

# EVALUATING AND IMPROVING ORGANIZATIONAL AGILITY

DEFINITION, CRITIQUE AND NEW CONCEPTUAL FRAMEWORK

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*PURPOSE: prepare new methodology for agility with which organizations can respond to the business change drivers through new advanced technologies and procedures.*

***Design/methodology/approach:** in this paper is firstly presented main definitions and concepts of agility. Then, with literature review process on agility's models, main models of agility are determined to the further investigation. Following, some of critiques about agility are analyzed and finally, the step-by-step methodology is presented as a comprehensive and holistic approach to agility evaluation and enhancement. **Finding:** in this paper, holistic definition of agility, as well as step by-step method for agility evaluation and enhancement discovered and explored. **Originality/value:** because of environmental divers and need for achieving competitive advantage(s) through encountering challenges and opportunities, organizations need to be agile so that they can respond quickly (by attaining new and powerful capabilities) to changes in customers demands. **Implications and further investigation:** proposed methodology is based on literature review and need to be deployed in real life organization in order to gain validity.*

***Key Words:** Change, Agility, Literature review, Approaches, Conceptual framework.*

## Introduction

Uncertainty and change in the business environment have been a major topic in management research for a long time. Thompson (1967) stated that one of the most important functions for any organization is to manage uncertainties. Drucker (1968) described the concept of entrepreneurial task as the search for change, response to change, and exploitation of changes as opportunities. In existing era, many factors are pressing on organizations to get adaptability and flexibility about changes that occur in business environment. As Hayen (1988) has pointed out, there is nothing new about change. However, today's change is taking place at a much faster speed than ever. It is indicated that several environmental factors affect on organizational ability and performance and tend to change the existing mood of an organization. The first set of conditions or factors that have pressures on organization are the series of socioeconomic, financial and political changes that occurred in the last quarter of the twentieth century. Further drivers for change are Changes in cost and efficiency; The adoption of agile manufacturing and industries' best practices; A need to manage supply chains more efficiently; A market shift from standardization to differentiated products; New regulatory policies and/or government regulations; Changing societal concerns, attitudes and lifestyles; and; Changes in the degree of uncertainty. Therefore, to respond to the above changes, organizations need to be truly agile. As it can be observed in literature review, many agility models proposed for enhancement of responsiveness and flexibility, but none of them doesn't suggest practical methodology to agility evaluation and enhancement. Many of authors propose different concepts and components for agility and don't agree on agility implementation or evaluation process. Meanwhile, their proposed framework are mainly based on manufacturing area and don't present holistic and comprehensive approach to agility evaluation and improvement in other organizational context (such as service and public sector organizations). As a new framework, we suggest the best practical methodology, based on combining previous models and introducing new elements in order to promote organizational agility level. With this introduction, this paper has five sections. At the first, definitions of agility and agile manufacturing are discussed so that the basic concepts and insights of agility paradigm are explored. At section two, literature review on famous and known models and approaches to design, implement and enhance agility's practices is presented, which this will help managers to customize practices of agility in their organizations. Following, critiques on agility concepts and frameworks are present and then, we propose a practical methodology for agility

implementation, which is based on above models. Finally, some recommendations of agility implementation and enhancement will be presented to the managers and practitioners.

## Literature review

### Definitions and Drivers of agility

At the beginning of the 21st Century, the world faces significant changes in almost all aspects, especially marketing competition, technological innovations and customer demands. Mass markets are continuing to fragment as customers become increasingly demanding and their expectations rise. These developments have caused a major revision of business priorities and strategic vision (Sharifi and Zhang, 1999). Organizations have realized that agility is essential for their survival and competitiveness. Available literature on agility, scarce as it may be, has provided many conceptual overviews of its dimensions and has further conceptualized related elements. Also, a preliminary empirical assessment of management attention for agility is available to further indicate the relevance of the general agility concept as recognized by management (Naylor et al. 1999). Obviously, different facets of agility have been emphasized by various authors and this has led to varied views reflected in the literature. According to Gunasekaran (1999), agility 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. Kid (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 soft technologies, human resources, educated management, information) to meet the rapidly changing needs of the marketplace (speed, flexibility, customers, competitors, suppliers, infrastructure, responsiveness). Youssuf 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; Youssuf et al. 1999). An equally important attribute of agility is the effective response to change and uncertainty (Goldman et al. 1995; Kid 1994; Sharifi and Zhang, 2000). 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; Kid 1994). These definitions should be considered simultaneously in order to gain a better understanding of what constitute agility. In other words, although various definitions of agility are available in literature world, these definitions do not contrast with each other (in table-1, some of the best definitions of agility has been presented briefly). *We define agility as organizational ability to sense, perceive, analyze and respond to the changes that occur in the turbulent environment based on competency, speed, cost, quality, responsiveness, team building, virtual structure, participation, knowledge and learning and at the same time, exploit from those changes. Or we claim that agility is about using organizational infrastructures and abilities to respond to the changes in order to gain powerful capabilities.* If we want to recognize agility in practice, we need to divide it into three phases as drivers (changes), capabilities (abilities in the organization) and enables (organizational context).

**Table 1: Definitions of Agility**

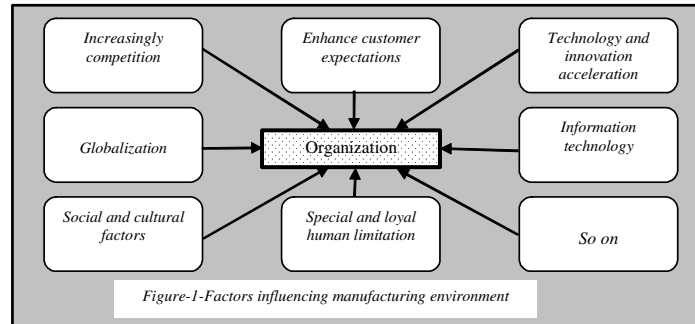
<b>Author(s)</b>	<b>Definition</b>
Iacocca institute (1991)	A manufacturing system with extraordinary capabilities (Internal capabilities: hard and soft technologies, human resources, educated management, information) to meet the rapidly changing needs of

	the marketplace (speed, flexibility, customers, competitors, suppliers, infrastructure, responsiveness).
Sharifi and Zhang (1999, 2000)	Agility is a basic ability for any organization that is sensing, perceiving and anticipating changes in the business environment. Also, Ability to sense, respond to, and exploit anticipated or unexpected changes in the business environment is called agility.
Maskell (2001)	Agility is the ability to thrive and prosper in an environment of constant and unpredictable change.
Vernadat (1999)	Agility can be defined as the ability to closely align organization systems to changing business needs in order to achieve competitive performance.
Helo (2004)	Agility is a capability of responding to change in a dimension beyond flexibility.
Goldman <i>et al.</i> (1995)	Agility, for a company, is to be capable of operating profitably in a competitive environment of continually and unpredictably changing customer opportunities.
Hormozi (2001)	Agile organizations are flexible and quick to respond to fast moving market conditions.
Dove (1996)	Agility is the ability to manage and apply knowledge effectively so that an organization has the potential to thrive in a continuous changing and unpredicted business environment.
Kid (1994)	To operationalise agility, it can be defined as ‘the synthesis of a number of enterprises that each have some core skills or competencies which they bring to a joint venturing operation thus enabling the cooperative enterprises to adapt and respond quickly to changing customer requirements.
Naylor <i>et al.</i> (1995)	Agility means using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile marketplace.
Power and Sohal (2001)	Agility means using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile marketplace
Youssuf <i>et al.</i> (1999)	Agility is the successful exploration of competitive bases (speed, flexibility, innovation, proactivity, quality and productivity) through the integration of reconfigurable resources and best practices in a knowledge rich environment to provide customer driven products and services in a fast changing market environment.
Prince and Kay (2003)	Ability to respond to sudden changes and meet widely varied customer requirements in terms of price, specification, quantity, qualify and delivery is called agility.

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Agility as a new paradigm for enhancing competitiveness has been widely researched since its inception in the early 1990s. The concept, in its various forms, is now recognized as a winning strategy for growth if not a basic one for survival in certain business environments. Agility implies not only the ability to respond to unanticipated change (responsibility) but also to act proactively with regard to change. You have frequently heard that if there is one constant, it is certainly change. Many researches place primary importance on the external changes. Nagel and Dove (1991) identified some of the key drivers that shape the future competitive environment of the twenty first century as information availability, technology acceleration, globalized market and competition, wage and job skills shifts, resource limitation, and increasing customer expectation. Sharifi and Zhang (1999) also classify changes as due to market, competitive, customer requirements, technological, and social factors. However, the definition of agility as the capability to react to unanticipated change raises the conundrum of not being able to define the

change a priori. Giachetti et al. (2003) argue that to deal with the unanticipated change, agility must be a structural property of the system. The importance and advantage of structural measures is they can be measured without predicting what change the system will encounter. Summarizing previous studies, Christopher (2001) identifies the general areas of business environment change as market volatility, intense competition, changes in customer requirements, accelerating technological change, and change in social factors. *In sum, it can be concluded from above that the main drivers of agility are increasingly competition, enhancing customer expectations, technology and innovation acceleration, globalization, social and cultural factors, market variability, information technology, special and loyal human resource scarcity or limitation, and so on (Figure 1).*



Dove et al. (1996) was one of the first to discuss agility as the capability of a process to respond to the unanticipated change. He defines agility as the ability to manage and apply knowledge effectively so that an organization has the potential to thrive in a continuous changing and unpredicted business environment. Sarkis (2001) express that the concept of agility is in the process of being defined by both practitioners and researchers. Even a number of definitions for agility have been posited within the last few years, a common thread focuses on being able to function and compete within a state of dynamic and continuous change. The concept of agility is one of the few domestic industrial visions that have been developed (Sarkis, 2001).

Agility has further been described by Goldman et al. in the book “*agile competitors and virtual organizations*” (1995) as dynamic, context-specific, aggressively change-embracing and growth oriented. From this point of view, agility entails a continual readiness to change (sometimes radically) and there is no time when a company has completely fulfilled the goal of being agile. According to above definition, Agility is context-specific in that differences among markets limit the generalizability of detailed rules for becoming agile. Agile firms embrace change as they understand not only their current markets, product lines, competencies and customers, but also understand the potential for future customers and markets and the necessity of changing to meet those opportunities.

According to Youssuf et al. (1999) agility is the successful exploration of competitive bases (speed, flexibility, innovation, reactivity, quality and profitability) through the integration of reconfigurable resources and best practices in a knowledge-rich environment to provide customer-driven products and services in a fast changing market environment.

According to the literature, characteristics of agile manufacturing are as following: Delivering value to customers, being ready for changes in terms of market and technologies, and Prospering from the turbulent environment emerging (Helo, 2004). Maskell suggests the most important aspects of agile manufacturing as customer prosperity, people and information, cooperation within and between firms, and fitting a company for change (Maskell 2001). Some other authors also identify critical elements of real agile manufacturing as strategic processing, core competencies, multiple winners, integration, and information technology.

### Agility models and approaches

Agile organization has been advocated as the 21st century's organization paradigm, and is seen as the winning strategy to become national and international leaders in an ever increasing competitive market of fast changing customer requirements (Youssuf et al. 1999). However, the ability to build agile organization and enhance it has not developed as rapidly as anticipated, because the development of technology to manage agile organization is still under way (Sharp et al. 1999). Thus, in embracing agile organization many important questions concerning agility need to be asked, such as what precisely is agility and how can it be measured? How will organizations know when they have it, as there are no simple metrics or indices available? How and to what degree does the organization's attributes affect companies' business performance? How to compare agility with competitiveness? If a company or organization wants to improve agility, how can it identify the principal obstacles to improvement? How to assist in achieving agility effectively? Answers to such questions are critical to the practitioners and to the theory of agile organization design. To assist managers in better achieving an agile organization, there have been numerous studies dedicated to design, implement, determine, and improve the agility of an organization. In this section, we introduce some of the best and famous models of organizational agility so that the practical methodology of agility implementation process can be developed based upon them.

**Goldman et al. approach:** researchers believe Goldman, Nagel and Preiss (1995) are among the first ones permeating the agility concept in the business world by introducing basically it to practitioners and managers in order to respond successfully to the changes. They identified four key dimensions of agile organization. The first dimension is enriching the customer. This entails a quick understanding of the unique requirements of each individual customer and rapidly providing it. The second dimension entails co-operation (intra-organizational, interorganizational co-operation such as supplier partnerships and perhaps emerging virtual relationships with competing organizations) in order to enhance competitiveness. The third dimension utilizes new organizational structure(s) to master change and uncertainty through techniques such as concurrent engineering and cross-functional teams. The fourth dimension leverages the impact of people, information and technology and recognizes the importance of employees as a company asset, placing greater emphasis on education, training and empowerment.

**Meredith and Francis model:** Meredith and Francis (2000) have proposed the 16 dimensional reference model for implementing agile manufacturing with main components such as strategy, linkages, people, and processes (Figure 2). This reference model provides a tool with which to audit each company on its degree of agility and provides an integrated definition of the components of agility. The reference model is presented in the shape of a wheel to demonstrate that its components are interdependent. A wheel is weakened if any spoke is absent, broken or fragile. It is the same with agility. That is, if any of the 16 components is under-developed, then the firm's agile capability is weakened. In sum, the purpose of the wheel is to assist managers to audit the agile capability of their firms, identify agility blockages and develop a focused development plan.

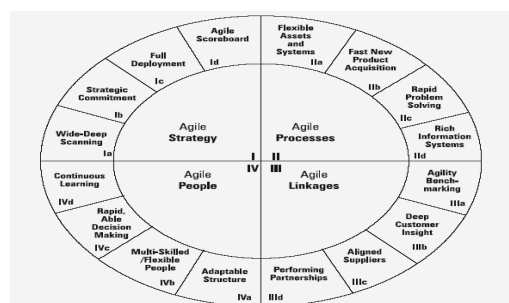
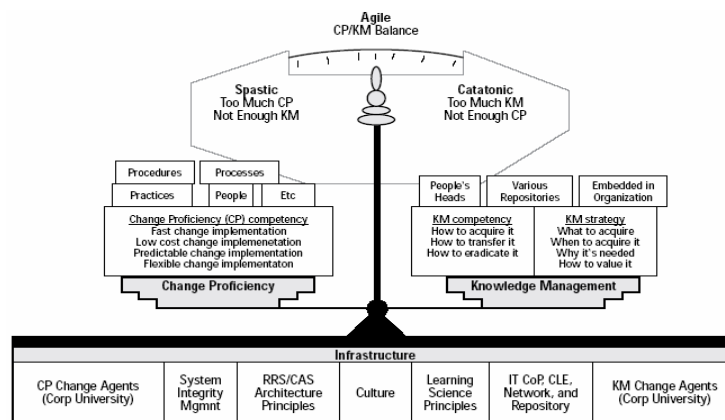


Figure-2- reference model of agility (Meredith and Francis, 2000)

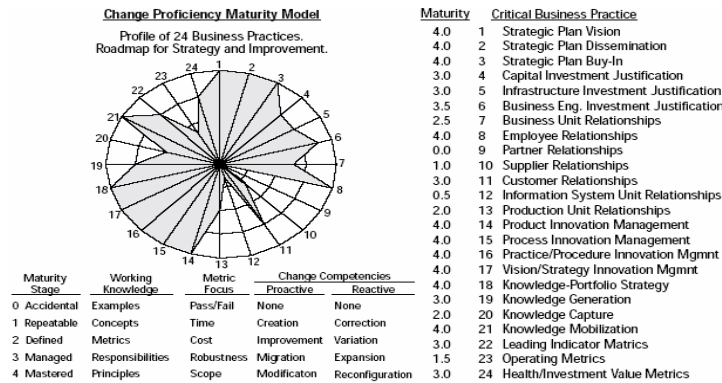
**Figure 2: Reference Model of Agility (Meredith and Francis, 2000)**

**Dove’s model:** Dove (1999) prefers to define agility succinctly as the ability to manage and apply knowledge as well as master to change proficiency. Though both knowledge management and change proficiency are still immature practices, dove (1999) feel a sufficient foundation exists to guide an organizational engineering project to success. Figure-3- attempts to represent the key relationships and dynamics our investigations have revealed so far. In this model, infrastructure of agility are System Integrity Management, corporate university change agents, RRC/CAS architecture principles, culture, learning science principles, IT, network and repository, KM change agents. As you see in following model, agility has two sides: change proficiency and knowledge management. At the left hand, processes, procedures and people of change proficiency are place on. Ant the right hand, competency and strategy of knowledge management are place in order to acquire, transfer, store and use of knowledge. According to Dove (1999) agility is achieved when change proficiency and knowledge management are balance.



**Figure 3: Agility: Knowledge Management and Change Proficiency (Dove 1999)**

Dove et al. (1996) define an agile enterprise as one that is broadly change-proficient; i.e., it exhibits competency at causing and dealing with change in the important competitive business practices of its business sector. According to them, there are three key concepts involved in this definition: change proficiency, critical business practices, and competency assessment. Sponsored by the Agility Forum, Dove et al. (1996) design a reference model structure that effectively captures and displays the essence of enterprise-wide competency at both proactive and reactive change (Figure 4). The reference model spans 24 interrelated critical business practices in 6 categories: strategic planning (3), business case justification (3), organizational relationship management (7), knowledge management (4), innovation management (4), and performance metrics (3)<sup>1</sup>. The seven organizational relationships focus on business units, employees, partners, suppliers, customers, information systems, and production systems. Each of the 24 practices is presented in a 3–5 page structure that provides: a generic definition, the framework and modules of a case-study practice that fits that definition, a set of generic proactive and reactive change issues, case-study responses for each issue, and finally, a change proficiency maturity synopsis that evaluates and displays the competency of the case example using the recently developed Change Proficiency Maturity Model (Dove et al. 1996). Figure 4 shows the change proficiency maturity profile for Remmele Engineering Corporation.



**Figure 4: Change Proficiency Maturity Profile for Remmele Engineering (Dove et al. 1996)**

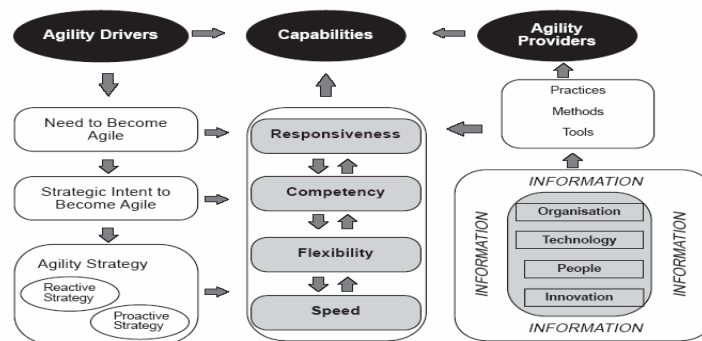
A five-stage maturity model framework was recently developed as a tool to assess existing corporate competency at change proficiency, as well as to prioritize and guide an Agility transformation or improvement strategy. The framework is based upon a progression through five stages of working knowledge and strategic focus for practices and procedures, with separate competency tracks for both proactive and reactive proficiencies. The framework is used to build a Change Proficiency Maturity Model for a specific business practice. They focus on change proficiency as a necessary and fundamental enabler for the agile enterprise. They also recognize that an agile enterprise can be as simple as a portfolio management company that constantly reshuffles the in-agile resources it controls, or as complex as a vertically integrated organization concerned about the Agility of each of its operating units, which in turn are concerned about the Agility of each of their key business processes. Complexity aside, all enterprises have frequent occasion to weather change, and each does so with its own degree of proficiency, or lack thereof. Some deal with each event as they come, some learn naturally from each event and get better at the next change, and some recognize competitive value in mastering the process of change.

Dove et al. (1996) do not gauge a company’s progress toward timeless mastery at change proficiency by accumulating points for practices like teaming, mass customization, virtual partnering, integrated product/process development, and other such very important concepts of the day. Instead, we look for more fundamental capabilities that allow a company to adopt and integrate whatever operating concepts are important today as well as those yet undefined that will become important tomorrow. Implementing today’s competitive practices says nothing about the ability to implement tomorrow’s.

**Ramesh and Devadasan model:** Based on twenty agile manufacturing (AM) criteria, Ramesh and Devadasan (2007) concluded that agile manufacturing is function of flexible and lean manufacturing systems. They believe various definitions of agile manufacturing are not contrast with each other. But commonality among most of them is the enunciation that AM is the ability of manufacturing enterprise to quickly respond to the market requirements. Thus, AM calls for radical changes in the system, culture and management styles being currently followed in traditional manufacturing environment. They introduced twenty criteria on agile manufacturing as organizational structure, delegation of authority, manufacturing set ups, status of quality, status of productivity, employee’s status, employee participation, nature of management, customer response adoption, product life cycle, product service life, design improvement, production methodology, manufacturing planning, cost management, automation type, information technology, integration, change in business and technical processes, time management, and outsourcing. Then, they designed the procedure to attain and enhance agility in organizations, which some the most important phases of theirs model are top management

support and commitment, organizational structure study, study the existing practices with reference to twenty agile criteria and estimate the deviations, identify and implement vital few activities eventually, expand implementation based on the impact, analysis the result of implementation.

**Sharifi and Zhang methodology:** In developing a model for achieving agility in manufacturing organizations, Zhang and Sharifi (2000) used three elements. Elements of their model are: (1) Agility drivers which are the changes/pressures from the business environment that necessitate a company to search for new ways of running its business in order to maintain its competitive advantage; (2) agility capabilities which are the essential capabilities that the company needs in order to positively respond to and take advantage of the changes; and (3) agility providers that are the means by which the so-called capabilities such as could be obtained (practices, methods, tools, techniques facilitating a capability for agility). As a result of surveying 1,000 companies, and conducting case studies in 12 of them, they concluded that practices related to people and organization issues were both more effective and important for manufacturers. They also found that the Internet, mass-customization and virtual organizations were only used by a small percentage of respondents, and usually only partially (Power and Sohal 2001). Figure 5 presents conceptual model of agility implementation from point Sharifi and Zhang view.



**Figure 5: Conceptual Model of Agility Implementation (Sharifi and Zhang 2000)**

As changes and pressures faced by companies may be different, the degree of agility required by individual companies will be different. This degree is defined as the “agility need level”, which is a function of various factors such as turbulence of the business environment, the environment that the company competes in, and the characteristics of the company itself. Once the agility need level is determined for a company, the next step is to assess the current agility level of the company, i.e. how agile the company is now. The difference between the level of agility required and that the company already has may then be analyzed to provide a basis for further decision making. The next stage following the analysis of agility needs is to determine the required agility capabilities in order to become agile. This would require the detection, recognition and classification of changes faced by the company, as well as the analysis of the impact individual changes will bring to the company. The agility capabilities required may then be determined from the changes. The final stage in the methodology involves identifying agility providers that could bring about the required capabilities, implementing the identified providers, determining the level of agility achieved (through performance measurement), and formulating corrective measures to further improve the performance. A number of tools are being developed to assist manufacturing enterprises to carry out the above process, which have already been discussed. In sum, Sharifi and Zhang (2000) have proposed a methodology to examine the business environment of the company, determine the level of agility needed by the company, speculate on the strategic alternatives available for the company to pursue, determine the abilities of the



company in response to unpredictable changes, determine the capabilities and priorities in implementing the capabilities required by the company to respond to changes (according to the specific circumstances surrounding it), identify the practices that could support the company's approach towards agility.

**Gunasekaran, Youssuf and Sarhadi model:** As we mentioned in definitions of agile manufacturing part, Youssuf et al. (1999) have identified core concepts of agile manufacturing as core competence management, knowledge structure, virtual organization, and capability for reconfiguration (Figure 6). They propose three parallel steps to base competitive position in order to achieve agility: metrics, agility attributes and pathways or obstacles. Gunasekaran (1999) has proposed a conceptual model for the design of agile manufacturing systems based on the four key dimensions of strategies, technology, people and systems. He notes that most of the literature in this area focuses on strategies or techniques, but there is little or no focus on the integration issues. He also states that there is a lack of empirical studies testing hypotheses based on theory in this area.

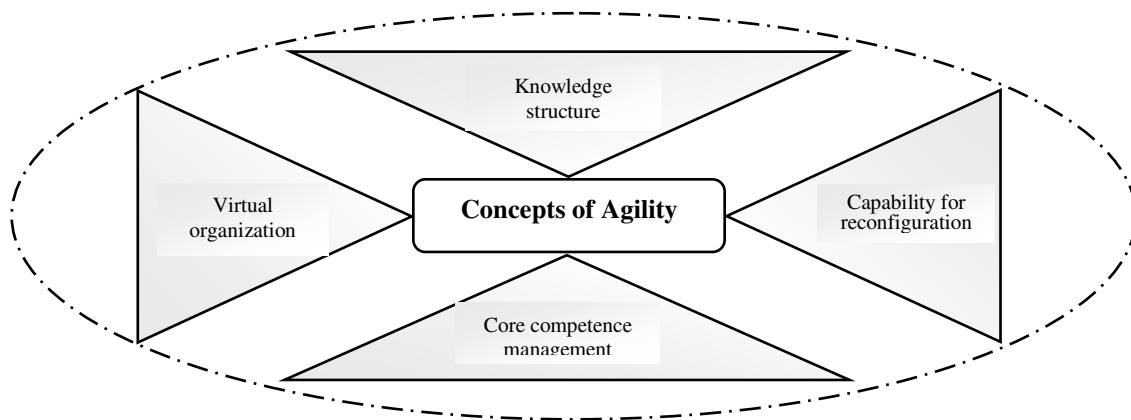


Figure-6- core concepts of agility (Gunasekaran et.al, 1999)

### Figure 6: Core Concepts of Agility (Gunasekaran et al., 1999)

Youssuf et al. (1999) have stated that an agile organization must develop a strategic plan to launch new products in succession. Launching a single product hastily without a follow-up could be counter-productive. According to them, collectively literature reviews provide insights to what constitutes agile practices and attributes of an agile organization. As mentioned above, attributes of agility are integration, competence, team building, technology, quality, change, partnership, market, education and welfare. Competitive bases, the pathways and obstacles to achieving these attributes are important issues for consideration if progress is to be achieved in moving towards agility. Also important is the metrics for the processes that are required for achieving agility.

**Youssuf and Crocitto model:** Youssuf and Crocitto (2003) have presented a human based model of organizational agility. They decided to expand on existing models of organizational agility by incorporating the role of people, advanced manufacturing technology, and organizational characteristics in organizational success; especially in the delivery of quality products and services. Their model emphasized on elements such as *leadership, culture, information technology, organizational memberships, suppliers, customers, and reward system* as fundamental aspects of agility. They suggest that above generic or human factors, along with advanced manufacturing and information technologies, can enhance flexibility and responsiveness of company gaining the agile manufacturing in the context. Then, if company

reinforces capabilities such as quality, cost and speed, is can achieve agility in the turbulent environment (Figure 7).

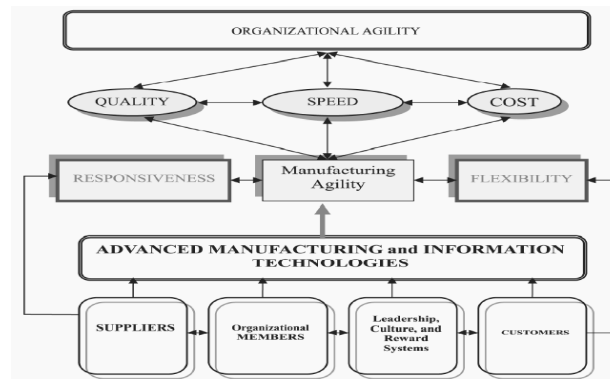


Figure 7: Human side of Organizational Agility (Youssuf and Crocitto 2003)

**Chin-Torng Lin et al. model:** According to Lin et al. (2005) the purpose of agile organization is to enrich/satisfy customers and employees. The main driving force behind agility is change. Even through change is nothing new; today’s change is taking place at a much faster speed than ever before. Turbulence and uncertainty in the business environment have become the main causes of failure in the manufacturing industry. The number of changes and their type, specification or characteristic cannot be easily determined and are probably indefinite. So, they have developed a model containing four aspects to be truly agile. The first aspect is that customer requirement, competition criteria, market, technology, and social factors are changing competition in business environments (Agility drivers). In the second aspect, agile organization tries to Enrich and satisfy customers based on elements such as cost, time, function, and robustness. Agility capabilities included in the third aspect are flexibility, quickness, responsiveness, and competency. Finally, to be agile, organizations need to reinforce the agility enablers/pillars such as integration, competence, team building, technology, quality, change, partnership, market, education and welfare by leverage people and information technology (Foundation), master change and uncertainty (Control), and collaborative relationships (Strategy). However, these enablers have been presented earlier by Youssuf et al. (1999). See Figure 8.

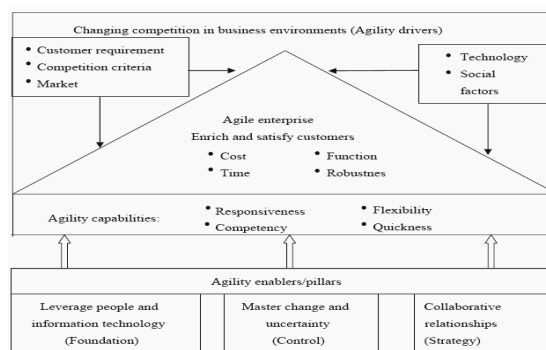


Figure 8: Conceptual Model of Agile Enterprise (Torng Lin et al. (2005)

### Critiques on agility paradigm

Organizations have realized that agility is essential for their survival and competitiveness. As mentioned before, available literature on agility has provided conceptual overviews of dimensions and has further conceptualized related elements. Obviously, different facets of agility have been

emphasized by various authors and this has led to varied views reflected in the literature. Despite the differences, all definitions of agility emphasize the speed and flexibility as the primary attributes of an agile. Thus, There is no commonly accepted definition of agility, and there are a large number of opinions concerning the meaning of this term. The term of agility is used in the research on how organization can cope with unpredicted and dynamically changing environment. An equally important attribute of agility is the effective response to change and uncertainty as Dove (1996) believe that agility is equal to knowledge management and change proficiency. Also, there is large number of publications on agility that are concerned with the specific strategies, techniques, and manufacturing and/or management practices. There is also a vast number and variety of strategies, techniques, and manufacturing and/or management practices described as a part of the agile enterprise. Only a few studies address the conceptualization and development of an integrated view of the agile enterprise concept. Although, some agility frameworks make an attempt to present a more integrated and holistic model, it still presents a view mostly focused on production and the technological aspects of enterprise. Moreover, most agility related publications are focused on the theoretical descriptions of agility and agility frameworks, mainly in manufacturing context. Only few of those metrics and frameworks were investigated in empirical research (Sherehiy and et al., 2007).

Two main approaches to understanding and defining agility have been distinguished among reviewed literature. The first approach is a very broad and imprecise concept that encompasses all definitions and description of various practices and technologies that have been implemented in industry during last two decades. For example, Youssuf et al. (1999) stated that agility is the synthesized use of the developed and well-know technologies and methods of manufacturing. This view is supported by Goldman et al. (1995), who describes AM as the assimilation of all flexible production technologies, together with experience gained from total quality management (TQM), "JIT" production, and lean production. Thus, according to this approach, agility is mutually compatible with lean manufacturing, CIM, TQM, materials requirement planning II (MRPII), JIT, and employee empowerment. Conversely, Gunasekaran (2002) also noted that AM is not lean, or flexible manufacturing, or CIM. To clarify the differences between the AM and current practices, Sanchez and Nagi (2001) stated that the lean manufacturing is a collection of operational techniques focused on productive use of resources, whereas agility is an overall strategy. Those authors contrast agile and flexible manufacturing in reference to the type of adaptation: flexible manufacturing is reactive adaptation, while agile is proactive. According to Tsourveloudis and Valavanis (2002), the flexibility is a capability of the whole factory to change from one task or production route to another, and agility is a strategic ability of the whole enterprise to adapt to unpredicted and sudden changes in the market.

The second approach to agility is much more narrow and focused. In this approach, the main emphasis is placed on the ability of rapid adaptation; however, it is not simply the speed of response. Agility is a rapid and proactive adaptation of enterprise elements to unexpected and unpredicted changes, and represents a new and radically different manufacturing business model. Enterprise elements are the goals, objectives, technology, and organization. It has been argued that since most of currently applied and well-known practices are not adjusted well to uncertainty and unpredictability of the dynamically changing business environment, those methods cannot be included into the concept of agility.

The development of an agile organization framework presents a serious challenge. First of all, the agility concepts are not yet clearly defined and conceptualized. Although the main and most important attributes of agility have been identified, those attributes are supposed to be applied to such complex structures as an enterprise. It has been proposed in the literature that, in reference to agility, the following components of the enterprise are most important: organization, people, and technology. Each of these elements is multidimensional and complex itself. Thus, numerous agility related concepts, practices and characteristics proposed in the literature can be summarized and classified in two main ways. First, it can be classified into groups according to the adherence or relevance to the main attributes of the agility. In the reviewed literature, a large diversity of agility

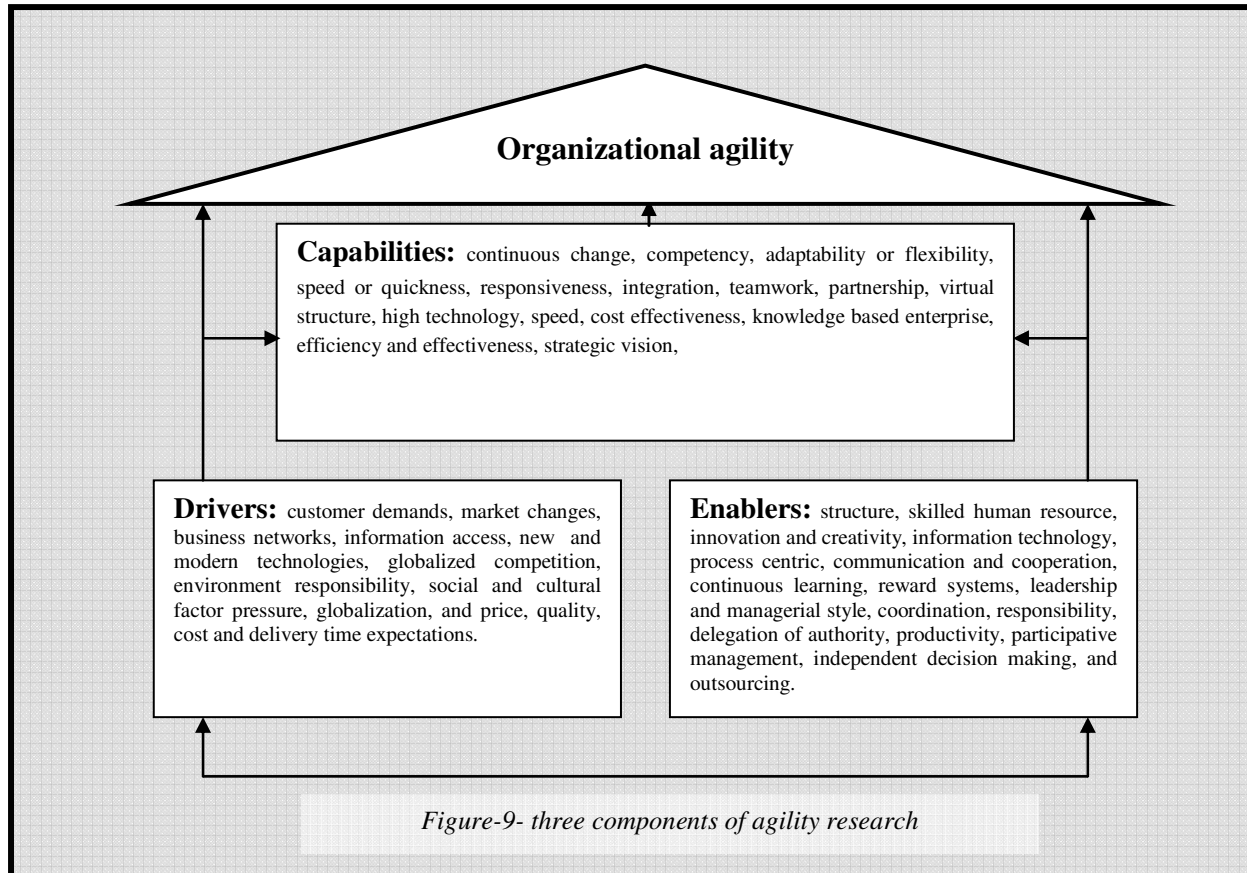
attributes has been identified. Based on the review, the following main attributes for an agile enterprise can be distinguished: (1) flexibility and adaptability, (2) responsiveness, (3) speed, (4) integration and low complexity, (5) mobilization of core competences, (6) high quality and customized products, and (7) culture of change. Table provides the summary of concepts related to the main attributes and characteristic of agility. It should be noted that among those attributes, the core and global characteristics of agility that can be applied to all aspects of enterprise include flexibility, responsiveness, quickness, culture of change, integration, and low complexity. These core characteristics should be reflected in most important aspects of enterprise: production/service, organization, and workforce. Flexibility is considered as the ability to pursue different business strategies and tactics, to quickly change from one strategy/task/job to another. The strategies should be of course different in some reasonable extent, which will not endanger the integrity and main mission of the enterprise. Responsiveness is an ability to identify changes and opportunities and respond reactively or proactively to them. The term “culture of change” is a description of environment supportive of experimentation, learning, and innovation and is focused on the continuous monitoring environment to identify changes. Culture of change is an environment where people on all organizational levels have positive and fearless attitude to changes, different opinions, new ideas, and technology. In order to respond to changes the management and workers at all levels have to continuously scan the business and work environment to identify changes and opportunities related to customers, suppliers, and competitors that may be exploited by the enterprise. The market and business environment have to be monitored in order to determine new technologies, practices and methods of production, management, and organization that can be used by the enterprise to successfully respond and adapt to the changes. The speed is ability to complete requirements of all other agile characteristics in shortest possible time. The ability to learn, carry out tasks and operations and make changes in shortest possible time. The integration and low complexity dimension is defined as close and simple relations between the individual system components, easy and effortless flow of the materials, information and communication between the system components, organizational structures, people, and technology. The described general attributes have to be translated into specific indices for each of the main enterprise structure: organization, workforce, technology, and operations.

The other classification of agile organization concepts and characteristics is based on their adherence to the enterprise structures. The global agility attributes can be established as goals for the high-level management and are applicable to whole enterprise. Starting from these general goals of agility, the more specific sub-goals and the means to achieve them could be derived. The more specific goals and ways to achieve them would depend on the specificity of the each particular enterprise. However, at the highest and global level of the enterprise can be established few domains that should be the main focus for enterprise while trying to achieve agility. These main domains are focus on customer satisfaction; cooperation, learning and knowledge management, and development of culture of change.

### **Organizational agility framework**

As you saw in literature review section, Agility as the term is the ability of an organization to respond quickly and successfully to the changes and also exploit them. Hormozi (2001) acknowledges that successful implementation of agile manufacturing requires changes in five areas as government regulations, business cooperation, information technology, reengineering, and employee flexibility. Sharifi and Zhang (2000) state that any organization firstly should identify agility level need it based on agility drivers' identification. To determine the current level of agility the organization has, capabilities of organization to respond the changes occurring in the turbulent environment is assessed and determined what capabilities the organization lack. After determining agility level the organization needs and the level of agility it has, strategic intent to become agile is necessary and then strategy development and formulation is started. By determining current and desired level of agility, as well as strategic planning, the providers help the organization to enhance existing abilities and capabilities are specified and promoted. In this section we are going to develop a practical methodology for agility's practice implementation in any organization. Indeed, as you have

seen and recognized in above materials, researchers suggest three main phases to agility. Those are agility drivers, agility's capabilities, and agility enablers or providers. *Researches have introduced many factors about drivers, capabilities, and enablers in the field. Here, we combine those elements to form new and complete model of organizational agility areas. Figure-9-shows this model.*



As you know, the aim of this paper is to prepare a conceptual model for agility evaluation and enhancement to respond rapidly to the changes in the environment. In other words, we are going to combine previous models and approaches to propose step-by-step methodology upon which organizations can improve their performance based on agility. In literature, previous models and methodologies don't prepare any step by step process for agility implementation (except somehow Sharifi and Zhang (1999) model). Although those models indicate three part of agility as drivers, capabilities, and enablers but don't agree on elements of these basic parts. Furthermore, steps such as strategy formulation, public and special environment consideration, performance measurement process, and developing action plans sometimes aren't clearly identified and stated. As you saw in agility approaches section, authors have stated many different definitions for agility concept and don't have agreement about defining it. We define agility as an organizational ability to respond to the business drivers using enablers in order to gain useful capabilities. In summary, main characteristics of this methodology than previous models are:

1. This model has step by step and systematic approach and guides organizations to implement easily and successfully.
2. Internal drivers of change is considered and determined in this model
3. Many factors, capabilities and providers have been identified in this model

4. Strategy formulation and action plans are highlighted in order to move away from current state to desired state.
5. After given period, it is needed to be measured performance (or level of agility that organization has gained) to re-analysis conditions and design improvement initiatives.
6. Some agility frameworks make an attempt to present a more integrated and holistic model, it still presents a view mostly focused on production and the technological aspects of enterprise, but, this model can be applied to any organization (whether profit, nonprofit, service, public and private).

Figure10 presents the practical methodology of organizational agility measurement and enhancement. Based on below presented model, any organization needs to analyze the dynamic or static state of organizational environment (as a first stage). Through considering mission and vision statement, goals and objectives, policies and procedures, rules, market change, liquidity flow, strategies, structure, business processes, and so on, it can be carried out by managers and employees. This work is done for determining the factors that cause the internal and external environment is varied.

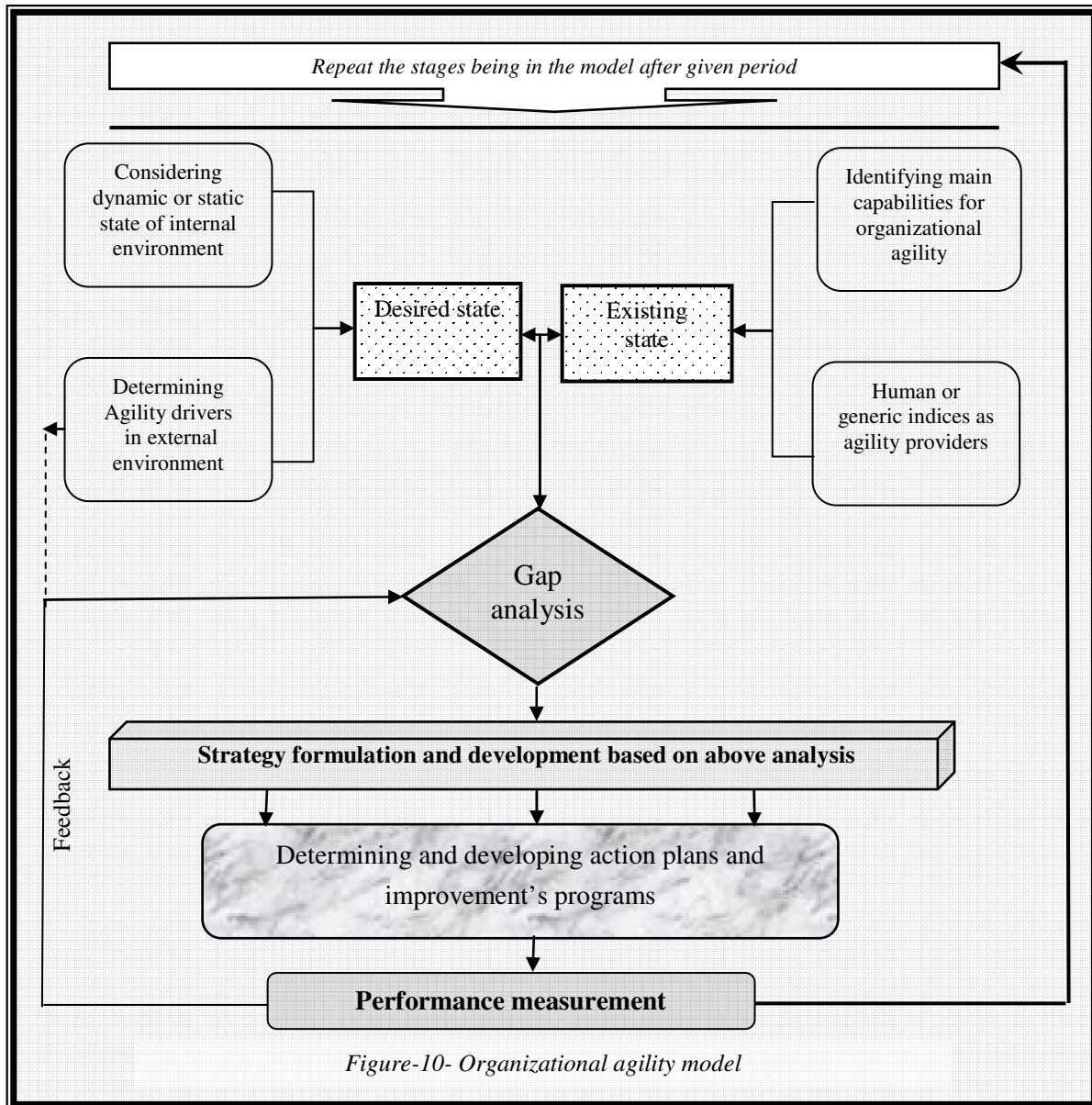


Figure-10- Organizational agility model

At second stage, it is important to be determined the drivers that press on organization to change or challenge the organizational life and survive. These are factors such as market environment's changes, level and intensity of competition, competitor characteristics; customer need, social and cultural factors, intra-organizational context, technology and innovation, globalization, environmental responsibility, and so on. Therefore, organizations need to determine quickly and successfully agility's drivers as they face with these factors and survive and life of them is being challenged. Results of this and previous stage can be placed into SWOT analysis model. In this place, organization should determine the level of agility they need to respond change or pressures. The level of agility needed for an organization is considered to be equivalent to the degree of turbulence of the business environment of the organization. The business environment is, as explained before, broken down into factors which are agility drivers, and for each a number of sub-factors are introduced which form the basis for designing the assessment questionnaire. The questions basically address the degree of turbulence of each sub-factor for the organization (Sharifi and Zhang 2000).

Then, it can be identified and fostered capabilities to readiness for changes and to overcome them (third stage). The most important and comprehensive elements of agile capabilities are flexibility, speed, competency, and responsiveness. Sometimes, agile capabilities were identified such as speed, flexibility, cost, quality, innovation, and proactivity, teamwork, participation, knowledge and skills, virtual structure. In general, organizations should attempt to reinforce these factors so that they can respond to changes or pressures and exploit them to gain competitive advantage. This, in turn, forces the organization to search for ways and tools to obtain/enhance the required capabilities. Obviously, different organizations will experience different sets of changes as well as different levels of pressures resulting from each change. Consequently, different combinations of capabilities will have to be obtained for different organizations.

Fourth stage comprises generic enablers or providers as culture and values, leadership, organizational change, performance measurement, information technology, and customer service. As with capabilities, organization can improve mentioned factors so that their potential to survive and act as a leader in the competitive markets is enhanced. In sum, based on results of third and fourth stages, organization can be informed with the condition of organization from agility's perspective. In this place, existing level of organizational agility is determined.

With recognizing organization's states, top managers can formulate and develop the best strategies to improve conditions with many development approaches so that the level of organizational agility is enhanced or reinforced. After given period, managers carry out performance measurement process to determine that the results expected are attained and to determine deviations from objectives and aims. By this, organizations again repeat this cycle (after given or specified period) to find deviations and gaps through environmental and gap analysis so that they respond to changes, uncertainties and turbulences and gain a sustainable competitive advantage.

By combining the results of previous stages, it can be implemented gap analysis to compare desired state with current state of organization. For improving conditions, many development approaches are designed so that the level of organizational agility is enhanced. After this, managers carry out performance measurement process to determine that the results expected are attained and to determine deviations from objectives and aims. By this, organizations again repeat this cycle (after given or specified period) to find deviations and gaps through environmental and gap analysis so that they respond to changes, uncertainties and turbulences and they can gain a sustainable competitive advantage.

## **Suggestions and Recommendations**

Nowadays, many organizations are facing constantly and intensely increasing competition stimulated by technological innovations, changing market environments and changing customer demands. This critical situation has led to a major revision in business priorities, strategic vision, and in the viability of conventional and even relatively contemporary models (Sharifi and Zhang 1999). In an increasingly competitive market, there is a need to develop and improve organizational flexibility and responsiveness. In the past decade, most companies adopted business process re-engineering (BPR) and total quality management (TQM) and other improvement approaches in response to challenges and demands; however, these were not always successfully.

Although the methodology was developed based on a review of the literature pertaining to the subject, it was seen as necessary to validate its practical applicability. A comprehensive methodological approach to strategy building with regard to agility is needed among organizations and such a methodology could be developed in practice. The methodology proposed in this paper, though still to be fully developed and validated, constitutes an important effort in this regard and helps to bridge the gap between theory and practice in the agility's literature. For practitioners, the proposed methodology provides a basis for assessing their business situations and a guideline for recognizing missing capabilities and building up strategic policies in pursuit of agility as well competitive advantage.



## Conclusion

Today's organization must operate in a highly dynamic competitive environment subject to internally and externally induced change. While many of these changes could be considered continuous, there are some very disruptive changes that can dramatically impinge on the organization's ability to survive. Therefore, in this paper, we firstly introduced definitions of agility and agile manufacturing to understand the basic meaning of concept. Then, several and most important models and approaches to implement and retain agility in organization are presented. Based on above models and literature review, we propose a practical methodology for agility implement and improvement. As mentioned in this paper, any organization should consider internal and external environment to recognize changers that press on it. So, managers must improve and enhance capabilities and abilities of organization to respond and also exploit the change that occur in the environment. After this, gap analysis process can be act to determine current and best state of agility's level. If there is constrains to improve organizational responsiveness, corrective actions and programs are designed to improve the level of organizational agility. In sum, we believe proposed model can help managers to enhance responsiveness and competency of organizations to respond changes and also exploit them. However, we suggest researchers to examine the validity and effectiveness of proposed model.

## References

- Christopher, M. and Towill, D. (2001), "An Integrated Model of the Design of Agile Supply Chains", *Journal of Distribution and Logistic Management*, Vol.31, No.4, pp.235-246.
- Crocitto, M. and Youssuf, M. (2003), "Human Side of Organizational Agility", *Industrial Management and Data System*, Vol.103, No.6, pp.388-397.
- Dove, R., Hartman, S., and Benson, S. (1996), "An Agile Enterprise Reference Model", US Agility Forum, Bethlehem University.
- Dove, R. (1999), Knowledge Management, Responsibility, and the Agile Enterprise, *Journal of Knowledge Management*, Vol.3, No.1, pp.18-35.
- Drucker, P. (1968), "Comeback of The Entrepreneur", *Management Today*, (Apr.), pp.23-30.
- Giachetti, R., Martinez, L., Saenz, O., and Chen, C. (2003), "Analysis of the Structural Measures of Flexibility and Agility Using a Measurement Theoretical Framework", *Journal of Production Economics*, Vol.86, No.1, pp.47-62.
- Goldman, S.L. and Nagel, R.N. (1993), "Management, Technology and Agility: The Emergence of a New Era in Manufacturing", *International Journal of Technology Management*, Vol.8, No.1-2, pp.18-38.
- Goldman, S., Nagel, R., and Preiss, K. (1995), "Agile Competitors and Virtual Organizations", Kenneth: Van No Strand Reinhold.
- Gunasekaran, A. (1999), "Agile Manufacturing: A Framework for Research and Development", *International Journal of Production Economics*, Vol.62, No.1-2, pp.87-105.
- Hayen, G. (1988), "Change, Challenge and Continuity: An Entrepreneurial Vision from an Electronics Multinational", *International Journal of Technology Management*, Vol.3, No.3.
- Helo, P. (2004), "Managing Agility and Productivity in the Electronics Industry", *Industrial Management and Data Systems*, Vol.104, No.7, pp.567-577.
- Hormozi, A.M. (2001), "Agile Manufacturing: The Next Logical Step", *Benchmarking: An International Journal*, Vol.8, No.2, pp.132-143.
- Iacocca Institute (1991), "21<sup>st</sup> Century Manufacturing Enterprise Strategy", Vol.1, Lehigh University, Bethelham, USA.
- Jackson, M. and Johansson, C. (2003), "An Agility Analysis from a Production System Perspective", *Journal of Manufacturing Systems*, Vol.14, No.06, pp.482-488.
- Kid, P.T. (1994), "A 21<sup>st</sup> Century Paradigm in Agile Manufacturing: Forging New Frontiers", Addison-Wesley, Wokingham.
- Lin, Ching-Torng, Chiu, Hero and Chu, Po-Young, (2005), "Agility Evaluation Using Fuzzy Logic", *International Journal of Production Economics*, pp.1-16.
- Maskell, B. (2001), "The Age of Agile Manufacturing", *Supply Chain Management: An International Journal*, Vol.6, No.1, pp.5-11.
- Meredith, S. and Francis, D. (2000), "Journey Towards Agility: The Agile Wheel Explored", *The TQM Magazine*, Vol.12, No.2, pp.137-143.
- Naylor, J.B., Naim, M.M., and Berry, D. (1999), "Leagility: Integrating The Lean and Agile Manufacturing", *International Journal of Production Economics*, Vol.62, pp.107-118.
- Nagel, R. and Dove, R. (1991), "21<sup>st</sup> Century Manufacturing Enterprise Strategy: An Industry Led View", Iacocca Institute, Lehigh University, Vol.1.

- Power, D., Sohal, A. (2005), "Critical Success Factors in Agile Supply Chain Management", *International Journal of Physical Distribution and Logistics Management*, Vol.31, No.4, pp.247-265.
- Prince, J. and Kay, J. (2003), Combining Lean and Agile Characteristics, *International Journal of Production Economics*, Vol.85, pp.305-318.
- Ramesh, G. and Devadasan, S. (2007), "Literature Review on the Agile Manufacturing Criteria", *Journal of Manufacturing Technology Management*, Vol.18, No.2, pp.182-201.
- Ren, J., Yusuf, Y.Y., and Burns, N.D. (2000), "A Prototype of Measurement System for Agile Enterprise", International Conference on Quality, Reliability and Maintenance, Oxford, UK, pp.247-252.
- Ren, J., Yusuf, Y.Y., and Burns, N.D. (2003), "The Effect of Agile Attributes on Competitive Priorities: A Neural Network Approach", *Integrated Manufacturing*, Vol.14, No.6, pp.489-497.
- Sanchez, L.M. and Nagi, R. (2001), "A Review of Agile Manufacturing Systems", *International Journal of Production Research*, Vol.39, No.16, pp.3561-3600.
- Sarkis, J. (2001), "Benchmarking for Agility", *Benchmarking: An International Journal*, Vol.8, No.2, pp.88-107.
- Sharifi, H. and Zhang, Z. (1999), "A Methodology for Achieving Agility in Manufacturing Organizations", *International Journal of Production Economics*, Vol.62, pp.7-22.
- Sharifi, H. and Zhang, Z. (2000), "Agile Manufacturing in Practice: Application of a Methodology", *International Journal of Operations and Production Management*, Vol.21, No.5-6, pp.772-794.
- Sharp, J., Irani, Z., and Desai, S. (1999), "Working Towards Agile Manufacturing in The UK Industry", *International Journal of Production Economics*, Vol.62, pp.155-169.
- Sherehiy, B., Karwowski, W., and Layer, J. (2007), A Review of Enterprise Agility: Concepts, Frameworks, and Attributes, *International Journal of Industrial Ergonomics*, Vol.37, pp.445-460.
- Thompson, J. (1967), "Organization in Action", McGraw-Hill, New York, NY.
- Tsourveloudis, N.C. and Valavanis, K.P. (2002), "On the Measurement of Enterprise Agility", *Journal of Intelligent and Robotic Systems*, Vol.33, No.3, pp.329-342.
- Vernadat, F. (1999), "Research Agenda for Agile Manufacturing", LGIPM, ENIM/University, *International Journal of Agile Management Systems*, Vol.1, No.1, pp.37-40.
- Yousuf, Y., Sarhadi, M., and Gunasekaran, A. (1999), "Agile Manufacturing: The Drives, Concepts and Attributes", *International Journal of Production Economics*, Vol.62, pp.33-43.

## Notes

1 The numbers into ( ) represent number of practices in each category. For example, "strategic planning" category has three practices as Strategic plan vision, Strategic plan dissemination, Strategic plan buy-In.