Innovation in practice

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Innovation – a practical guide to cultural impacts

In-no-va-tion (1) the introduction of something new (2) a new idea, method or device: novelty.

An **innovation** is something entirely new; but there is no such thing as an unprecedented technological **innovation** because it is impossible for an inventor to work in a vacuum and, however ingenious the invention, it must arise out of the inventor's own previous experience. It can be argued that the same innovation occurs in a number of different places at a number of different times. If a business is carrying out a specific novel approach to some process and this is co-incidentally discovered elsewhere it is no less innovative because it was not known by the second party. History is replete with examples of co-incident innovation – the windmill being one classic example.

This lecture is going to look at the cultural activities inside an organisation that are needed to assist in the process of innovation – how the culture affects the discovery process and the uptake of innovative ideas. In this approach we will look at those activities that encourage the innovative process and those that discourage the process. We must recognise that innovation is not the preserve of the scientist, but is part of the driving human spirit to try something new and different. Thus, the power to innovate resides in all of us but needs encouragement to blossom. We will consider the structures that businesses put in place to encourage or discourage this innovative spirit and look at the consequences of each structure.

Stage 1 – Individual activity centred on part of a process or single operand

One of the key issues raised in earlier lectures is the need for breadth and depth of knowledge for innovation to occur. At the individual operator level, the operator is the 'expert' of the process. The daily activity involved in the processing of material through the machinery provides the operator with an intimate understanding of what the machinery is capable of and, in particular, what issues cause problems in the smooth operations of the machine. This provides a depth of knowledge of the machinery that is unmatched by technicians. What the operator lacks, however, is breadth of knowledge; the operator often does not appreciate the interactions between their activities and the rest of the operations

Thus, the involved operator is one of the best sources of innovation for the activities involved in their machine as they find innovative ways of avoiding processing problems or improving the operations of the machines.

From a business perspective, the individual operator is both a strength and a weakness when it comes to innovation. The strength lies in the depth of knowledge of the operation of the machine. The weakness comes from the lack of breadth of knowledge. This can lead to optimisation problems. The individual operator often does not have a complete picture of the organisation or even of their own plant and the part they play. In this case it can lead to sub-optimal choices. An operator of a worsted carding machine knows that water is an important control factor for the operation of the card. Increasing the water content of the incoming wool can lead to much higher efficiencies in carding due to better control over static. However, incorrect addition of water can mean that the burr removal efficiencies of the card are sub-optimal, causing efficiency and quality issues at the combing stage of the process. Thus, an inadequate knowledge of the entire process can lead to sub-optimal choice on the part of the operator.

It is important for the business to have a process to monitor and approve changes to processes. With such a mechanism in place, operators can be freed to try innovative solutions to problems. Before changes are made to processes, however, the changes need to go through an authorisation process to ensure there are no adverse effects upstream due to the changes. Other lectures on quality have shown the need for correct measurement and interpretation. These tools are vital for ensuring that changes lead to meaningful results across the organisation. Without such a mechanism in place, businesses often apply very rigid structures to control the process. These structures ensure adherence to approved procedures but often stifle the creativity of the people doing the tasks. As very few tasks remain static over time (wear and tear and subtle changes to inputs frequently occur) the very rigidity of the work instructions can result in poor performance as the process does not react to external influences.

Stage 2 – Team process improving on a process

From an individual working on a single machine or step in the process, the next development is to utilise a team of people working on improving a single process. The advantages of this are in the application in breadth of knowledge to the problem. This team approach, when effective, utilises the combined different understandings of the individuals. Thus technicians, operators and others can interact to bring different perspectives to a problem to arrive at a significant innovative solution. Here we combine the strengths of multi disciplines into creating a new paradigm in which to work.

The strength of the team approach contains within it the seeds of its failure. Teams function best when all of the members are focused on a single outcome. This can prove problematical in an operating environment because the outcome may not be the correct one. Teams often fail due to poor problem selection or understanding. Good work may result in inapplicable solutions being applied. This is particularly so when teams select their own problems to work on rather than being vetted by others. This often results in group think and lead to sub optimal answers. Both problems and solutions need to be individually assessed before work starts or solutions implemented.

The business culture here must become one of encouraging and supporting change mechanisms to allow people to be creative. Team dynamics must be understood and supported. Dangers exist when the team is too narrowly focused on short-term or departmental outcomes, again without holistic understanding of the outcomes required for the business. Here, incorrect reward mechanisms can lead to short-term innovative solutions that cause problems in the long term for the business. Rewards must be focused on teams not individuals, should be not linked to wage rates and must be transparent. The outcomes for the solutions must be outlined prior to starting the project and the audit function should be done independently of the team. Follow up on projects to determine actual outcomes are a vital component of good projects.

Stage 3 – Team process operating at a plant or process level

There is little difference between Stages 2 and 3, which are primarily about focus and support. Whereas Stage 2 can be exemplified by first-line management support, Stage 3 needs high level operational support to be effective. Here, the main problems of the operation as decided by plant management are solved. Direction is important, and the skill levels of the teams must be higher. Understanding of the strategic direction of the department is important, and innovation teams become a strategic imperative for successful organisations. At this stage innovation is the key to improving the process. For most processes the technology is built into the machines carrying out the process. In textiles in particular most of the innovation is done by the machinery manufacturer. The team works

on integrating the machinery into the particular processes in the plant and making subtle innovations to ensure that highest standards are maintained. Often textile machinery manufacturers visit mills looking for the modifications being made to their machinery so as to improve the next model.

However, as with all management theories and practices, there are considerable risks associated with innovation teams at this level of an organisation. Plant management is often rewarded for short-term performance, such as cost cutting or operational efficiency. This is often not correlated with increases in sales or other company objectives. Thus, even plant management can focus on the wrong aspects. It is also axiomatic that engineers like to work within known parameters and are often blindsided by other than engineering factors. Project selection becomes vital and should not be left solely with technical people. Work on discontinuous technologies will not be done in such an environment.

Stage 4 - Team process operating at a business level across technology platforms

At this stage all of the resources of the company are available for innovation. Many projects are launched and particular products, technology platforms and processes are targeted for improvement. ***This does not guarantee success.*** Studies of the hard disk industry show that technology leaders at specific points of time seldom made the market adjustment for the new technology. Thus, the industry leaders in the early computer hard disk production companies did not survive the change to five and a half-inch disks, and these companies did not survive the change to smaller disks. Thus, resources and highly skilled technical experience does not guarantee innovative thinking and industry survival. In fact, there are a number of studies that show the opposite is in fact more common. Case studies looking at the computer hard drive industry and the change between chain and hydraulic operated excavators are available and show the problems with discontinuous innovations on industry dynamics.