Chapter 9
New Product Development Based on Knowledge Creation and Technology Education

Haris Papoutsakis
Technological Education Institute (TEI) of Crete, Greece

ABSTRACT
The aim of this chapter is to investigate if and to what extent the process of New Product Development, today, is based on Knowledge Creation and Technology Education. The value chain and the way it allows the company to achieve and sustain competitive advantage is used, in this chapter, in a way that facilitates the exploration of the relationship between technology and competitive advantage. This is done under the competence-based perspective of the organization, where knowledge is the point of departure and the individual – in this case the industrial employee – the relevant unit of analysis. With knowledge and knowledge creation being the reference point, their influence on new products and on the product life cycle has been investigated. The significance of the technology education background of each individual has also been examined in an effort to determine whether there is a need to strengthen Technology Education in existing national curricula. Surveys collected from 486 employees, of 51 industrial companies in Spain, were analyzed in order to test our hypothesis. The results of this study support our main hypothesis and allow us to draw conclusions on the significance of the relationship under investigation.

INTRODUCTION
The hypothesis under investigation in this chapter is that New Product Development (NPD), in the 21st century, is increasingly based on Knowledge Creation (KC) and Technology Education (TE).

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TE background in order to create new knowledge aiming to design innovative new products.

In this introductory section the concept of technological literacy is introduced, and the meaning of knowledge explored. Then the competence-based theory, the theoretical framework of this research, is put forward. The complementary dimensions of competencies and capabilities are extensively examined and the concept of fit is introduced. In the following section, the research enablers are introduced: the KC process is analyzed and TE and its relationship with industry are examined from an economic and industrial understanding perspective. In the third section, the value chain is used as a facilitator to approaching the NPD process. The impact of KC and TE in every phase of this process is discussed in the fourth section, both through the literature and a questionnaire-based survey. The study results are analytically presented, and finally, in the last section, our conclusions are presented together with some suggestions for future research.

**Technological Literacy**

In the modern organization, effective use of technology is considered among the key variables that drive competitiveness. Because technology is employed, to some degree, in every value creating activity, changes in technology can impact competitive advantage by progressively changing the activities themselves or by making possible new configurations in the value chain. Companies, in their desire to innovate, reduce cost and protect or sustain competitive advantage, often resort to changes regarding their production technology, lean manufacturing, internet marketing activities, customer relationship management, and other technological developments.

However, this investigation concerns not technology itself, but the technological literacy of the industrial employees. Dyrenfurth (1991) considers that technological literacy is a “multi-dimensional concept” and as such it is addressed, in terms of its curricular implementation, in subsection TE and Industry, in the following section. For Dyrenfurth, technological literacy is essential for everyone, while specific technical education only for those pursuing specific occupations. Modern organizations increasingly recognize the significance of TE in general schools, for reasons associated with the development of future employees.

**Knowledge**

There is no unanimity concerning the definition of knowledge. The difficulty in doing so originates in the very intangible meaning of the term: knowledge, wisdom, intelligence are concepts constantly revised and redefined as parts of cognitive psychology and the philosophy of science.

Davenport and Prusak (1998) underline that knowledge, data, and information, are not identical concepts. Knowledge transcends both data and information in a number of ways. It derives from information, in a similar way that information derives from data, via a transformation that takes place in and within persons. Von Krogh, Ichijo and Nonaka (2000) define knowledge as a “justified true belief”. When somebody creates knowledge, he or she makes sense out of a new situation by holding justified beliefs and committing to them. This interesting approach matches the perspective of this study. According to Sveiby (2001) this definition is building on Plato and arguing against the Descartian body and mind split. In previous works, Sveiby (1994, 1997) building on contemporary philosophers, Polanyi and Wittgenstein, defines knowledge as a capacity-to-act which may or may not be conscious. The emphasis of the definition is on the action element: A capacity-to-act can only be shown in action. Each individual has to re-create his or her own capacity to act through experience. The last two definitions provide ideal ground for approaching knowledge under the perspective of the investigation hypothesis.