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A review of enterprise agility: Concepts, frameworks, and attributes

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Abstract

Existing knowledge about agile manufacturing (AM) and an agile workforce was reviewed in order to extend the concept of agility to the whole enterprise. The frameworks that describe other elements of the enterprise besides manufacturing, or contain attributes that could be applied to all enterprise structures were also included into the review. The review identified a large number of papers related to the AM. However, there was little empirical research done on the agile workforce and agile organization. This review identified the global characteristics of agility which can be applied to all aspects of enterprise: flexibility, responsiveness, speed, culture of change, integration and low complexity, high quality and customized products, and mobilization of core competencies. The need for further research in order to empirically establish and validate the attributes and indices of the agile workforce and agile enterprise has also been discussed.

Keywords: Agility; Agile manufacturing; Agile workforce; Agile enterprise; Adaptive enterprise; Responsiveness; Change

1. Introduction

The problem of how organizations can successfully deal with unpredictable, dynamic, and constantly changing environments has been a prevailing topic both in industry and academia for a few decades. Many different solutions have been proposed: networking, reengineering, modular organizations, virtual corporations, high performing organizations, employee empowerment, flexible manufacturing, just-in-time (JIT), etc. Among proposals of how to deal with an uncertain and unpredictable environment, the three notions of "adaptive organization", "flexible organization", and "agile enterprise" are the most predominant and popular. There are many different approaches to define each of these terms and there is much confusion and ambiguity concerning definitions and components of each of these concepts. Some authors make a sharp differentiation between those concepts while others use them synonymously. However, in general all concepts were considered as possessing the ability to adjust and respond to change.

Research on how organizations cope with uncertainty and change using the term "adaptivity", investigated how the organization's form, structure, and degree of formalization influenced the ability to adapt (Burns and Stalker, 1961; Hage and Aiken, 1969; Hage and Dewar, 1973). In the 1980s, the research was more focused on the organizational flexibility. Reed and Blunsdon (1998) describe organizational flexibility *as an organization's capacity to adjust it's internal structures and processes in response to changes in the environment*. The review of research on flexibility by Volberda (1996) and De Toni and Tonchia (1998) show that most of the definitions of the flexible organization emphasize the ability to adapt and respond to change. In the beginning of the 1990s, the new solution for managing a dynamic and changing environment emerged—agility. According to Gunasekaran (1999), agile manufacturing (AM) is the *ability of surviving and prospering in a competitive environment of continuous and unpredictable change by reacting quickly and effectively to changing markets, driven by customer-defined products and services*. Kidd (1994) defined agility as *a rapid and proactive adaptation of enterprise elements to unexpected and unpredicted changes*. The creators of "agility" concept at the Iacocca Institute, of Lehigh University (USA) defined it as: "A manufacturing system with capabilities (hard and

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soft technologies, human resources, educated management, information) to meet the rapidly changing needs of the marketplace (speed, flexibility, customers, competitors, suppliers, infrastructure, responsiveness)'' (Yusuf et al., 1999). Yusuf et al. (1999) proposed that agility is the successful application of competitive bases such as speed, flexibility, innovation, and quality by the means of the integration of reconfigurable resources and best practices of knowledge-rich environment to provide customer-driven products and services in a fast changing environment.

Despite the differences, all definitions of ''agility'' emphasize the speed and flexibility as the primary attributes of an agile organization (Gunasekaran, 1999; Sharifi and Zhang, 1999; Yusuf et al., 1999). An equally important attribute of agility is the effective response to change and uncertainty (Goldman et al., 1995; Kidd, 1994; Sharifi and Zhang, 2001). Some authors (Sharifi and Zhang, 1999) state that responding to change in proper ways and exploiting and taking advantages of changes are the main factors of agility. The next common component of published definitions of agility is a high quality and highly customized products (Gunasekaran, 1999; Kidd, 1994; Mccarty, 1993; Tsourveloudis and Valavanis, 2002).

As the brief overview of the agility definitions shows, this concept comprised both characteristics of adaptability and flexibility. It seems that these two terms represent the evolution of the idea of the organization or enterprise that is able to adjust. The agile enterprise/organization may represent the latest stage of development of this idea, which could combine all important notions from the adaptive and flexible organization concepts. Although, studies on agility utilize some ideas and practices related to the adaptive and flexible organization, many important developments on this topic from the organizational and management field were overlooked. In order to clarify the agility concept and to categorize the large diversity of strategies, techniques, and practices that are mentioned in the literature as components of agile enterprise need to have their origins investigated. In order to synthesize the agile enterprise concept, important knowledge related to managing the unpredictable and changing environment needs to be reviewed. Workforce adaptation and organizational flexibility that was conducted in such areas as industrial and organizational psychology or organizational development and behavior also is in need of review.

In this paper, the attempt was made to make an overview of the existing frameworks of AM and attributes of manufacturing, organizational, and workforce agility. For this overview, AM frameworks were selected that could be adapted or extended to the whole enterprise. Therefore, this review includes frameworks that encompass other elements and structures of the enterprise besides manufacturing, and contains attributes that could be used to describe not only manufacturing but also other enterprise structures. The literature on organizational flexibility and workforce adaptability was reviewed in order to select the ideas that could be utilized to create a comprehensive framework for agile enterprise. It was out of the scope of this paper to make a comprehensive review of all research and concepts related to the organizational flexibility or agility. The main goal was to identify the origins and theoretical background of some ideas implemented in the agile enterprise field in order to clarify the ambiguity of the concept, and categorize the large variety of concepts, strategies and practices described in the literature as a part of agility.

2. Adaptive and flexible organization

The idea of adaptive organization has originated from the contingency approach in organizational research. Contingency theories are classes of behavioral theory that state that there isn't one universal way of managing or organizing a company, and that the organizing style is dependent on the situational constraints of environment in which the company operates (Donaldson, 2001; Hatch, 1997; Vecchio, 2006). This view is based on the approach that treats organizations as open systems that have to interact with their environment in order to be successful. This in turn implies that organizations cannot be considered and analyzed in isolation of the environment. The main premise of the contingency theory is that organizational effectiveness can be achieved by fitting the characteristics of the organization to contingencies that reflect the situation of the organization (Donaldson, 2001). Thus, in order to maintain effectiveness, the organizations have to adapt over time to fit changing contingencies. The environment, organizational size, and organizational strategy are considered as main contingencies that shape the organization.

The investigation of the relationship between the characteristics of the environment and organizations determined two main types of the organizational design, structure, or form: mechanistic and organic (Burns and Stalker, 1961). The results showed that in relatively stable and predictable environments, the organizations tend to have a mechanistic design. This type of organization has highly hierarchical structure and formal management operation with centralized authority, large number of formal rules and procedures, precise division of labor, narrow span of control, and a formal means of coordination. The organizations that operate in the unstable, changing, and unpredictable environment usually have an organic design, which is less formal, less hierarchical, and less mechanistic. The organic design has a less precise division of labor, wider span of control, more decentralized authority, fewer rules and procedures, and more personal means of coordination. The main features of organic and mechanistic designs (Burns and Stalker, 1961; Hatch, 1997; Donaldson, 2001; Vecchio, 2006) are presented in Table 1.

The observation of an organization's operation in different environments showed (Burns and Stalker, 1961; Donaldson, 2001) that the hierarchical approach is most efficient in case of routine operation, and mechanistic