Management of Technology in China: Views form Enterprises

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Abstract

China has been experiencing dramatic growth since the open door policy was instigated in 1978. During this time, the country not only had to embrace technology, but having to do so quickly in order to meet the challenges of the global economy. This paper reports the findings of an exploratory study, based on interviews with executives and senior managers from China on their views of managing technology. The paper introduces a technology management framework to investigate how Chinese organisations manage, and hence, exploit technology for competitive gains. Results show three different major strands to managing technology in Chinese organisations: those that manage technology by first investigating the impact of technology versus the need for the technology; those that manage technology by focusing solely on the needs; and those that manage technology by doing neither.
Introduction

Technology has clearly had an impact on our lives. The last 100 years has seen more technology impact on our lives than at any time in history. The past 100 years saw hundreds of medical discoveries to that saved millions of lives and increased the lifespan of millions others. Drugs such as the antibiotic penicillin, medical equipments such as x-ray and new surgery techniques, and even cleaning and sterilising equipment have saved many lives. Thousands of new technological discoveries such as the television, sewing machine, microwave ovens and vacuum cleaners have made our lives more comfortable, while aeroplanes revolutionised travel and made our lives more interesting. Developments and discoveries in agriculture such as fertilisers and farming tools, and even genetically modified foods produced by organisms that have been genetically altered have contributed to feeding an ever increasing global population. Technology in manufacturing and production such as computer numerically controlled machine, flexible manufacturing systems and robotics have enabled mass production and processing of material to take place, leading to the availability of cheaper goods from television sets to t-shirts. Construction technology has enabled roads be constructed, office blocks, factories and homes to be built quicker and cheaper. The list goes on. Technology has been the driving force in the 20th century and it promises to hold the same if not greater importance during the 21st (Antoniou and Ansoff, 2004).

Countries throughout the world have embraced technology to modernise and to develop economically. China is one of these countries to embrace, and benefit from, technology, to help the country grow and develop economically from a somewhat backward country to one of the world’s economic superpowers in a little more that a quarter of a century. There are many accounts of the use and management of technology in Western countries, and in Japan.
However, relatively little is understood about how management of technology occurs in China. This paper seeks to increase the understanding of management of technology in one of the world’s fastest growing economy.

**The Chinese Growth Context**

In China, the world has witnessed one of the most breathtaking economic transformations of the twentieth century (Woo and Prud’homme, 1999) and this transformation is likely to continue for many years to come. China’s real GDP growth is regaining momentum after a sharp slowdown in the second quarter of 2003, most likely to be attributable to SARS. Despite this, the economy ended 2003 with a 9.1 percent growth, with fourth quarter growth at 10.4 percent (World Bank, 2004). Also according to the OECD, the strong growth, averaging 8.2 percent in the first half of 2004 has been driven by domestic demand and the contribution of net export to growth has been small, as very strong export growth was accompanied by even stronger growth in imports and a falling current account surplus. World Bank figures (World Bank 2004) pointed to a 9.7 percent growth in the first quarter of 2004. The IMF (IMF, 2004) forecast real GDP growth figures of 8.4 percent and 8.0 percent for 2005 and 2006 respectively, while the Economic Intelligence Unit (EIU 2002) forecast more conservative figures of 7.5 percent and 7.8 percent for 2005 and 2006 respectively. The Chinese government’s own target for 2004 is a 7 percent growth. In contrast, forecast for UK are 2.9 percent and 2.6 percent for 2005 and 2006 respectively.

China has done much to encourage Western investment into the country, not least through the establishment of 19 special economic zones, 6 open coastal economic zones, and 15 free trade zones. In addition to this, the Central Committee of China’s People’s Congress emphasised,
through the Eighth Five-Year Plan proposal and the 10-Year Programme for Social and Economic Development, that maintenance of economic reform and an open door policy were mandatory (Ji, 1991). Jiang Zemin, the former Chinese President has described this 10-Year Programme as “advancing socialism” (Clifford, Roberts, Barnathan and Engardio, 1997).

As Leung and Yeung (1995) noted, there is no doubt the Chinese Government intended to provide a stable and yet exciting investment environment. Evidence can be seen from investment committed by such multi-national corporations as Bayer, Fiat, Volkswagen, BMW, Philips, Rio Tinto, Coca-Cola, Philip Morris and Motorola amongst many others. The general trend has been an increase in foreign investment in China. The value of European Union trade with China has risen from 16.2 billion euro in 1990 to 95.8 billion euro in 2000. In 2003, this figure has grown to 135.7 billion euro (Eurostat, 2004). China also saw the growth in local, home grown, companies, and this growth is not simply in terms of number of companies, but the value and strength of these companies. The later half of 2004 saw Lenovo, a Chinese owned computer company take-over IBM’s personal computer division.

To meet the demands of these investments and the growth in its economy, China embarked on a construction and consumption spree. Thousands of kilometres of highways, roads and hundreds of bridges were constructed in record times. Gleaming new factories sprung up where rice used to grow and dozens of high rise buildings transformed entire cities beyond recognition. Jobs were created, homes built, living standards raised and China saw a spectacular rise in consumer demands from television sets to cars, from clothes to washing machines, from shoes to mobile phones. Even the travel industry such as airlines struggled to meet demands, resulting in the birth of numerous new airlines and airports.
All of these points to an increase in usage and uptake of technology as enterprises, large and small look to technology to increase competitiveness, improve productivity and increase revenue. As the Chinese government has been privatising its State-Owned Enterprises (SOE) over the past 10 years, in an attempt to improve competitiveness of Chinese business, Chinese businesses trade in a competitive environment. Further, Chinese companies no longer only compete within China amongst Chinese enterprises compete in a global economy, both on its own soil and abroad. In China, Chinese businesses have to compete with companies that include Nokia, Siemens, and Wal-Mart. Technology is seen as a key tool to enable businesses to function more effective and be competitive.

**Context of Management of Technology**

There is no doubt that technology, when used and managed appropriately, has had an impact, usually positive, on organisations, and contributed to their competitiveness, and will continue to do so as long as there is proper management of technology. Weiss and Birnbaum (1989) observed that technology is a major factor in shaping the industry characteristics within which firms compete. Supporting this are works of Roberts (1992) and Iansiti and West (1997) that suggests that firms that know how to use technology find it an excellent vehicle for obtaining competitive advantage. Technology’s contribution to improving an organisation’s competitiveness is not when it is considered in isolation, but in interacting and playing a role in an organisation’s corporate strategy. For example, one of the premises of Porter’s (1985) concept of the value chain concerns the impact of changing or altering one of the 9 activities on not only that activity but the other eight. Figure 1 depicts Porter’s value chain. Using this line of thought, implementing technology in, for example, the operations activity will not only impact on the efficiency of the operations function, and the inbound logistics and outbound logistics, but
throughout the value chain. This means that management of technology should involve more than having a good understanding of the technology itself but understanding how technology will impact on other parts of the organisation.

To support this proposition, there are, in literature, references made to the need to examine and understand beyond the technology. Chanaron and Jolly (1999) stressed that rapid technological changes is extremely risky and Twiss and Goodridge (1989) commented that the adoption of new technology is a highly complex process. This is especially true in a global economic environment where global competitive strategies are increasingly becoming technology driven (Badawy, 1998), and more and more organisations adopt technology rapidly to gain competitiveness. Further, as Bhalla (1987) observed, it is critical to integrate business and technology in an environment of stiff competition, changing social values and fast development of new technologies.
In such circumstances, it becomes more important that managers control the impact of technology on marketing, finance and human resource management functions (Chanaron and Jolly, 1999). Managers have not necessarily done this in the past and Chanaron and Jolly (1999) suggested an explanation for this, that management of technology has been under strong influence of engineering-based disciplines, and implied that available literature tended to focus initially dealt with such topics as project evaluation, research and development, and technology forecasting, although management scholars have been opening new areas such as technology and human and social issues, and technology and business strategy.

Further, as Pavitt (1990) observed, since the 1980s there has been increased interest among management scholars, consultants, and practitioners in the role of technology in such matters as corporate strategy, operations management, global competition, and strategic alliance. Amongst these are Monger (1988), Twiss and Goodridge (1989) and Bhalla (1987). Monger (1988) suggested that management of technology should incorporate mechanisms to deal with management’s understanding of new and emerging technologies, organisational and workforce issues, and factors external to the company. Twiss and Goodridge (1989) went on to suggest an involvement of the culture of the business, its strategies, the organisational structure, managerial attitudes, and personnel policies in the management of technology. Bhalla (1987) provided a similar view in referring to successful integration of technology depends on an organisation’s ability to recognise the effective of human resources.

The National Research Council (1987) report suggested that management of technology links engineering, science and management disciplines to plan, develop, and implement technological capabilities to shape and accomplish the strategic and operational objectives of an organisation. Dankbaar (1993) suggested that management of technology is all management
activities associated with the procurement, with research and development, adaptation and accommodation of technologies in the enterprise, and the exploitation of technologies for the production of goods and services. Badawy (1991, 1998) meanwhile suggested that the management of technology is the practice of integrating technology strategy with business strategy, requiring the deliberate coordination of R&D, manufacturing and service functions with the marketing, finance, and human resource functions of the company.

Framework for Management of Technology

It is with the above discussion in mind that the author developed a management of technology framework that incorporates external factors to the organisation and internal factors within the organisation. This framework is presented in figure 2.
This framework serves to summarise the key issues that need to be considered in management of technology in an organisation. It considers both external and internal factors, and how these factors influence the management of technology in an organisation and how the organisation’s technology can influence the factors.

**Competitors:** Technology can often be a critically important element in the competitive battles between firms (Narayanan, 2001). Technology does this through its ability to add to an organisation’s competitive priorities, in for example, reducing cost, improving quality and speed of delivery, increasing flexibility, and providing better service. Technology helps to deliver this through automation technology, better and more precise equipment, and information technology. An organisation possessing technology that can give it added competitiveness will no doubt impact on its competitors, leading to its competitors also wishing to possess similar technology. Thus, both the competitors and the organisation itself will have some impact on each other’s technology. It is also a point to note that organisations do, and need to, constantly monitor the competitors’ technology capabilities. There are positive and negative sides to this. On the positive side, if the technology is what the organisation needs to gain competitiveness, then implementing it would have a positive impact. However, and on the negative side, it is possible for organisations to invest in technology that it may not necessarily need or is suitable simply because the competition has it.

**The industry:** Many industries have industry standard technologies that organisations in those industries should adopt. For example, in the airline industry there is the standard usage of passenger check-in systems that are imposed on airports and airlines to provide seamless communication and transfer of information where necessary. In the hotel industry, there are also industry standards, suggested but not imposed, such as the hotel’s own information and
management systems. Thus, the industry itself can influence the technology organisations use. Similarly, the organisation’s technological developments can in-turn impact on the technology the industry uses when the organisation has a superior technology that its competitors implements, and when sufficient players implement the same technology it becomes industry standard. However, it must be remembered that where the industry imposes strict standards, improvements are usually not dramatically different.

_The customers:_ One of the most important factors to consider when introducing technology is the organisation’s customers. There are three issues to consider within this factor. First, is to consider whether customers will use the technology that the organisation has or will implement. Organisations need to consider how the technology they implement will impact on the customers, an important issue is whether the customers are ready to accept and use the technology. For example, it is perhaps true that there will continue to have physical bank branches for many years to come despite the presence of reliable and relatively safe internet banking technology. The reason for this is perhaps that the majority of bank customers today are simply not ready to move over to internet banking. Therefore, although it is true that if banks were to close all of their physical branches they will make significant savings, they will also lose the majority of their customers. Customers can also push organisations to implement technology. For example, self-service check-in at airports was introduced in response to customer requirements of quicker check-in processes.

Second, organisations need to consider whether the technology the organisation has or use will impact on the customers even though the customers will not be directly be using the technology. For example, implementing IT may speed up communication with customers, introducing a
customer database will improve customer information, although the customers may not be using any technology themselves.

Third, regards customer expectations. The presence of technology can raise customers’ expectations of what that technology can do beyond what it was designed to do and this is also something an organisation need to consider. As opposed to the technology that internal staff uses, internal staff can receive training, external customers do not usually. For example, it is not uncommon for passengers in airports to expect, and even demand, accurate information on flight departure times in events of, for example, bad weather. Airport information systems are usually very accurate, but are not designed to ‘second’ guess the weather.

Not all technologies that organisations implement have a direct impact on customers or where the customers actually have to use the technology. Therefore, not all organisations consider the impact of technology on the customers.

**The suppliers**: There are a number of concerns here. First, both the organisation and its suppliers may have technologies that are not compatible with each other’s technology. This will make it difficult purchasing function for the organisation and in the order to delivery function for the suppliers. This is especially true in for example organisations such as distributors or departmental stores that have large number of products and suppliers. Secondly, and this will be raised as part of the value chain considerations, a new piece of technology may raise production capabilities and the supplier may not be able to meet the demands.

**Technology, Task, People**: Although these three factors are important when individually considered, they are better considered together. The availability of technology can affect the
organisation’s strategy, and the organisation’s technology requirements will impact on the availability of technology as demands will motivate technology providers to develop more technology (‘push and pull’ of product development). Organisations need to consider whether the technology is appropriate or not. In this context, appropriate technology refers to technology that is well adjusted to the needs of its users (Jamison and Hard, 2003). This means that the technology should not only be suitable and can be used to perform the task (or process), but that the users can use the technology. For example, a computer-based irrigation system might not be appropriate for a poor Malaysian farmer nor is a card based catalogue system suitable for the Library of Congress (Jamison and Hard 2003).

There are further considerations, which should be more important than the availability of the latest technology. Organisations should consider whether the technology is suitable and can perform the task it is meant to do, and that the individuals who will be using the technology can actually use it to perform the task. For example, a task that is simple and repetitive will require people who can perform simple and repetitive task. If technology is involved in performing this task, the technology is unlikely to be complicated, and indeed should not be complicated. The technology, task and people should therefore match. It also depends on the people within the organisation, as to whether the people have an eye for technology, and hence will not only be more supportive when it comes to implementing technology, but will also bring new technology to the organisation.

**The organisation:** The organisation’s culture, background, competitive environment can all influence the organisation’s views on technology. There will be organisations that have a culture that encourage the use of technology. There will be organisations that are in industries where technology and technology innovation and development are crucial to their survival.
Similarly, there will be organisations where technology is not viewed with importance, or does not have a structure that support the use and investment in technology.

**The value chain**: This factor has been discussed earlier. The concept of the value chain is closely associated with Porter (1985) who suggested that the term technology encompasses the entire set of technologies employed in the organisation’s value chain. Below are some examples:

- Inbound logistics: Transportation technology; material handling technology
- Operations: Production and manufacturing technology; packaging technology
- Outbound logistics: Transportation technology; material handling technology
- Marketing sales: Communication systems technology; media technology
- Services: Diagnostic and testing technology; information systems

Porter (1985) also pointed out that any of the technologies can affect the industry structure or a firm’s differentiation or cost position, and therefore its competitive advantage. Technology thus plays a key role in an organisation’s value chain. Further, as previously discussed, an organisation’s value chain is dynamic in the sense that each activity impacts on other activities in the value chain and using technology to, for example, improve efficiency of the operations area will likely lead to, increase flow in inbound and outbound logistics. Thus, how technology affects the value chain activities must be considered when implementing or changing technology in an organisation.
Research Objective

The available literature in the area of management of technology is vast ranging from published papers to reference books. In 1993, Clarke and Reavley's (1993) identified over 10,000 references in the area of science and technology management. Reference books such as Steele (1989), Lowe (1995), Gaynor (1996), and to a certain extent, Narayanan (2001) began appearing to serve the growing interest amongst academics, students, and practitioners.

Although there exist in literature a large body of knowledge in the management of technology area, most of these usually concerns the management of technology in developed countries and western countries. In comparison, there have been very few studies conducted on the management of technology in one of the most dynamic and fastest growing economies, China.

The Chinese government has also been encouraging its organisations to increase the use of technology, specifically in the use information and information technology to drive industrialisation. Zhou et al (2005) suggested difficulties that China faces in furthering its industrialisation goals, including:

- The fundamental installations of many industries particularly the state-owned enterprises are outmoded and backward;
- The degrees of computerisation and automation are generally very low;
- The educational levels of employees are low;
- Organisational structures and management of many of the enterprises are outdated and ineffective; and
- Accounting practice, documentation standards, public information and legal infrastructure are imperfect.
These obstacles, Zhou et al (2005) further suggest that what make some of the information systems that are well-established in developed countries such as MRP II and ERP often unsuitable for Chinese organisations. This increases the importance of understand the main features of the management of technology by Chinese organisations in China, and this paper seeks to do this.

The paper begins with a brief overview of the literature on management of technology, and in particular, it attempts to provide a framework for management of technology. The author's experience in working with the Chinese showed that there are differences in how the Chinese conduct and run businesses and organisations from those in the west, which, in no small part is due to cultural and historical differences.

The use of primary case examples allows for the determination of problems and issues faced by the technology manager in China. Thus, this paper will establish how management of technology occurs in Chinese organisations.

**Methodology**

Over a period of eight months, fifteen senior managers from China’s enterprises were interviewed. The list of cases selected for the study is illustrated in table 1. The names of the organisations and interviewees have been removed at the request of four of the organisations therefore to be consistent all cases have been treated as anonymous. Further, these four interviewees also requested that during the reporting of the findings there is also anonymity. This is a characteristic of the Chinese, as face is important in the Chinese culture, and the
interviewees did not want to be identified if their organisations have not managed technology according to what is perceived to be ‘best-practice’. All the case organisations are Chinese organisations, as are the interviewees.

Table 1 Case Study Companies

<table>
<thead>
<tr>
<th>Case</th>
<th>Organisation Background</th>
<th>Status of Interviewee</th>
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<tbody>
<tr>
<td>Case 1</td>
<td>A bank with nationwide operations</td>
<td>Senior Manager</td>
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<tr>
<td>Case 2</td>
<td>A young and rapidly expanding insurance company</td>
<td>Senior Manager</td>
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<tr>
<td>Case 3</td>
<td>A provincial petrochemical company</td>
<td>Director</td>
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<tr>
<td>Case 4</td>
<td>A provincial petrochemical distributor</td>
<td>Deputy Director</td>
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<tr>
<td>Case 5</td>
<td>A provincial chemical production company</td>
<td>Director</td>
</tr>
<tr>
<td>Case 6</td>
<td>A provincial mining company</td>
<td>Deputy Director</td>
</tr>
<tr>
<td>Case 7</td>
<td>A provincial steel company</td>
<td>General Manager</td>
</tr>
<tr>
<td>Case 8</td>
<td>A provincial power company</td>
<td>Senior Engineer</td>
</tr>
<tr>
<td>Case 9</td>
<td>A regional railway company</td>
<td>Senior Manager</td>
</tr>
<tr>
<td>Case 10</td>
<td>A new fund management company</td>
<td>Senior Manager</td>
</tr>
<tr>
<td>Case 11</td>
<td>Governmental Department</td>
<td>Director</td>
</tr>
<tr>
<td>Case 12</td>
<td>A University</td>
<td>Professor and Senior Administrator</td>
</tr>
<tr>
<td>Case 13</td>
<td>A transport company</td>
<td>Senior Manager</td>
</tr>
<tr>
<td>Case 14</td>
<td>A provincial construction company</td>
<td>Senior Engineer</td>
</tr>
<tr>
<td>Case 15</td>
<td>A government department responsible for transport</td>
<td>Director</td>
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</table>

These interviewees were selected because their organisations recently implemented technology and they have either played a leading role or been involved in the implementation programme. Only three of the participants led a team to select, appropriate, implement, and manage the technology, the others were either part of the selection, implementation or advisory teams. Further, the organisations have been selected to reflect different organisations (service, manufacturing and public sector) and to embrace a wide span of activities and interest in China.
This paper deals with the issues of the activities involved in managing technology of the selected organisations. The methods that were adopted in gathering the information were as follows:

- literature research and survey;
- provide participants with semi-structured interview questions prior to the interview;
- personal interviews;

These methods were chosen over other methods because:

- personal interviews are effective for gathering data of the following types; awareness and knowledge, attitudes and opinions, intentions, motivation and behaviour. All of these are key to the research;
- some of the participants do not speak English, and so the use of an interpreter was necessary;
- the topic treats “management of technology” in the broad sense, which involves how the organisation manage their technology and consequently needs to be studied in the same broad way; and
- a semi-structured interview questionnaire is flexible and permits the change in direction instantly, and new areas can be explored.

The research was principally a case study involving the characteristics of management of technology of the organisations. Each case was written-up individually to retain the individuality of the original statements given by the interviewees. With regards to any bias responses, this paper does not seek to prove or disprove any prior knowledge on management of technology but to examine the actual experiences of those involved with managing technology in China. Thus, the responses of the interviewees were accepted as that which they experienced.
Findings

This study shows three main ways that organisations manage technology. The first type is those that manage technology by identifying the appropriate technologies and before making a selection will investigate the impact of technology versus the need for the technology. The second category is those that manage technology by focusing solely on the needs for the technology to meet the task; and those that manage technology by doing neither.

Type One: Strategic Management of Technology

This type of organisation manage technology by considering factors that are internal as well as external, and consider how technology will impact on the organisation as a whole before implementing the technology. Six of the organisation reviewed fall into this category. Table 2 summarises the experiences of the four organisations.

These organisations view technology not as stand-alone but an integral part of the organisation, suppliers and customers. These organisations will implement the technology because the technology is identified as what will enable the organisation to gain added competitiveness and improve productivity. Because of this the organisations are prepared to make, sometimes, quite significant changes such as restructuring management, recruiting and retraining workforce, and are prepared to make investment in other areas of the organisation.
<table>
<thead>
<tr>
<th>Factors</th>
<th>Organisations' experience and activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitors</td>
<td>Have high concern on what competitors do and what technology they have; Will consider implementing a technology competitors have; Conduct constant monitoring and expect competitors to do the same and to implement what the organisation has; Discussions with potential suppliers of technology to find out what competitors use.</td>
</tr>
<tr>
<td>Industry</td>
<td>Pay close attention to industry and Ministry recommendations; Pay attention to industry recommendations, standards and best practice especially those in other countries; Will implement a technology industry or Ministry recommend.</td>
</tr>
<tr>
<td>Customers</td>
<td>Not all organisations’ technology are directly used by the customers and technology may be seen as supporting customers (rather than what customers directly use); Presence of formal feedback system to gain views of customers but not widely used or disseminated; Predominantly use informal feedback; Will consider whether customers can use the technology if customers are directly affected, and assign dedicated customer support staff to help customers use the technology.</td>
</tr>
<tr>
<td>Suppliers</td>
<td>Have some concern about ability to interact with suppliers, but rather expect suppliers to work to organisation’s system; Some organisations have regular consultations with suppliers with regards to technology usage and needs; Some see their technology policy as one that also pushes suppliers to implement new technology.</td>
</tr>
</tbody>
</table>
### Technology
Regular monitoring of available technology; Frequent discussions with technology suppliers (vendors); May set standards and specifications to vendors to meet and produce the required technology; Cost is an important consideration; Will look within China and outside China for best technology provided it falls within their financial resources.

### People
View people as important and see training as a way of ensuring people can use the technology; Not all people in organisations support implementing new technology into organisation; Have pockets of technology minded individuals who tend to drive technology.

### Task
Generally agree that the technology need to be able to conduct the task; Task processes not usually redesigned, and technology usually seen as tool to speed up task and to enable the organisation to perform task not previously possible.

### Organisation
Usually positive view from organisation, with pockets of resistance; Culture is usually what holds progress back; How technology impacts on organisations considered in corporate strategy and modified accordingly; Technology may be seen as driver to ‘move’ organisations forward.

### Value chain
The immediate areas of impact examined and considered first; Other areas in value chain usually considered before implementation of the technology.

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**Type two: Practical Management of Technology**

These organisations manage technology by focusing solely on the needs for the technology to meet the task. There is little consideration on how technology affects the organisation except on the area where the technology will be implemented, and the expectation that the technology will deliver improved productivity. The qualifications and ability of employees to use the
technology is not usually considered until after a decision has been made to implement the technology. It is not unusual for training to be provided only after the technology has been implemented and the organisation has had an opportunity to assess what is needed. Similarly, these organisations would only assess the impact of the technology on other parts of the organisation after implementation has taken place. Six organisations fall into this category.

These organisations monitor closely the technologies their competitors have and those used by others in the same industry in other countries, through the activities of a small team of senior managers. These organisations also hold frequent discussions with technology suppliers, and may work with consultants to select and implement the technology.

Type three: Unstructured Management of Technology

These organisations used to typify the traditional Chinese SOEs. Although these enterprises have their own management structure, they ultimately receive instructions from a government department or ministry. Thus, it would not be unexpected if the technology used by the enterprise were selected by some higher authority outside of the organisation. In this study, two of the fifteen organisations commented that they did not have complete control over the technology their organisations were given. However, senior management in these organisations were able to make a request for investment in technology to the governmental department or ministry. When asked about the suitability of the technology to perform the task, and about the people who will need to use the technology, the response were ‘there are better and more suitable technology used by enterprises in more advanced countries, but there will always be better and more suitable technologies if the money is available.’
One organisation (the remaining of the fifteen interviewed) commented that the technology in his organisation was not imposed on them by a ministry but the decision was made by a group of executives who did not consider how the technology will make any improvements in the organisation. The decision made was because another organisation in the same industry (but not in direct competition) has the same technology. However, the investment in this technology was not wasted as the organisation did eventually put it into operation.

Conclusion

This study provided some interesting, and unexpected findings. The majority of Chinese organisations still work along a reporting structure that leads to a governmental department or state ministry and it is not uncommon for decisions to be made for the organisations by higher authorities outside of the organisation. With this in mind it was expected that a good number of organisations would fall into a type three organisation category, and that management of technology in Chinese organisations would not be complex and dynamic enough to consider how the technology would affect the organisation, or even, one might argue, that the organisation would have no input or control over the technology that would be implemented. The findings showed a different story as only two of the fifteen organisations interviewed consider themselves to be a type three organisation category. Type three companies, although having a somewhat unstructured management of technology, function this way because of a wider and stricter reporting and management structure. The organisations are often not in control of major investments such as technology.

There was also a belief that Chinese organisations will implement technology indiscriminately because the competitive nature of Chinese organisations will ensure one organisation will
implement the technology that a competitor has. The findings again showed a different story as only one of the fifteen organisations interviewed had implemented technology without assessing what benefits the technology will bring. Six of the organisations interviewed considered implementing technology only if a practical benefit can been seen (type two organisation), and another six organisations implemented technology only after the impact on other areas of the organisation has been considered (type one organisation).

Further, many Chinese organisations are practically state monopolies, and as with any organisation with a monopoly, customers and customer satisfaction are not usually given highest priority. It was therefore expected that these organisations would not give much consideration as to the views of their customers and how technology would impact on them. The findings again proved different as all six of the type one organisations considered the views of their customers through formal or informal feedback. Further, in cases where customers have to directly use the technology that the organisation implement, the organisations (two out of this six) considered assigning dedicated support staff to help customers use the technology.

In terms of management of technology Chinese organisations are not known to have good practice and are commonly thought not to be complex and dynamic enough to consider how the technology would affect the organisation. The findings instead showed a more advanced form of management of technology present where a strategic view is considered, the type one organisations.

Type one organisations would consider a wide range of factors before deciding on a technology to implement. Although many of these organisations do not use, and were not aware of, any management of technology frameworks when considering technology implementation, many of
the actions that they took can fit into a management of technology framework. Although type
two organisations only tend to consider how the technology will improve productivity in the area
where the technology will be implemented, there are indications that they will consider the wider
impact of technology in future implementations. The reason is that having implemented
technology, especially where they have to make alterations to their management, or in
transportation, or having recruit new employees, they are more aware of what is needed for
smoother implementation of technology and to better exploit the technology for competitive
gains.
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