

## MANAGING TECHNOLOGY'S SUCCESSFUL JOURNEY FROM CONCEPT TO SUCCESSFUL IMPLEMENTATION

**DR STEPHEN J PRATT**

The College, Swansea University, Bay Campus, Swansea U.K. SA1 8EN

### **ABSTRACT**

The utilisation of information technology (IT) is seen to be key to organisational success. Unfortunately the potential dangers of implementing inappropriate technology, or changing the operational workings of current business processes on extant an IT infrastructure, is often overlooked. It is therefore postulated that management course should not just focus on the benefits of IT, but also include technological impact (TI) risk assessments to work in association with the existing pedagogical teachings of art and the scientific method.

**KEYWORDS:** Management Options, Business Processes, Managing The Human Resource Etc.,

### **INTRODUCTION**

Discussions on the role of management is traditionally focused on the effective utilisation of available resources, to the exclusion of the wider societal impact that it has on its customers, employees and society. The primary driver behind this is the predominant focus on financial efficiency reflected in formula based performance criteria. To that end Information Technology (IT) has been seen as an underpinning effective tool to deliver greater efficiency. Too often that is done to detriment of the end user, whether employee or customer, being financially counterproductive (through loss in customer sales or employee loyalty).

The success of established organisations is founded on the embodiment of a long term strategy which requires an ever changing set of eclectic skills that are able to respond to the demands of a fickle, global market economy. Investment in IT is often seen as a way to provide financial return in improving operational efficiency whilst simultaneously reaching out to a wider customer base. The management of the application of IT within the workplace has been around implementation wherever possible, with primary focus on data analysis and presentation.

Effective management is founded on the effective use of available resources, whilst recognising any shortfalls or gaps in resources. Quality decisions require good and accurate data, and understanding what it represents in an eclectic manner so that the impact of decisions are fully realised. Too often the focus is on a more quantitative approach where formula based criteria take precedent over the qualitative, empirical values that significantly contributes to overall organisational efficiency and brand. In maintaining any quality position management have to articulate, and subsequently implement, the strategic benefits of any major change which in turn requires an eclectic set of skills that is able to respond to the demands of stakeholders in an agile manner.

Invariably the management of the latest technological products and support services are generally approached from a technical perspective. The short-term technological focus is often driven by the desire to secure immediate commercial benefit at the detriment of the employee and customer impact which can create disillusionment, and should be avoided wherever possible. Particularly when the complex issues of managing possibly esoteric, emotionally

vulnerable, high-demand, highly-charged, highly-educated, highly-valued people which are business critical doesn't get the same focus, or urgency, as securing financial return on investment.

The ability of employees to actively contribute to organisational change relating to the adoption of technology can be effective, and business efficient, when motivation is a key factor in human resource management. Recovery from a badly conceived strategic design, resulting from an ill-thought and badly planned implementation of the prosed technology invariably culminates in management approaching the changing environment in a destructive, problem solving manner which can be demotivational and draining on all of those involved. The overarching demand is for an extension of the focus on the required managerial skill set to reflect on the consequences of technological adaptation and more purposeful change which encompasses more than financial criteria.

## MANAGEMENT OPTIONS

Management/business schools primarily focus on the issues facing organisations: i.e. being the most effective and efficient as possible given operational constraints. Efficiency largely focused on maximising available resource usage whilst identifying those resources (human or otherwise) that are required, both short and long-term, to protect the existence of the organisation. Effectiveness is about ensuring that the resources are getting the best result, with an emphasis on the softer issues of quality. The former necessitating quantitative assessments while the later more qualitative.

The need for a formalised approach to management emanated from the first industrial revolution Towne(1986) and the recognition to replace ad hoc, on the job training manifested in the establishment of Wharton School (late 1800s), Tuck School of Business (1900) and Harvard Business School (1908) the need for formalised management training to replace the *ad hoc*, on the job training was recognised. Primary focus being on the scientific, more quantitative approach to assessing performance Taylor(1911), Taylor(1972) rather than emphasising the importance of the 'art' components in managerial skill set. The debate between the two approaches is steeped in history as reported by Joullie& Spillane (2015). Indeed the positioning of these two aspects goes back as far the 1800s when the first management school, *Ecole Speciale de Commerce et d'Industrie*, was formed in Paris in 1819. Then Roux(1800), for the scientific position, and Say(1803) for the humanistic side, favoured the need for the more formal assessment of industry.

Pfeffer(2002), Donaldson (2002) and Ghoshal(2005), like many, were negative about the value of MBAs, which were seen as the panacea for ineffective management. The reality is that managers should not be acting in isolation simply trying to defeat their counterpart in a competitor organisation in some macho-competitive event, rather team players interacting with others to achieve the best corporate result. Management should not be easily automated with decisions being based on cold analytical algorithms which was considered a major contributor to the corporate disasters of early 2000s and a failing of extant MBA programmes Podolny(2009), Mintzberg(2004). In fact Mintzberg(2004) and Cappelli(2020) espoused the importance of ensuring the inclusion of more emotional intelligence enabling social compromise, a factor necessary in organisational management to develop the requisite leadership skills.

Post-industrial revolution heralded the need for rigorous, mechanistic, performance analysis to reassure that managerial processes effectively harnessed the benefits arising from the symbiotic relationship of effective teaming and technology. This was more recently extended to adopt a more softer approach that was essential when the beneficial corporate traits of organic cultures were recognised. The plethora of information offered by current technology has, in many ways, been to the detriment of the evolution of qualitative assessment (Prahalad(1999)). It is therefore postulated that

managerial practices have not evolved, in a dynamic way, to harness the diversity of information sources in a symbiotic manner.

## MANAGEMENT OF BUSINESS PROCESSES

One of the founding questions is should the teachings' of management practices be a more balanced combination of the scientific and the artistic? This is particularly relevant when there is increasing recognition of the importance of creating working environments where design thinking (Salunhe(2018)). Current deployment of technology applications manifest in quick solutions that highlight agile criteria in response to the need for flexibility in meeting the responses of an impatient, technology savvy, consumer base.

Adoption of a mechanistic approach undoubtedly suited organisations that are looking to provide cost effective alternative solutions in highly competitive markets where control is scientifically managed and assessed. Organisations are evolving to embrace the demand for unique innovative ideas for product lines, or their application or production, where the focus on achieving success is through risk analysis. Management need to identify, develop and nurture flair and creativity in the workplace if they are to capitalise on the acquired talent and technological resources (Mello(2015)). This demands a non-prescriptive approach as the quality of the outcome is dependent on the quality of investigation undertaken.

## MANAGING THE HUMAN RESOURCE

The notoriously difficult task of managing people and technology has introduced another layer of complexity as the application of developed products and associated services becomes increasingly competitive. This additional level of complexity requires management to reassess how best to achieve the next step of operational excellence, assuming that it is already clearly defined. By necessity technology has demanded the extension of simple marketing criteria to embrace the wider aspects of social use of products addressing personal and environmental concerns through lateral experimentation and experimentation Powers(2018). Design thinking (Liedtka(2018)) the development of bespoke solutions in an organic manner which is particularly pertinent as the need for immersive skills increases in all applications.

This has been endorsed by the proponents of design thinking (Liedtka(2018), Mello(2015), Powers(2018), Knight(2020) and Salunhe(2018)) that advocate the benefits of inspiration and ideation significantly contribute to the quality of the final solution and/or deliverable through the quality of analytical work undertaken. Cappelli(2008) took it further by stating that end-to-end quality can only emanate if the underlying principles of critical thinking are embraced and embedded throughout. This has been reflected with a change in language at the turn of the millennium where there less focus on standards, measurement, results, etc and more focus on empathy, social impact, and motivation which is reflected in the emergence of ethereal leadership skills enabling a more corporate social responsibility focused agenda.

## MANAGING TECHNOLOGY APPLICATION

The successful management of the use of technology in an organisation, and indeed society, is much more than the development of appropriate applications using software languages focusing on a high-level of abstraction. Success, and the effective use of technology in an organisation, is dependent on ensuring that it is appropriately embedded within the business processes. Inappropriate application of complex technology on the day-to-day operation of an organisation potentially is a risk if the idiosyncratic nuances of the symbiotic relationship between them are not clearly understood. Historically the development of applications have been undertaken somewhat distantly removed from reality which

obscures understanding and context of how and what knowledge will result in implementing a quality design, and subsequent problem resolution, more difficult.

In deciding the best solution for the technology infrastructure of an organisation the ability to de-clutter the abundant information is necessary to provide the clarity of vision required to the required design solution Shalley(2017). As Spinellis (2018) highlights differential analysis requires detail: Assessing the disparity between situations requires context as well as knowledge to understand the extent of variation and the true values being considered. Automated design techniques to provide off-the-shelf solutions is insufficient and does nothing to develop the inherent knowledge necessary to develop quality analytical skills within the team.

The success of any root-cause analysis technique depends on the quality of the methodological approach taken, and the subsequent data mined from that exploratory exercise. Management approaches to developing bespoke, operationally enhancing technology is founded on having the right in-house skills that need to be adaptive to change, one-size does not fit all.

### **Technology Management: Effective Systems > $\sum$ Individual Resources**

Technological developments are either driven by actual or perceived demand. Historically technology has been seen as a way of gaining an advantage: i.e. militarily, societally or commercially. Investment in the defence technology, for example, has always been significant with effective deployment being presumed on the basis of utilising an effective armed-forces organisation: The *raison d'être* for an armed-forces infrastructure. The historic basis of management often requires an adjustment to its practices to accommodate new technology as evidenced by the industrial revolution.

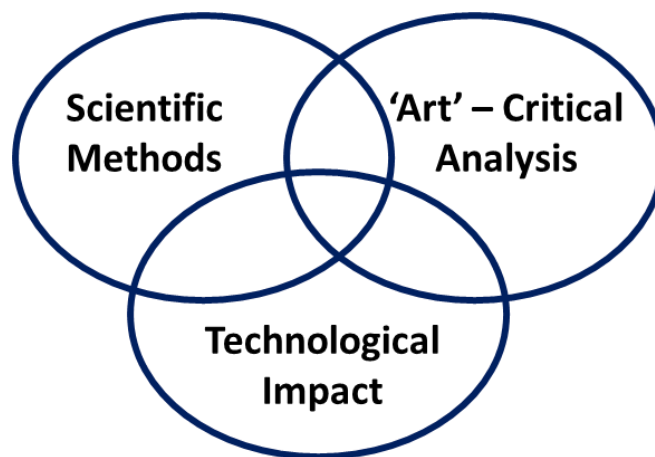
The development of computing was primarily driven by the desire of scientists to take advantage of the computational power available to analyse and solve problems in a way that had never been envisaged. The profligate nature of the computing manufacturing industry was based on the ubiquitous application to many areas of commercial and societal environments. This phraseology soon changed to Information technology (IT) to steer discussions and application focus to a wider application base: i.e. no longer just data, but now information. In doing so it encouraged the adoption of computing technology in all aspects of society; socially for pleasure, commercially for competitive advantage and more recently for humanitarian reasons. Organisations relying on rapid reactive management is no longer appropriate, there is a need to get ahead of the curve in securing effective IT operation. The key to this being the interpretation, and conversion, of data into information.

Unlike the armed-forces organisations other institutions, whether public or private, had to adjust in order to adopt. Some on the basis of perceived positive impact on the effectiveness of an organisation, others based on perceived psychological pressure and market positioning. An example being the changes to working practices caused by the Covid pandemic where choice was not really an option and the dependency on an effective, supportive technological infrastructure was evident. During this unfortunate period of the pandemic the experience of the deployment of business resources, human or otherwise, is reflected by the managerial process that are appropriately planned and established for activation when required. The concept of being properly prepared, with the relevant training, should not be surprising as the armed-forces are well aware of the dangers of badly managed technology.

The technical complexities involved often dictated the use of management consultants to ensure that the return on investment was secured. Although initial success was invariably achieved, and demonstrable, the long-term security on

investment relied heavily on incumbent management to achieve it. That is traditional managerial practices supplemented by IT awareness training which is often insufficient for the challenges met. The complexities of the technology being deployed has meant that management training can no longer be solely focused on the deployment and operation of IT, but more forward thinking towards the Technological Impact (TI) on business processes. This third element (i.e. TI) of the troika of managerial skills fully exploits the scientific skills and artistic flair of critical analysis with the aim of safeguarding against technological implosion (see Figure 1).

The protection of business processes from technology is as valid as assessing the benefits automation can offer. TI requires a thorough understanding of the symbiotic relationship between IT, business process and the human component that is crucial in realising the effect of any operational change, irrespective of its cause. Senior management is about managing risk: i.e. identifying it and identifying available resources to resolve or protect against it. Technological skills can no longer be on the periphery of the skills set, and certainly not restricted to those who have a scientific bent.



**Figure 1: Managerial Skills Troika**

Pressure in ensuring technology is effectively implemented within the business-as-usual (BAU) process infrastructure of an organisation is a success can either be politically driven by governments, or shareholders or simple peers without realising the implications of IT integration. To be effective IT needs to be purposeful in all aspects of its application, and not just financially advantageous.

In making those key decisions TI needs to consider many factors, including:

- Driving-to-the-bottom line may be achieved, but often at the cost of quality. Before the ubiquitous use of the internet, and emails, the construction of a message took time and thought, and therefore purposeful. Coping with potential information overload caused by the unfettered use of IT now means that messages, problems, general work issues can be easily offloaded without thought or purpose causing unnecessary stress and inefficiency in the workplace.
- The enforced implementation of IT on staff can significantly impact the well-being and efficiency of employees. As a consequence there is a danger that the vocational aspects of the office-life is diluted by the push for so-called progress as defined by the ongoing pressure for the application of technology.
- There are examples of where technology clearly assists, and indeed supports, organisations in continuance despite obstacles. Clearly the pandemic has demonstrated that where almost overnight many organisations changed to

remote working. The ease with which this was accomplished, and how it was effectively achieved, was dependent on the technology used: i.e. power of the laptop or hardware device available and bandwidth connection to the remote location. Despite the extant dangers of the pandemic many companies are operating remotely with all customer interaction completed online, to the detriment of customer satisfaction. Those operating online customer services do not always have the information to hand as this remote working is based on existing organisational systems that may not be appropriately interconnected to provide the information required: previously disconnected systems cannot be expected to work in a symbiotic manner overnight. The impact on customer loyalty needs to be carefully considered.

- Much is written about the value of the employee and the importance of motivation and loyalty. However the ill-thought application of IT can have a detrimental effect on employee relations. Too often the introduction of IT is seen as punitive measure against those in the organisation trying to use it for previous failings. Technology is often used as the vehicle to downsize an organisation by removing middle management and/or administration. The consequences often result in a break in the symbiotic relationships between business processes with peripheral tasks either being up or down in the hierarchy (Pan(2020)).
- Integration of systems information is a key component of effective supply-chain management and yet the introduction of new technology often overlooks the symbiotic relations between sub-systems between disparate domains that must be maintained.
- Disaster recovery whether natural, or the result of a deliberate attack, needs to be managed and prevented. Any form of deliberate attack has ramifications well beyond technology: e.g. loss in customer confidence in the event of a cyber-attack.
- A less technique issue relates to the way information is handled and used. Data protection is becoming more of a corporate issue as the proliferation of technological use (and misuse) as blurred the boundary between commercial and societal technological platforms. Managing The TI implications of the use of gathered user information extends well beyond ethical values into legislative areas where the consequential costs can be significant, financially and reputationally.

The managerial skills required to scenario test various scenarios necessitate the managerial troika set of skills that balance the scientific, with the creative analytical flair and technological risk analysis.

## CONCLUDING COMMENTS

The challenge for management is to ensure that IT not only achieves its return on investment, but provides the infrastructure necessary for the long term future of the organisation. Too often the focus is placed on implementation with insufficient attention given to the impact that technology can have on employees and customers.

Management courses need to embrace the three facets of the troika: i.e. scientific, art and TI. The technology aspect can no longer be viewed as a 'nice to have'. The impact of technology needs careful analysis, and control for which there needs to be a clear, concise consensus on what management skills are required today and the immediate future. The importance of quality management including TI should be engrained in the DNA of managerial decisions, underpinned by the quality of the analysis undertaken. As such a good starting point is to embed the drive for quality at the earliest

opportunity in management courses. In doing so such courses need to generate the hunger for quality and the supportive cognitive skills needed to cement the managerial role in identifying and managing identified and possibly unforeseen risks that business confront in reality.

## REFERENCES

1. Cappelli(2008) Cappelli, P., *Talent Management for the Twenty-First Century*, Harvard Business Review, Vol. 86, No. 3, pp. 74-133, 2008
2. Cappelli(2020) Cappelli, P., *Stop Overengineering People Management: The trend toward optimization is disempowering employees*, Harvard Business Review, Vol. 98, No. 5, pp. 56-63, 2020
3. Donaldson(2002), Donaldson, L., *Damned by our own theories: contradictions between theories and management education*, Academy of Management Learning and Education, Vol.1, No.1, pp: 96-106, 2002
4. Ghoshal(2005), Ghoshal, S., *Bad Management Theories Are Destroying Good Management Practices*, Academy of management learning Education, Vol. 4, No. 1, pp: 75-91, 2005.
5. Joillie(2015) Joullie, J.-E, Spillane, R. *The Philosophical Foundations of Management Thought*, Lexington, 2015
6. Knight(2020) Knight, E., Daymond, J &Paroutis, S., (2020), *Design-Led Strategy: How To bring Design Thinking Into The Art Of Strategic Management*, California Management Review, Vol 62 , issue 2, pp. 30-52, 2020
7. Liedtka(2018) Liedtka, J., *Why Design Thinking Works*, Harvard Business Review, Oct, pp. 72-80, 2018
8. Livingston(1971), Livingston, J.S., *Myth of the well-educated manager*, Harvard Business Review, Vol. 49, No. 1, p.79
9. Mello(2015) Mello, A.L., Rentsch, J.R., *"Cognitive Diversity in Teams: A Multidisciplinary Approach"*, Small Group Research, Vol. 46(6), pp. 623-658, Sage, 2015
10. Pan(2020), Pan. S.L., Cui. M., Qian. J., *Information resource orchestration during the COVID-19 pandemic: A study of community lockdowns in China*, International Journal of Information Management, Vol. 54., pp. 1-8, 2020
11. Mintzberg (2004) Mintzberg, H., *Leadership and management development: An afterword*, Academy of Management Executive, Vol. 18, No. 3, pp. 140-142,2004
12. Mintzberg (2004), Mintzberg, H., *Managers, Not MBAs*, San Francisco: Berrett-Koehler Publishers, 2004
13. Pfeffer(2002), Pfeffer,J., Fong, C., *The End of Business Schools? Lees Success Than Meets The Eye*, Academy of Management Learning and Education, Vol.1, No. 1, pp: 78-95, 2002
14. Podolny(2009) Podolny, J.M., *TheBuck Stops (and starts) at Business School*, Harvard Business Review, Vol. 87, No. 6, pp.62-67, 2009
15. Powers(2018) Powers, M.P.(2018), *Think Different*, Alexandria: Society for Human Resource Management, Vol. 63, No. 5, pp 91-95, 2018
16. Powers(2018) Powers, M.P. *"Think Different"*, HR Magazine, June-Aug, 2018 [www.SHRM.COM](http://www.SHRM.COM)

17. Prahalad(1999) Prahalad, C.K., Krishnan, M.S., (1999), *The New Meaning of Quality in the Information Age*, Harvard Business Review, Vol 77, Issue 5, pp.109-119, 1999
18. Roux(1800) Roux, V. (1800), *De l'influence du gouvernement sur la prosperite du commerce*, Paris : Fayolle, 1800
19. Salunhe(2018) Salunhe, S., Kadam, "Design Thinking: An Approach For Bridging The Gap Between Industry And Academics", International Journal of Research in Commerce & Management, Vol 9., pp. 1-7, Sept 2018
20. Say(2011) Say, J.-B.(2011) [1803] *Traité d'économie politique*, Paris : InstitutCoppet
21. Shalley(2017) Shalley, C.E., Gilson, L.L., "Creativity and the Management of Technology: Balancing Creativity and Standardisation", Production and Operations Management, Apr, Vol.26. No. 4, pp. 605-616, 2017
22. Spinellis (2018) Spinellis, D. *Modern Debugging: The Art of Finding a Needle in a Haystack*, Comm. Of the ACM, Vol 61. No. 11, pp. 124-132, Nov 2018
23. Taylor(1911), Taylor, F.W., *The Principles of Scientific Management*, New York: Harper Brothers 1911
24. Taylor(1972), Taylor, F.W. *Scientific Management: Comprising Shop Management, The Principles of Scientific Management and Testimony before the special House Committee*, Greenwood Press, 1972
25. Towne(1986) Towne, H.R., *The Engineer as an Economist*, Academy of Management Best papers Proceeding, Supplement, 1986