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## SOME ASPECTS OF PROCESS INNOVATION\*

Innovations have been the ultimate source of sustainable competitive advantage. The paper presents the classical Schumpeter's view on innovations. It clears the essence of process innovation, its benefits and costs, as well as outlines the most important elements in the industrial innovation field and the blockers for process innovation. Some studies on process innovation approach are also presented.

*Keywords: innovations, process innovation, industrial enterprise.*

**1. Introduction.** Nowadays there are many challenges that industrial enterprises face to maintain their competitiveness. Just running industrial operations effectively is not enough for the companies in the long term. Necessary condition to ensure competitive advantage is application of innovation and utilising innovativeness in new ways.

Innovation and company innovativeness have been a challenge and an object of research for the scientists for many years. One of the researchers who have been contributed in this respect is Joseph Schumpeter. He identified innovation as the critical dimension of economic change [17]. Schumpeter argued that economic change revolves around innovation, entrepreneurial activities, and market power. He sought to prove that innovation-originated market power could provide better results than the invisible hand and price competition. Schumpeter argues that technological innovation often creates temporary monopolies, allowing abnormal profits that would soon be competed away by rivals and imitators. He said that these temporary monopolies were necessary to provide the incentive necessary for firms to develop new products and processes [17].

The current paper presents the classical Schumpeter's view of innovation. It clears the essence of process innovation, its benefits and costs, outlines the most important elements in the industrial innovation field and the blockers for process innovation. The paper also presents some studies on process innovation approach.

**2. The classical view of innovation.** Schumpeter's view on innovation reflects his "methodological individualism", a term coined by him [12]. Whereas in the classical economists and Marx the whole shapes the parts, Schumpeter sticks to the view that the parts constitute the whole. He is also concerned with explaining

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*endogenous* economic and social change [22]. However, in his view it is not a systemic cause that keeps generating change from within the economic system, it is rather the existence of "a second type of economic action". In addition to the genotype of "hedonic" or "static" men and women there is the genotype of "energetic" or "dynamic" ones, which is much smaller in number and constitutes an "elite". The latter genotype is said to be the "*agens*" of economic development. If this type did not exist there would be no economic change, a proposition which the classical economists and Marx would in all probability have strongly contested [12].

According to some researchers the problem with Schumpeter's explanation is that it is unclear how the explanation of economic change could ever be endogenous, given the postulate that there is always a proportion of the population that represents "dynamic" agents whose interest consists *ex definitione* in revolutionizing the existing state of affairs, in building economic dynasties, etc [13, 19]. Once the cause of economic dynamism is given from the outside, only the course the system takes is endogenous. In this perspective the criticism Schumpeter levelled at Adam Smith that the latter conceived of economic change exclusively as a response to exogenously changing data, recoils on the Austrian [12].

Among the best known elements of Schumpeter's doctrine of economic change and innovation is his list of five types of "new combinations":

(1) The introduction of a new good – that is one with which consumers are not yet familiar – or of a new quality of a good.

(2) The introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially.

(3) The opening of a new market, that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before.

(4) The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created.

(5) The carrying out of the new organisation of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position [20].

Schumpeter considers innovation as a major weapon in the competitive struggle. He conceptualized technological change and the institutionalisation of research and development as an integral part of the development of industrialisation.

**3. Key definitions.** *What is a process?* A process is a specific ordering of work activities across time and place, with a beginning and an end, and clearly identified inputs and outputs: a structure of action [4].

*Business process* is a structured *set of activities* designed to produce specific outputs for internal or external customers or markets. It implies a strong emphasis on *how* work is done within an organisation, in contrast to product focus's emphasis on *what*. Further more business processes have cross organisational boundaries and they are generally independent of formal organisational structure [3]. *Activity* is a combination of people, technology, raw materials, methods and environment that produces a given product or service.

*Process Innovation* means performing a work activity in a radically new way. Process innovation is generally a discrete initiative and it also implies the use of specific change tools and technology for enterprise engineering and transformation of business processes [4]. Innovation is usually concerned with creation and development of new ideas and solutions. However innovation is not completed until its economic impact becomes apparent. Noori has compared process innovation with product innovation and studied relations between them [14]. So in the way of product innovation also process innovation must be "commercialised" before it is completed.

According to Oslo Manual a firm can make many types of changes in its methods of work, its use of factors of production and the types of output that improve its productivity and/or commercial performance. The Manual defines four types of innovations that encompass a wide range of changes in firms' activities: product innovations, process innovations, organisational innovations and marketing innovations.

*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.*

Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products.

Production methods involve the techniques, equipment and software used to produce goods or services. Examples of new production methods are the implementation of new automation equipment on a production line or the implementation of computer-assisted design for product development.

Delivery methods concern the logistics of the firm and encompass equipment, software and techniques to source inputs, allocate supplies within the firm, or deliver final products. An example of a new delivery method is the introduction of a bar-coded or active RFID (Radio Frequency Identification) goods-tracking system.

Process innovations include new or significantly improved methods for the creation and provision of services. They can involve significant changes in the equipment and software used in services-oriented firms or in the procedures or techniques that are employed to deliver services. Examples are the introduction of GPS tracking devices for transport services, the implementation of a new reserva-

tion system in a travel agency, and the development of new techniques for managing projects in a consultancy firm.

Process innovations also cover new or significantly improved techniques, equipment and software in ancillary support activities, such as purchasing, accounting, computing and maintenance. The implementation of new or significantly improved information and communication technology (ICT) is a process innovation if it is intended to improve the efficiency and/or quality of an ancillary support activity [15].

According to other authors process innovations can be divided into two broad categories: technological and organizational process innovations. The term "technological process innovation" refers to new products (such as new information systems) that are used in the production process, while "organizational process innovations" (such as new management accounting methods) are new ways of organizing business activities [5]. However, in practice the distinction between technology and organizational process innovations is often blurred, as the introduction of many new technologies is accompanied by changes in the organization of business activities [18].

Effective process innovation may enhance organizational efficiency and responsiveness.

**4. Blockers for process innovation.** It is remarkable how many ideas originating from the work floor have the potential to radically improve business processes. Unfortunately, these people are rarely asked to share their views, and, if they do, the ideas are often discarded by middle management as too radical or not worthy of consideration, and this can be used as an excuse for not asking for or contributing further suggestions [11].

In order to create an environment that will allow and encourage people to provide their innovative ideas, an organization must provide a trusting, caring organization where all personnel feel an ownership for the innovative process [11].

Trust is critical, and personnel must feel that they can trust their leaders and the environment in which they function. Caring is about respect and empathy for others, and ownership is about providing people with as much control over their own destiny as is possible [11].

The following syndromes are also often seen within organizations [11]:

- **“Around the edges”** syndrome – where the processes and associated people are treated like sacred objects: They cannot, or do not want to, discuss efficiency and effectiveness, or ask the tough questions. Executives keep “looking at the edges” of the problem and not at the heart – solving symptoms rather than the cause. For most of these organizations innovation is limited to bringing in new technology rather than addressing the fundamental issues.

- **“Black box”** syndrome – where executives see their processes as a “black box.” They don’t know the details, but somehow the processes produce outcomes.

The executives have a feeling that these processes may not be as efficient, or as effective, as they could be (quality and rework are not measured), but at least the processes work and the executives are afraid to change anything because change might disrupt these fragile “black box” processes, and fixing a problem is tough when you do not understand it.

The lack of process-centric middle management view can block new ideas reaching executive management, and stop new directions from executive management being fully understood and implemented at the working level [11].

#### **4. Benefits and costs associated with process innovations**

**4.1. Benefits.** Drawing from innovation adoption studies, a recent review of the literature has identified two approaches to categorize benefits associated with process innovation [1]. The first approach considers benefits depending on their strategic importance and differentiate between three categories [2]:

(1) direct benefits from the improved transmission of information and the resultant cost savings from reduced document handling;

(2) indirect benefits from improved efficiency within the firm, and improved relationships with suppliers and customers and

(3) strategic benefits relating to the ability to forge closer business links with customers and/or suppliers.

The second approach to classifying benefits considers the link between benefits and the focal firm adopting the innovation. This approach identifies two categories of benefits:

(1) first order benefits are related to the firm’s action and include (a) operational benefits such as lower transaction and production costs and (b) strategic benefits that result from changes in the buyer–supplier trading relationship and

(2) second order benefits incorporate the influence of factors beyond the control of the focal firm and relate to the outcomes that the innovation has had on the success of the focal firm relative to its competitors.

**4.2. Costs.** Drawing from existing studies of inter-organizational process innovation, recent work has developed a systematic framework for examining innovation costs [1]. The framework identifies six categories of costs associated with process innovation [2].

**Development costs** are incurred by organizations involved in the development of a process innovation (usually a form of IT) and result from participation in the elaboration of the technology. The development effort involves both the in-house development of a new process technology, and/or the effort involved in collaborative development, including membership fees for participation in standard development consortia. Utterback (1974) estimates that this early stage cost of originating and developing a successful innovation is about 15–30 % of the total cost of bringing the innovation into use [7, 2].

**Initiation costs** are borne by organizations that acquire a technology from external developers, and include the costs associated with building awareness of the innovation. With few exceptions, exiting literature generally ignores the effort involved in searching for and acquiring innovations. However, research has found that most of the ideas for innovations come from outside the firm, and a significant number of innovations (33 %) are wholly adopted from other firms. Consequently, searching for technical possibilities to meet existing needs, building awareness and learning about the potential of particular innovations are important activities that require time and effort and, therefore, must incur some costs [1, 2].

**Switching costs** are the costs arising from the need for compatibility between existing organizational and technological assets and a new technology. Switching costs have been identified as one of the key barriers to the adoption of innovations by researchers examining innovation from both economics and information system perspectives [2].

**The cost of capital** results from the uncertainty of any investment in innovation. Two types of uncertainty associated with investments in innovations have been identified [2]: (1) technological uncertainty, which reflects the risk that the investment will not meet its performance, time and cost targets. Hollenstein and Woerter (2008) distinguish between costs associated with technological (i.e. technical performance) and economic (i.e. time and cost) uncertainties [7]; (2) market uncertainty reflects the risks of negative reactions from supply chain partners and the general public.

**Implementation costs** are associated with acquiring and implementing an innovation, and include direct and indirect costs. Direct costs are readily attributable to the acquisition and operation of technologies, notably equipment costs, while indirect costs include organizational- and human-related costs. Human costs can be attributed to individuals and result from on the job training, management time and resistance to the new technology. Organizational costs arise due to changes in the existing practice to support the integration and assimilation of the new technology [2].

**Relational costs** are associated with the relational context in which the innovation is implemented. The relational context is important because the adoption of any process innovation that spans organizational boundaries requires the consideration of costs (and benefits) to be extended across all the partners involved in. Trust is one of the key relational variables that has been studied in the context of inter-organizational innovation adoption. Lack of trust among innovation partners has been shown to breed conflicts and tensions among potential adopters, increasing the costs associated with innovation adoption [2].

**Ethical costs** are costs associated with (1) privacy concerns and (2) health concerns regarding the use of technology [2].

**5. Industrial innovation field.** To emphasise the importance of innovative customer approach to business and manufacturing processes [16] outlines the *industrial innovation field* (see Figure). The four important innovation elements in the field have linkages and interdependencies between each other.

Linkages at this general level work in both directions, either as internal customers or suppliers to each other. In manufacturing companies the main stream runs in five relations: technology for processes, technology for products, processes for products, processes for customers and products for customers [16].

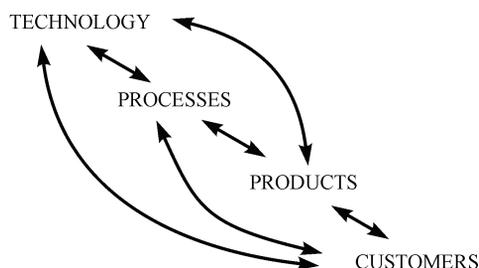


Figure. Industrial innovation field [16]

**6. Some studies on process innovation approach.** The need for systematic approach to innovation management is widely recognised in industrial innovation field [8]. This implies the need for supporting tools, methods and models at different management levels and even an innovation system for the whole company. In this section we should point out some studies on process innovation approach:

1) The model of gradually detailing process concept by Jensen and Westcott [10]. The contribution of this study was the development of process concept model and a structured approach for translating a manufacturing strategy into a set of tactical manufacturing innovation projects.

2) The process application of fusion model by Ishii and Ichimura [9]. The main finding of this proposed method is that it is possible to develop production design as a product characteristics deployment process, from the technical characteristics to the manufacturing characteristics. The use of fusion model stresses creation of something new or combining in a new way.

3) A case study of technology adoption, product design and process change introduced by Greis [6]. The case revealed that changes in product and process design will affect the technologies and operations of numerous organisations along the production supply chain.

4) The generations of industrial innovation is clarified by Sweeting and Davies [21].

1. Technology push: emphasis on R&D
2. Need-pull: emphasis on marketing, reactive R&D

3. Coupling model: emphasis on the integration of the R&D and marketing interface (push/pull combinations).

4. Integrated model: emphasis on integration between R&D and manufacturing (strong supplier linkages, design for manufacturability).

5. Systems integration and networking model: emphasis on corporate flexibility and speed of development (co-development with customers and suppliers).

Progress of industrial innovation requires readiness to handle all the more complicated structures also when assessing new process initiatives and projects.

### 7. Conclusion

Innovation offers a critical source of sustainable competitive advantage. A **process innovation** is the implementation of a new or significantly improved production or delivery method. Effective process innovation may enhance organizational efficiency and responsiveness.

The paper presented the classical Schumpeter's view of innovation. It cleared the essence of process innovation, its benefits and costs outlined the most important elements in the industrial innovation field and the blockers for process innovation. The paper presented some studies on process innovation approach which revealed gaps in the existing process innovation studies. Future studies should be focused on proposing models and instruments aiming at improvement the assessment of process innovation initiatives and projects.

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## **НЕКОТОРЫЕ АСПЕКТЫ ПРОЦЕССНОЙ ИННОВАЦИИ**

Инновации являются важнейшим источником устойчивого конкурентного преимущества. С точки зрения классической теории инноваций Шумпетера рассмотрена сущность инновационного процесса, его выгоды и издержки, блокаторы для него, наиболее важные элементы в промышленной сфере инноваций. Представлены некоторые результаты исследований инновационного процесса.

**Ключевые слова:** инновации, процессная инновация, промышленные предприятия.