SWP 5/96 **AGILITY AND FLEXIBILITY: WHAT'S THE DIFFERENCE?**

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AGILITY AND FLEXIBILITY: WHAT'S THE DIFFERENCE?

INTRODUCTION

There is growing interest in the concept of "agile organisations" amongst management practitioners and academics. Early publications have been largely practitioner-oriented and have been at pains to claim that this is a new idea, with fundamental differences to other concepts such as flexibility and lean production. However, there has been little direct explanation of what these differences actually are. A particular area of confusion appears to be over the difference between "agility" and the established concept of "flexibility", a confusion which this paper starts to attempt resolving.

FLEXIBILITY

The concept of flexibility in business organisations emerged in the 1970s as a response by large corporations to a perceived overspecialisation, particularly in operational areas. According to Corrêa's review of the literature (1994), the two basic reasons for this were to cope with *environmental uncertainty* and to be able to produce *variability in outputs*. Interest developed in the concept of *economies of scope* (Goldhar and Jelinek, 1983) in contrast to the received mass production wisdom of economies of scale. Practitioners' efforts primarily tended to be aimed at increasing the flexibility of operational resources, in particular labour and capital equipment. In the early 1980s there was much interest in technological advances in computer-controlled production facilities which allowed self-contained "flexible manufacturing systems" to be developed. Many large manufacturers pursued this theme, some with a vision of a "lights-out" totally automated factory processing materials in batch sizes of one.

In practice there were few successes (one being the Yamazaki Mazak plant in Worcester, UK) and the actual degree of flexibility provided was open to question. Authors such as Jaikumar (1986) warned against an over-emphasis on automation technology to achieve flexibility to the exclusion of managment systems. Part of the problem was one of definition: what did "flexible" actually mean? Early attempts to provide a definition of flexibility were provided by Mandelbaum (1978): "the ability to respond effectively to changing circumstances"; and Buzacott (1982) who used the classifications of "machine" and "labour" flexibility. These definitions did not however provide the rigour needed for unambiguous debate.

Recognising that the flexibility concept was poorly defined, Nigel Slack undertook research at Templeton College which resulted in his proposal for a framework for conceptualising and analysing flexibility in a manufacturing organisation (Slack, 1987). Slack's typology addressed flexibility in three ways *level*, *type* and *dimension*.

Level

- Total Manufacturing System
- Individual Structural and Infrastructural Resources

Slack found that most managers interviewed in his research focused on the flexibility of technology, labour and manufacturing infrastructure rather than the whole manufacturing system. Buzacott (1982) and Gerwin (1982) also distinguished these levels.

Type
- Product Flexibility
- Mix Flexibility
- Volume Flexibility
- Delivery Flexibility

Slack used these four categories to organise the types of flexibility mentioned by managers in his research. They broadly concur with those proposed by Gerwin (1986) and Doona and de Silva (1990). Product flexibility relates to the ease of new product introduction and product modification. Mix flexibility is the ability to change the relative proportions of different products within an aggregate output level, whereas volume flexibility allows this aggregate output level to be varied. Being able to change planned delivery dates is delivery flexibility.

Dimension
- Range
- Response

Slack proposed that the degree of flexibility of a resource or system could be assessed in terms of the breadth or "range of states" it could cope with (e.g. batch sizes of 1 to 1000) and in terms of the ease with which changes could be made within this "capability envelope". "Ease" was taken to include time and / or cost.

In his research, Slack found that managers from various functions saw flexibility differently: managers from support functions saw it as "a means of coping with unplanned disturbance" whereas in manufacturing it was seen as "an aid to productivity" (Slack, 1987). In both cases the emphasis was on the resource, rather than the system level.

Other authors have looked at flexibility at a higher organisational level than Slack, i.e. at the Strategic level. An early paper on "strategic flexibility" was that by Aaker and Mascarenhas (1984) in which they defined it as "the ability of the organisation to adapt to substantial, uncertain and fast-occurring [...] environmental changes that have a meaningful impact on the organisation's performance." This concept was developed by Das and Elango (1995) who suggested ways of achieving strategic flexibility, categorised into "internal" and "external" methods.

AGILITY

The concept of organisational "agility" appears to have emerged from Government-sponsored research on both sides of the Atlantic.

In 1990 the United States government commissioned the Iacocca Institute of Lehigh University to conduct research with industrial partners to set a strategic agenda for US manufacturing companies for the 21st century. The results of this work were published initially in a report in 1991 (Nagel & Dove) and more extensively in a book (Goldman et al., 1995). The major themes to emerge from this study were *agility* and *virtual organisation.* The Lehigh study defined four "dimensions of agile competition":

1. Enriching the customer.
2. Co-operating to enhance competitiveness.

3. Organising to master change.
4. Leveraging the impact of people and information.

Enriching the customer
Rather than simply selling physical products, an agile company sells tailored solutions to their individual problems. This solution comprises a mix of products, information and services. A trend towards this approach has been seen clearly in the personal computer industry: hardware has now reached near-commodity status in mid-range machines, with differention based on bundled software and support services.

Co-operating to enhance competitiveness
An agile organisation employs the core competence approach to strategy and forms alliances to provide non-core functions or processes. An extreme version is the "virtual organisation" where a group of independent firms, each with a valuable core competence, come together to exploit a specific market opportunity and then disband. They can act as a single entity through the extensive use of computer networking and IT which minimises the effects of geographical dispersion. The concept orginated from work on dispersed teams in Digital Equipment (Hopland and Savage, 1989) and is related to Handy's idea of "shamrock" organisations (Handy 1991) which consist of a core, contractors and part-time workers.

Organising to master change
An agile company can support different organisation structures simultaneously, reflecting the diversity of the tasks it has to perform to meet customer requirements. People and physical assets are able to be redeployed / reconfigured rapidly.

Leveraging the impact of people and information
People and information are the basis for differentiation in agile firms, with an emphasis on high value-added products.

The reasons for putting agility at the core of strategy for the twenty-first century were based on observation of the following phenomena (Goldman et al., 1995):

1. Increasing market fragmentation
2. Growth in the need to produce to order
3. Recognising markets are heterogeneous
4. Shrinking product life cycles
5. Converging products and services
6. Globalisation of production
7. Simultaneous co-operation and competition between firms
8. Distribution infrastructures which support greater customisation

Similar phenomena were investigated by Pine at Harvard Business School in a separate study which combined them into a single concept of "turbulence" (Pine, 1993). Pine conducted empirical research in a selected range of industry sectors. He concluded that an appropriate strategy to deal with turbulence was to reconfigure operations to allow individual customer specifications to be accomodated even in high volume manufacture. He coined the term "mass customisation" to describe this.

UK Government's Department of Trade and Industry sponsored research by PA Consulting Group which culminated in the DTI publication "Managing into the Late 1990s" (PA Consulting, 1993). This report also set out the external factors likely to affect manufacturing firms and offered recommendations on strategy. Within the report the well-established concept of "focus" in manufacturing (e.g. Skinner, 1974) was discussed and a matrix with the axes of "product complexity" and "market uncertainty" put forward as an aid to identifying an appropriate focus.

It was suggested by PA that whilst focus was still a valid strategy, the demands of markets and competition would require firms to be able to change focus rapidly and easily.

COMPARING FLEXIBILITY AND AGILITY: A FRAMEWORK

There are clear distinctions between the resource- or system-level flexibility described by Slack and the strategic organisational and inter-organisational issues addressed by authors on agility. However, distinctions between agility and strategic flexibility are perhaps less clear cut. The author believes that it is possible to modify and extend Slack's flexibility framework to enable the nature of agility to be better understood.

Slack's 1987 paper was written when "functional" organisation structures were dominant; his use of the "manufacturing system" concept refers to the manufacturing or production function (Slack, 1987 p4). It seems possible to introduce a contemporary view of organisations by replacing "system" with "core business process", where production is one activity within the "order fulfilment" process for example (Hammer and Champy, 1993).

It would also appear to be valid to add to Slack's two "levels" the higher levels of *organisation flexibility* and *business network flexibility* into an overall hierarchy. *Organisation flexibility* is synonymous with the concept of strategic flexibility discussed above; the terminology has been modified to be consistent with the rest of the framework which uses a structural hierarchy (systems, resources, etc) rather than a decision hierarchy (strategic, tactical, etc). The term *business network flexibility* is adapted from Venkatraman's (1991) concept of "business network redesign", where a business network includes the organisation itself, it suppliers, customers and alliance partners. It should be noted that this definition is broader in scope than the conventional idea of a "supply chain" which focuses on players in the order fulfillment process.

Further, the author would argue that Slack's two "dimensions" of range and response are completely applicable to these two higher levels. Strategic *range* flexibility is the ability to adopt a wide range of diverse strategies such as the range from lowest cost producer in a broad range of markets to focused differentiation, using Porter's classification (Porter, 1980). Strategic *response* flexibility refers to the ease with which the organization can switch from one strategy to another. Business network *range* flexibility incorporates both the variety of different organisations with different core competences which can form a network, and the variety of the relationships between them (e.g. prime-subcontractor, joint-ventures, alliances, virtual organisations). Business network *response* flexibility assesses the ease with which the inter-firm relationships can be dissolved and re-formed.

These modifications can then be used to give the following overall framework:

Level	**Dimension**	
	Range	Response
Business network		
Organisation		
Core process		
Resource		

Slack's original work was operations-oriented, which is reflected in the "types" of flexibility he describes and so cannot be directly applied to this higher level flexibility concept.

The author argues that "agility" can be fitted into this framework according to the following rationale.

Level

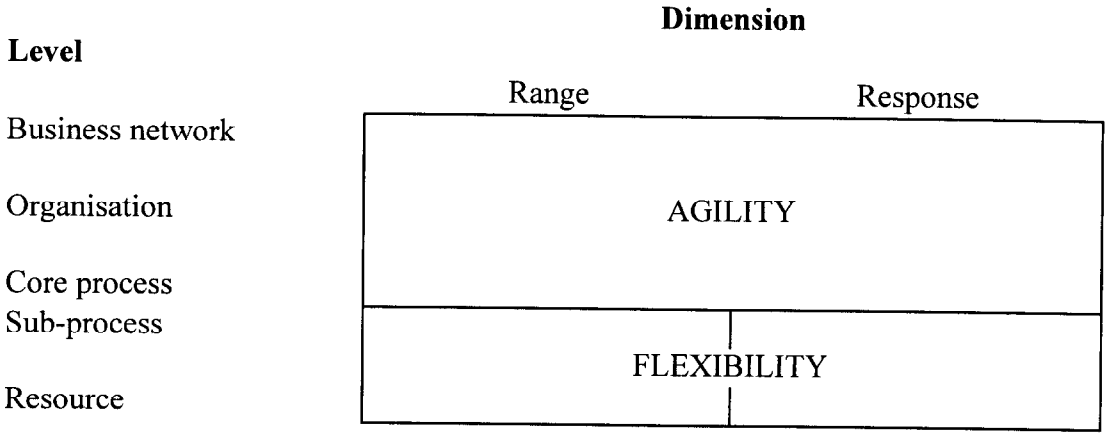
A major difference between agility and flexibility is that the former places far more emphasis on the higher levels in the hierarchy. The "virtual organisation" approach to achieving agility is clearly aimed at at the business network and organisational levels. Part of the confusion about defining agility is the tendency for all current work on resource-level flexibility (e.g. development of new manufacturing technologies) to be labelled as "agile manufacturing". At the process level, there is a less clear-cut distinction, although it could be argued that flexibility is most often associated with a *sub*-process (e.g. "production" rather than "order fulfilment").

Dimension

The current literature appears to associate the agility concept particularly with the *response* dimension (for example Youssef, 1992). There appears to be no problem in applying this dimension to all four levels. However, the application of the *range* dimension to the top two levels proposed generates interesting questions about the concept of agility. For example: is an agile company one which has the ability to totally change the nature of its business?. What are the limits on the number and variety of inter-firm partnerships which an agile enterprise can sustain? It would appear that the extent of the range dimension in an agile company has not yet been well explored, but the examples of agile practice quoted by authors such as Goldman et al. (1995) include considerable range flexibility at the strategic and business network levels, as well as lower down in the framework.

Thus it is proposed that agility is characterised by range *and* response flexibility at the organisation and business network levels, enabled by flexibility at process and resource levels.

This rationale results in the following positioning of agility and flexibility in the extended framework:



CONCLUSIONS

The purpose of this paper was to bring some clarity into the distinction between "flexibility" and "agility" as business concepts. In summary, it is felt that the real difference is the *level of application* of the concept, agility placing greater focus on the strategic levels, whilst flexibility is most often associated with the operational levels. In addition, *agility implies both range and response dimensions*, whereas flexibility can be one or the other or both. To provide "agility" at the organisational and business network levels, flexible operations are needed. Therefore the two concepts should be seen as complementary rather than mutually exclusive. A more consistent approach to using the terminology discussed here should reduce the current confusion found amongst both the academic and practitioner communities.

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