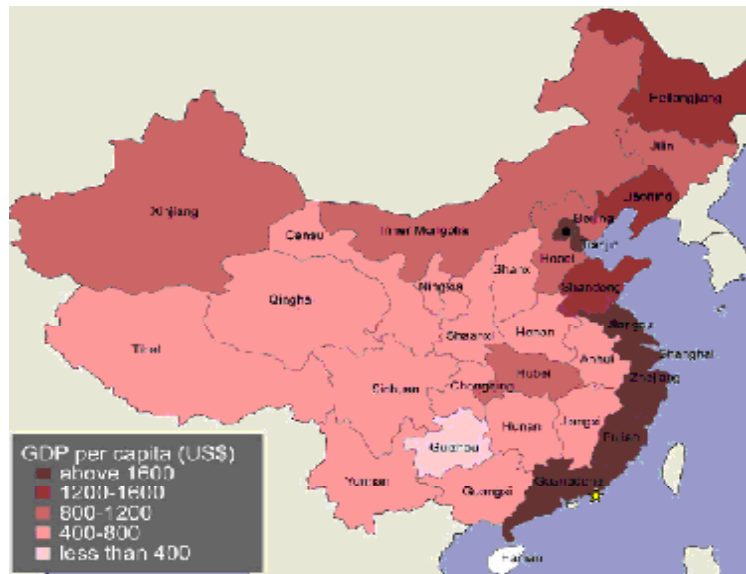


Figure 1: Per capita GDP of different regions in China in 2002 (Source: Klotz, 2004).

Due to this economic inequality, the general level of IS and IT utilization in the coastal regions is much better than that of the inland regions. Based on the statistical report of the 17th China Internet development survey provided by the China Internet Network Information Center, the number of netizens (users of the Internet) in the seven coastal regions accounted for 40.7% of the country's total in 2005. Conversely, more than 95% of the populations in many inland regions still cannot access to the Internet. This led to the natural conclusion that the research project reported in this paper had to target one of China's coastal regions rather than inland regions.

Guangdong (a southern coastal province which consists of 21 cities) has the highest regional GDP and the second highest regional FDI among the seven coastal regions in 2003. In fact, the number of netizens in Guangdong has been the highest in the country for many years. As the pioneer of China's economic reform, Guangdong is also the first region that was open to foreign investments and absorb foreign technologies in the 1980s. As a result, Guangdong presents itself as a region where the use of IS in organisations is mature enough to allow an exploration of post-implementation issues of ERP systems.

4.3 Social Dimension

When analysing the social dimension, the researcher particularly looked at China's unique culture and its impacts to ERP adoption in Chinese companies.

Culture, as defined by Hofstede (1997:5), is the "collective programming of the mind which distinguishes the members of one group or category of people from another". Hofstede (1997:5, 10) points out that culture shapes a person's patterns of thinking, feeling and potential acting and has many types, i.e. national culture of a country and organisational culture of a company. Hofstede (1997) investigated the cultural differences of more than 50 countries in the world according to four dimensions: power distance, collectivism vs. individualism, femininity vs. masculinity, and uncertainty avoidance. Based on Hofstede's studies, one conclusion can be drawn: the Chinese culture is fundamentally different from that of western countries in terms of high power distance, low individualism and low uncertainty avoidance. Many recent studies (Martinsons & Westwood, 1997; Martinsons & Hempel, 1998) demonstrate that this uniqueness in Chinese culture shapes the ways people conduct organisational and business activities and influences the implementation, and the use of ERP in particular (Reimers, 2002; Zhang et al., 2005; Pei, 2005).

The high power distances of the Chinese result in very centralized decision making and directive management systems in China's companies (Martinsons & Westwood, 1997). Specifically, most decisions in Chinese companies are made by the top managers and the information flows are generally top-down in terms of directives and bottom-up in terms of reporting. Subordinates tend to obediently follow the directives of their superiors and seldom question the suitability of the superior's decisions (Martinsons & Westwood, 1997; Martinsons & Hempel, 1998). Research findings of Reimers (2002) show that centralized decision making renders negative impacts for ERP implementation in Chinese companies in at least two ways: first, centralized decision making in the steering committee may lead to some delay in the decision making process thus causing schedule and possibly budget overruns of the ERP project; second, centralized decision making enables senior management to unilaterally change some project parameters and thus increases the possibility for making mistakes. Pei (2005) finds in her case study that because employees generally accept work as assigned by their managers, without questioning or even knowing the reasons for doing so, and have relatively low motivation to work in teams, it is difficult for Chinese companies to form an effective project team to ensure the success of ERP implementation. In addition, the centralized top-down management style in Chinese companies reduces the need and willingness to exchange information between managers across departments (Martinsons & Westwood, 1997; Martinsons & Hempel, 1998).

Low uncertainty avoidance dictates that Chinese people are more tolerant of uncertainty and unclear information, and tend to accept situations as they are rather than to try and predict and control them (Martinsons & Westwood, 1997). Thus Chinese managers are less inclined to use systematic procedures and explicit information to tailor business plans and forecasts to predict the uncertain future (Martinsons & Westwood, 1997; Martinsons & Hempel, 1998). Also instead of conducting a rational analysis of data related to a specific problem, Chinese managers are inclined to make their decisions based on subjective experience, common sense and intuition (Martinsons & Westwood, 1997). Since a major purpose for using ERP is to collect comprehensive sets of data to support business planning and decision making, it can be argued that Chinese managers may tend to underutilise the full potential of their ERP systems. Reimers (2002) reinforces that managers in traditional Chinese companies do not trust the data provided and the suggestions made by the ERP systems and tend to disregard the figures recommended by the system and replace these using their own experiences. Martinsons & Westwood (1997) conclude that therefore IT investments in Chinese companies typically aim to automate, control and monitor the basic operations, rather than to improve business planning and decision making.

4.4 Technological Dimension

Since the target of this PEST analysis is directly related to ERP systems, the study of this dimension focused on the current development and use of IT and IS in China, rather than on other technologies.

After more than ten years effort, China has now built up a modern information network which covers more than 2000 cities of the country and links to all major international networks in the world (China Economic Yearbook Editing Committee, 2004: 111). As a result of this rapid informatization the number of netizens in China has risen from 0.62 million in 1997 to 111 million by the end of 2005 (China Internet Network Information Center, 2006). Nevertheless, the informatization development in different regions of the country still manifests a significant unbalance. 40.7% of the country's netizens were located in the seven coastal regions and averagely 19% of population in the seven coastal regions can access to the Internet. Guangdong, the southern coastal province that has been chosen for conducting this research project, has almost 1.5 million netizens and accounts for 13.4% of the country's total. On the other hand, IT investment in the industry has been increased year by year. CCID Consulting, cited by Zhang et al (2005), reports that China's ERP sales reached US\$226.9 million in 2003 and will grow at an estimated rate of 23.5% and reach US\$652.8 million in 2008. A later report of CCID Consulting, cited by Wang (2006), states that China's ERP sales reached US\$289.96 million in 2004. Taking the global ERP market which reached US\$23.65 billion in 2004 (ARM Research, 2005) into consideration, China's ERP sales accounted for 1.2% of the global ERP market.

The analysis of IT development and usage in China clearly indicates that studies of IS post-implementation are now not only topical, but probably highly desirable. In particular, and due to the large

investment in ERP systems (thousands of Chinese companies have implemented these systems), it is clear that studies focusing on ERP post-implementation issues are now required to provide a vision of their utility, associated business advantages and risks.

4.5 Conclusion from the PEST Analysis

Through the PEST analysis, the researcher developed an in-depth understanding on China's current context in terms of political, economic, social and technological dimensions. Based on the PEST analysis, the researcher identified Guangdong (a southern province in China) as an ideal context for the study of ERP post-implementation. Guangdong is one of the pioneer regions of China's economic reform and one of the most important and fast-growing economic regions in the country. Consequently, the region has achieved very high levels of IS adoption and informatization development, therefore it presents itself as an ideal context where to study a phenomenon such as post-implementation of ERP. Conversely, other regions that are starting to implement ERP solutions would be ideal to study ERP implementation. Therefore Guangdong was selected as the region for carrying out the PhD project.

A second important conclusion of the PEST analysis was the realisation that SOEs hold more than 50% of the total industrial assets in China. Thus, SOEs play at the present moment a crucial role in sustaining the continuous development of China's national economy, in contrast with other types of companies (e.g. private companies and foreign companies) in the country. The contribution of these latter companies is expected to grow, but at the present moment a study of ERP post-implementation in SOEs is expected to yield more important and significant findings. Therefore SOEs were selected to study in the PhD project.

Finally, a set of SWOT analyses was conducted after the PEST analysis to analyse the Strengths, Weaknesses, Opportunities and Threats of various key industrial sectors in Guangdong. As a result of the comparative examination of these SWOT analyses, the electronic and telecommunication manufacturing sector was selected as the main target of the study.

Therefore, the PEST analysis presented in this paper allowed the researcher to narrow an initially over-ambitious study (ERP post-implementation in China) to a realistic and clearly limited context. One that is eminently feasible and will guarantee a better chance of success to the PhD project (ERP post-implementation in SOEs, in the electronic and telecommunication manufacturing sector in Guangdong, in China).

5. Conclusions

This paper proposes the use of PEST analysis as a tool to identify narrower contexts and focus research questions around feasible and meaningful business contexts. This approach helped to develop a profound understanding of both the generic and the specific contexts. Furthermore, as argued in this paper, PEST proved to be a valuable decision-making tool to select an appropriate region (e.g. Guangdong in China) and a type of company (e.g. SOEs) in which to conduct the research. Finally, in combination with a set of SWOT analyses, the approach proposed helped identify a suitable sector (e.g. the electronic and telecommunication manufacturing sector) to carry out the research. In conclusion, the use of PEST analysis in the initial stage of IS studies results in the redefinition of research questions and in data collection contexts, thus providing a research setting that is more likely to produce useful, meaningful and generalisable findings. But more importantly, the PEST provides a clear rationale for the narrow context selected, one that can be easily presented and defended both at viva voce examinations and in publications.

However, it is in the generalisation that student's ambitious expectations need to be guided and managed. To student's great disappointment, the very effort of narrowing and focusing the research, means that generalisation of findings is now only possible for similar regions, company types and sectors as the ones studied. Therefore, students, much to their chagrin, will not be allowed to issue sweeping statements about the applicability of their study nationwide or even continent wide.

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¹ Translation of the Italian Quotation by the authors:

"The first temptation of the student is to do a thesis that addresses many issues. If the student is interested in literature, their first impulse is to do a thesis on the totality of the Italian modern literature. If asked to focus, they will want to address all literature since the end of the II World War.

These are extremely dangerous thesis. It is in fact an argumentation that would worry the most experienced of researchers. For a student it would be an impossible task. They would come back with either a list of authors and their work according to the fashion of the day, or would try and give their work some originality and then would be accused of unforgivable omissions."