



Analytical network process for software selection in product development: A case study

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Abstract

Application of software for manufacturing processes is one of the resolutions many enterprises have resorted to in the 21st century. This has been a result of increased complexity of products, globalization, rapid changes in technology and so on. The idea was that application of software especially for product development would increase the competitive advantage of industry nevertheless the irony has been that most of the investment in software has not achieved the expected results. We carry out a case study to introduce a methodology, the analytical network process as a multiattribute strategic decision making approach to help in the selection of appropriate software to suit the product development process of a particular product. © 2006 Elsevier B.V. All rights reserved.

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1. Introduction

According to a report by the MIT commission on industrial productivity, [Dertouzos et al. \(1989\)](#) asserted that the two major weaknesses hampering product development in America were seen as, technical weaknesses in development and production, and failures in co-operation (lack of teamwork). Globally, the later has been dealt with to a satisfactorily adequate level but the former has remained a problem for many enterprises despite the rapid increase of technology. [Clark and Fujimoto \(1991\)](#) reported that this could be associated with a number of factors like difficulty in designing for simplicity and reliability, disregarding competition, disregarding voice of customer, excessive development time, failure to incorporate quality in design phase,

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inadequate concentration on the product, slow decision making process and application of inappropriate technologies, a present dilemma.

Technology failures could be accredited to the existence of rival technologies, design problems and failure to provide adequate quality. Furthermore, efforts to deal with market obstacles and management for instance have gone a long way in materialization, however, despite improved manufacturing concepts like lean production, agile manufacturing, concurrent engineering and so on, the technology problem has become gross as a result of increased software technology. We have witnessed the mushrooming of software not because of differentiation in functionality but as a result of the variation in vendors, i.e. we have many software programs performing the same functions but branded different names giving the impression they are all different yet actually they are not. In a part solution to deal with this problem, we carry out a case study by introducing and illustrating how the strategic multiattribute decision approach the analytical network process (ANP) could be used to select appropriate software for the product development process of a specified product. We attempt to eliminate the illusion that general knowledge in purchasing software is sufficient but that rather a multicriterion, multiattribute strategic decision making approach would yield better performance in the selection criteria. In our case study, we considered the production of a pen.

2. Product development and realization process

A product can be generally described as something produced by human or mechanical effort or by a natural process. It could be a direct result or a consequence. However, we chose to view a product as a result or consequence of a combination of both human (the concept) and mechanical effort (design and manufacturing), catalyzed by natural resources (resources) in order to satisfy human needs. We thus highlight that the process of realizing a product commences and is based on trends of human needs. We then define product realization as the process by which a new product idea is conceived, investigated, taken through the design process, manufactured, marketed and supported through obsolescence. We can then comfortably define product development as the process entailing from the concept, through to the design, manufacturing and finally the launch of the product. However for purposes of this research, we emphasized product investigation, design and manufacturing considering that the concept phase would have already been dealt with by the time manufacturing software were required. Thus these three stages of product realization is what we shall refer to as the product development process (PDP). The idea is to select appropriate software to apply in the PDP in order to realize the desired product features for a new product (technology push). We can divide this procedure into two processes to ease analysis, the design phase and the production phase.

For the design phase, it is argued that motivation and analysis for a new product comes from watching the market changes, thus a feedback on existing products and customer comments are paramount. Customer surveys or focus groups of customers need to be periodically done to get a sense of where the market is heading and what product features the customers want. Like wise, the engineering department needs to be engaged in continual bench marking of competing products, processes and should be aware of product innovations. Production department should know what works well in manufacturing process. Sometimes simplification leads to more robust designs.

Usually a balanced product team to oversee this phase would be selected consisting of representatives from management, design engineering, marketing, metrology, product liability, production engineering, quality assurance and service. Ulrich and Eppinger (1995) suggested a project team should consider the following as target areas for successful product development

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