

Summary

Process innovation within manufacturing firms is under exposed in literature and researches for decades in contrast to product innovation. Despite of promising technical product innovations it turns out that manufacturing firms not pursue and implement these innovations to improve process performance. The main question is what limits the implementation of technical innovation within manufacturing firms to innovate manufacturing processes?

Innovation is defined as implemented technologically new products and processes and significant technological improvements in products and processes. A process is a transformation of an input to a specific output. Innovation of a process is an improvement of this transformation and can be achieved by implementing product innovation. Radical implementation and rethinking of the manufacturing process is the same as business process reengineering. The framework for this method is the plan-do-check-act cycle. Literature show by empirical results improvement is dramatic when process reengineering is combined with automation of processes.

Operations improvement is often confused with process innovation. This is related to the definitions of function and task. The task is concerned with what needs to happen or needs to be done in order that the contribution is realized such that the function is fulfilled. Innovation comes forth out of the function of the system and improvement comes forth out of the performing of tasks. Innovation is initiated by the need of survival of the existing system within the environment. Innovation contributes to fulfilling the function whether operations improvement contributes to performing tasks.

Innovation, improvement and reengineering are all about change. Dissatisfaction, vision or concrete steps are needed to overcome the resistance to change. Most studies focus on reducing resistance to change. Other studies show that resistance can strengthen the change and serve as an asset and a resource. The awareness of this phenomenon is potentially contributing to successful implementation of technical innovation. Adequate readiness for change and sufficient resources are suggested by other research in order to successful change status quo. Time is a resource and change is unlikely if high workloads are present. A shortage of time limits therefore process innovation.

Manufacturing firms can be classified as innovation-adopting organizations and implementation of product innovation is generally a problem-solving process. One of the main issues concerning implementation is recognition or absence of problems that have to be solved. Literature about decision making acknowledge that the characteristics of the decision making process are increasingly process-based rather than project-based. The implementation of new technology is therefore not selecting the best solution to the technical problem, but finding the best solution for the disagreement of parties involved. This limits implementation of new technology.

In the field of psychology researchers found that increasing employees' self-confidence and clarifying their role in the firm are key points for process innovation. Innovation depends also on the ability of

employees to learn, operate and work with new technology. Implementation of new technology is often associated with dismissals of employees and therefore slow down this process.

Abstract models of process innovation are not very useful because managers are often not capable to translate the valuable information to practical situations. Therefore process innovation is limited by the restricted knowledge of the responsible managers. From innovation models found in literature can be concluded that a source is needed as an initiator for process innovation. The absence of sources like technological enablers, lack of performance in processes and resource opportunities logically hinder process innovation.

An example of a product innovation is an autonomous material handling system. The cost of material handling is a significant portion of the total production cost and therefore worthwhile to optimize. In this perspective there is no reason to not implement a technical innovation that reduces the cost of material handling. Implementation of autonomous robots affects more than the material handling system and is therefore more complex than other new production equipment. It is a trend that technical innovations need more and more knowledge and understanding. This complexity is limiting process innovation.

This literature assignment contains certain selected perspectives on process innovation found in literature. Process innovation is limited in different ways. From what is found can be concluded that the human factor is the most limiting for process innovation.