

## Chapter 2.20

# A Novel Practical Triangular Approach to Process Innovation: VDF Model

**Daniela Butan**

*University of Limerick, Ireland*

**Emma O'Brien**

*University of Limerick, Ireland*

**Mark Southern**

*University of Limerick, Ireland*

**Seamus Clifford**

*University of Limerick, Ireland*

### **ABSTRACT**

This chapter presents a novel Knowledge Management model - VDF (Variation Mode and Effect Analysis & Design of Experiments & Finite Element Analysis) for process innovation and efficient problem solving in enterprises. To date there is no practical unified tool that enables companies to switch from engineering chaos to a structured, sustainable process. Unlike process improvement the current method creates a multidisciplinary framework which promotes innovation into the

organizations processes. The VDF triangulated approach uses the company's tacit knowledge asset, convert it into explicit knowledge (through a Variation Mode and Effect Analysis) and it couples it with engineering scientific tools (Design of Experiments and Finite Element Analysis) to solve problems and innovate inside the organization. The unified model was validated through multiple company case studies one of which is presented in this chapter. The use of this model resulted in a robust, controllable, innovative process which could be sustained due to the development of key knowledge.

DOI: 10.4018/978-1-60960-783-8.ch2.20

## **THE NEED FOR A PRACTICAL APPROACH TO PROCESS INNOVATION FOR MANUFACTURING COMPANIES**

“Process creation is an innovation process that emphasises the need to design and redesign products in a way to match organisational needs with emergent technology” Zumd (1984). Its importance is founded in a study conducted by Yamin et al. (1997) that discovered that process innovation was the stronger predictor of performance over product innovation.

*“A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.” (OECD, 2005)*

Despite the perception that it does not provide significant economic benefits, process innovation is as important as product innovation to a company. Process innovation requires a significant amount of knowledge of the internal workings and processes of the company as well as potential machinery and technologies that can enhance the process.

Within companies engineers often feel that they have a thorough knowledge of their processes. However, this is often not the case, many times continuous problems in products such as a high rate of defects; low productivity and yield are due to problems with the production process and a lack of understanding of its capability and limitations. Often engineers spend time tweaking the process or machinery to try to address such problems which often result in new problems occurring. Taking the steps to innovate the process can often solve many of these underlying problems permanently, resulting in a more sustainable process.

To date the research in product innovation has been limited to the debate on which type of innovation is suitable for what type of companies and barriers to process innovation. There have

been few practical models to assist companies to adopt process innovation in a scientific, structured method. There are tools available to support process innovation however companies are often unaware of which tools to select based on their suitability, furthermore as a standalone these tools have their limitations.

Within companies process innovation is often chaotic, based on trial and error or instinct. The need for a practical approach to guide companies in the area of process innovation is long overdue.

As mentioned previously process innovation is greatly concerned with the knowledge of the internal processes of the companies, much of this knowledge is undiscovered and people are unaware that it is required. Thus it involves a large amount of knowledge creation is required. This chapter outlines a novel model for process innovation that brings together the existing tacit knowledge of all stakeholders in the process convert it into explicit knowledge and it couples it with engineering scientific tools to solve problems and innovate inside the organization.

The chapter will first discuss tools used in the process innovation and their limitations; it will then discuss a novel model that provides a practical approach to process innovation. It will then illustrate the successful use of this model using a case study.

## **2. EXISTING APPROACHES AND THEIR LIMITATIONS TO PROCESS INNOVATION**

There are plenty of tools that can be used to facilitate process innovation but companies are unaware what tools to select to ensure the maximum efficiency during process innovation. Some of the most common engineering tools that have been used to improve and optimise processes are:

- Variation Mode and Effect Analysis (VMEA)

14 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/novel-practical-triangular-approach-process/58122](http://www.igi-global.com/chapter/novel-practical-triangular-approach-process/58122)

## Related Content

---

### Corporate Governance and Values: Postulating a New Typology of Corporate Governance Systems Including Values

Supriya Banerjee and Mike Franz Wahl (2020). *Examining Cultural Perspectives in a Globalized World* (pp. 175-207).

[www.irma-international.org/chapter/corporate-governance-and-values/250060](http://www.irma-international.org/chapter/corporate-governance-and-values/250060)

### Governance of Hybrid Digital Ecosystems in Banking: A Comparative Analysis of Three International Digital Banks

Zyed Achour (2025). *Journal of Business Ecosystems* (pp. 1-14).

[www.irma-international.org/article/governance-of-hybrid-digital-ecosystems-in-banking/393060](http://www.irma-international.org/article/governance-of-hybrid-digital-ecosystems-in-banking/393060)

### Perspective of Policy Interventions in Rice and Cassava Value Chain Among Women in Nigeria

Elejo Grace Adejo, Olusola Jamiu Saliu and Patrick Emmanuel Adejo (2020). *Developing Sustainable Food Systems, Policies, and Securities* (pp. 127-150).

[www.irma-international.org/chapter/perspective-of-policy-interventions-in-rice-and-cassava-value-chain-among-women-in-nigeria/257938](http://www.irma-international.org/chapter/perspective-of-policy-interventions-in-rice-and-cassava-value-chain-among-women-in-nigeria/257938)

### Making Sense of Changes in Sports Practices Brought About by the Pandemic: The Case of Colombia

Juan D. Zabala-Sandoval, Andrés Gómez-León, Jaime H. Sierra-González and Iván D. Hernández-Umaña (2021). *Impacts and Implications for the Sports Industry in the Post-COVID-19 Era* (pp. 180-198).

[www.irma-international.org/chapter/making-sense-of-changes-in-sports-practices-brought-about-by-the-pandemic/278866](http://www.irma-international.org/chapter/making-sense-of-changes-in-sports-practices-brought-about-by-the-pandemic/278866)

### Engaging Customers and Managing Customer Relationships: Strategies and Initiatives

Pratap Chandra Mandal (2023). *Journal of Business Ecosystems* (pp. 1-14).

[www.irma-international.org/article/engaging-customers-and-managing-customer-relationships/322405](http://www.irma-international.org/article/engaging-customers-and-managing-customer-relationships/322405)