



## 20 - Management and Technology

*The challenge of managing emerging technology can be as different for managers as the transition from regulated business into a free market or the extension of a firm's products into foreign or emerging markets. If managers fail to recognise that the game is different, they may already have lost it before the first round of play.<sup>1</sup>*

In the previous chapter, Chapter 19 - Individuals and Technology, an outline of why existing employees were hesitant to learn new technologies was provided. However those individuals who hold management positions also exhibit difficulties in adopting new technologies by failing to recognise which technologies are likely to have an impact upon the enterprise. Management decisions may be delayed or managers themselves may be hesitant to commit the enterprise to a new and unfamiliar technology.

However, once a decision is made, there are still further decisions to be made. These are managing the change process, training staff, developing new networks and processes and perhaps starting an entirely new company to manage and promote the new technology. The recognition of the impact that new technologies will have and the subsequent changes create situations where uncertainty and ambiguity may exist in the minds of the managers.

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The Shared Technology Project has been mainly concerned with the process of identifying the new technologies that are crossing boundaries primarily for future training purposes. It will be the responsibility of manager, not only in enterprise but also with education institutions, to effectively manage this process. As there is a wealth of management literature that examines the management of innovation; research and development; and, change and adoption of new techniques, these issues will not be discussed at length in this chapter. This chapter will discuss some of the more general areas of importance for management and aspects that managers should be aware of during this change process.

### **Spotting the Technology**

A general trend in the technologies examined in this project have focused on issues of the impact of a new technology. One of these is a focus on the reduction of energy consumption. The focus on reducing energy consumption will affect not only the lowering of the costs of using such technology but also make the new technology more economically attractive. Another focus is within the property development industry where there is increasing interest in low environmental impact as a result of the development.

This move to low environmental impact is being driven by the community and through government agencies' desire for less waste. This focus of low environmental impact will be of importance and will remain an underlying concern to the general community. The perceptions of the customer regarding the adoption of a new technology that reduces the use of resources may provide for product or service differentiation for a company and a competitive advantage.<sup>2</sup>

Traditional approaches to testing new technologies on the enterprise's target market have often involved market trials and gauging customer reactions. However this may not always be the best plan for examining the feasibility of new technologies. This is because the customer may need to change his or her processes to accommodate these new technologies and when faced with these changes, the customer may choose not to participate. Therefore many companies fail to adopt these new technologies "because it is only valuable to such a new, emerging market segment and not to the firm's existing customers."<sup>3</sup>

Despite this, it has been found that the more successful companies are focused on developing new technologies that address the future performance issues of their customers. Staying close to the customer will provide a company with current performance feedback but not future market adoption.<sup>4</sup> For some products the customer is always right but for others, the customer may not have even considered that there could be a better way of doing things.

The two types of technologies discussed here are termed sustaining and disruptive.

- The sustaining technologies provide for a predictable rate of improvement and customers will be able to easily recognise the benefits of such an improvement.
- The disruptive technologies change the performance characteristics of a product but provide the client with a different range of attributes that require the customer to recognise their value.

However, the early entry into these disruptive technologies provides the enterprise with earlier market leadership and the possibility for greater profitability.<sup>5</sup>

Within the technologies outlined in this project, it is possible to see that for some industries the technology is sustaining while for others it is disruptive. Enterprises may be able to anticipate the entry of a new technology and form partnerships with previously non-related industries. In other words, companies who have expertise in one area needed by another are able to make significant cooperative arrangements that satisfy each other's requirements with benefits for both organisations.

This cooperation between two previously unrelated disciplines certainly has some commonality with the various departments within educational institutions. During the development of "e-commerce", the university departments of marketing and computer science had difficulty in deciding into which department this new business process should be placed. It is possible that within vocational education a similar situation may occur. For example, will the next generation of instrument technicians be trained in the electrical/electronics departments or within the information technology department?

## Risk and Innovation

Any new venture is accompanied with risk. A risk assessment is necessary prior to investing in any area whether it is a sustaining technology or a disruptive one. For sustaining technologies, past history and market testing can provide for a balanced assessment. However when assessing the future potential of disruptive technologies, other methods are required. These methods do not rely on a historical context. Innovation is the key.

The Australian Industry Group recognises the need for innovation as "countries which grow strongly do so through active support for innovation."<sup>6</sup> Australia has had a history of being innovative with a focus on "speculation rather than calculation; comfort and lifestyle orientation rather than the challenge of building a growth-oriented enterprise; and a short reward horizon rather than pursuit of long-term opportunity."<sup>7</sup>

It is suggested that for national entrepreneurship to flourish, small to medium enterprises should shift their focus from coming up with new ideas (traditional Australian focus) to a focus on transforming the new idea to tangible market outcomes.<sup>8</sup> That is, it is not so much the technology itself that is to be the focus but what advantageous disruption should be made so that the enterprise is able to capitalise upon the good idea. This is one of the fundamental tenet of capitalism – instability within in markets where newly created demands are met with limited supply thus leading to scarcity and the ability of the enterprise to command higher pricing in the short term.

This focus on creating instability does require fresh thinking and enterprises should move from relying on experience to relying on imagination. "The strategy-making process should be led not by those with the most experience but by those with the greatest ability to envision the future. A person who ranks high in the hierarchy of experience qualifies as futurist only if the future mirrors the past."<sup>9</sup>

## Committing to the technology

For new companies who have invented or developed the new technology, seeking growth opportunities and gathering capital to commercialise the technology is of great importance. However, most companies will be established companies and managers will need to decide if they will become involved in these shared technologies. There are believed to be a few pitfalls awaiting enterprises who choose new technologies<sup>10</sup> and these are:

**Delayed participation** – waiting and evaluating delay participation and in fast moving technologies and an enterprise may miss an opportunity. Managers need to examine the technology as to what it can do rather than how the market looks at the moment.

**Sticking with the familiar** – when an organisation is not willing change, its market may make the decision to change for the enterprise by not buying the old product. The organisation is then forced to move into the new area and loses the ability to choose where it will position itself.

**Reluctance to fully commit** – the new technology makes existing and profitable products seem redundant and may result in reducing the profit stream. Managers may wish to remain in both markets outwardly but tacitly stay with the money-maker.

**Lack of persistence** – new technologies take time before they are adopted and managers seeking short-term results may dump the new technology before it is able to reach maturation in the market.

The developers of the four traps mentioned above recommend that managers of companies considering new technologies should maintain a scanning process for complementary technologies. This scanning process should become part of the business strategy and planning process. A learning culture (as mentioned in Chapter 19 – Individuals and Technology) is important for the organisation to keep an open mind about new technologies and provides for open and healthy debate regarding the utility of the new technology.<sup>11</sup>

This process of evaluation will always be dynamic and with the introduction of various technologies, the target will always be moving. The goal is “to find a route that lies between going on blind faith or gut feel and the misplaced precision that stems from myopic or static financial models. It is about being roughly right, rather than precisely wrong.”<sup>12</sup>

## Preparing the Enterprise for Change

In a recent review of the information and communications technology (ICT) sector and the turbulent history of the past few years it was believed that technological innovation must be accompanied with managerial innovations. It is believed that managerial innovation is what makes the technological innovations work. Companies do not get the benefits from technology unless they change the way that they do business.<sup>13</sup>

Clayton Christensen has been involved in reviewing the process of innovation and says that “innovation isn’t random. Those outcomes appear to be random when we

don't understand all the factors that affect successful innovation. If we could understand and manage these variables, innovation wouldn't be nearly as risky as it appears."<sup>14</sup>

Christensen recommends that managers disrupt their competition by allowing the less-skilled and less-wealthy do things for themselves and to seek to involve the low end of a market with the technology. Christensen does recommend that managers consider three aspects before setting out to change a market. These are:

- Does the organisation have the resources necessary to succeed;
- Will the values of the organisation allow the employees to place a high priority on the innovation; and,
- Will the processes of the organisation facilitate a successful outcome in this new area.<sup>15</sup>

The International Labor Organization reports that "evidence shows that major gains in enterprise performance only occur where the use of the new technologies has been combined with wide-ranging changes in work organization. Evidence also shows that the most widespread use of the new technologies exists in enterprises that have adopted the most thorough range of work organization changes, such as the decentralization of decision-making, and the organization of work into semi-autonomous, task-oriented teams."<sup>16</sup>

### People

An assessment needs to be made of the technical capacity of an enterprise when attempting to establish a new technology. Not only does this include the processes of the organisation but the technical capacity of the people who will be working within the enterprise. There are specific technical skills required as well as the ability of individuals to share knowledge throughout the enterprise and to create networks.<sup>17</sup>

In a study of enterprises facing such a change, the recruitment of people who were of high quality was the preferred option of an overwhelming number of companies as a pathway to gain the knowledge and skills required. The focus is on finding people with the generic skills and the ability to learn.<sup>18</sup> Some managers believe that it is too difficult to teach workers new skills and processes and that starting with "fresh minds" was a better option.<sup>19</sup>

Management innovation has included the removal of a layer of supervisory control and placing this responsibility upon the technicians. The move to team-based processes and multi-skilling has provided for increased profitability. It has also provided these technicians with a better working knowledge of the new technology and processes than management. The differences between management's understanding and the working staff is critical to the success of the enterprise. "The culture of the firm and the attitude of managers appeared to have a significant impact on the uptake and success of workplace changes and training effectiveness."<sup>20</sup>

This new structure requires managers to create appropriate ways of providing feedback and rewarding employees for efficient work processes. Employees are also more wary of management's desire for lean workforces. This has led to the

breaking of the “psychological social contract” between management and employees where the employee no longer believes that merely by doing a good job will he or she retain employment. In this environment, individuals recognise that employment may be transient and must be prepared to change employers.<sup>21</sup>

In recent years within the information and communications technology (ICT) industries, individuals remained with an employer as long as the work they were completing provided them with skills and competencies that would make them attractive to another employer. In industries facing changes in technology, it is possible to understand that the more astute workers will be seeking opportunities that will provide them with professional development opportunities. It will be these workers who will move to more new technology oriented enterprises to ensure that they remain employable.

Astute managers will need to provide these employees with professional development opportunities within the enterprise (such as training or skill enhancement) or they will be lost to other organisations who will. The only thing worse than training staff and having them leave is to not train them and have them stay.<sup>22</sup> A lack of inaction by management will prevent the enterprise from learning how to deal with change and how to manage this change through existing staff.

#### Work processes

The research and consulting enterprise, Gartner, has promoted the concept of the “real-time” enterprise where a reduction in the time between authorising an action and the notification of the authorisation is greatly reduced. This style of work process will rely upon wireless computing devices and Radio Frequency Identity Tags (RFIDs). However is recognised that the most inhibiting factor to becoming a “real-time” enterprise is the changes in working habits and the organisational structure.<sup>23</sup>

These types of organisations can address emerging opportunities more quickly and have greater flexibility in dealing with unexpected events. All of this revolves around access to real-time data and the ability of an enterprise to manage and interpret this information.<sup>24</sup> In other chapters we have discussed the technologies developed in networking and wireless communications that will enable these types of organisations and work processes.

Therefore the work processes of the future will involve more distributed communication systems with instructions issued automatically and reporting completed through a wireless or wireline communication system. The use of information and communications technologies (ICT) will increase and will require individuals become more familiar with the concepts of computer networking and wireless communications. Managers must plan for this change.

#### Organisational structure and culture

An organisation, like people, develop set ways of accomplishing tasks. As with individuals, learning new tasks is sometimes difficult but of course not impossible. For organisations, learning new tasks are at worst impossible and at best require long periods of change for the new tasks to be adopted and performed efficiently.

For new technologies, the length of time required may prevent the organisation from being able to enter in to the new market.

It is for this reason that some observers suggest that a new company be developed and located away from the main organisation. This allows for a new organisational structure and culture to be developed based on the technology being utilised.<sup>25</sup> The focus should be on developing a culture that promotes learning and encourages innovation and experimentation. These are the generic skills that employers are seeking from new employees and need to be matched by the culture of the organisation. It is not possible to encourage these behaviours and generic skills in individuals within a management culture of control and punishment.

## Summary

The successful adoption of new technologies depends upon a managerial system that supports change, innovation, and distributed responsibility. Managers need to develop new strategies, processes and cultures within their enterprises if the new technology is to be adopted and supported. Managers need to scan the technology landscape regularly to ensure that opportunities for continued economic viability are not missed.

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