

CREATIVITY & COMPETITION IN GLOBAL INDUSTRIAL SUPPLY CHAINS

Chris Stanghan, Crane Fruehauf

SUMMARY

This article examines the use of Creative Problem Solving Techniques in UK companies and its implications for Supply Chain Management. This evidence suggests that the use of Creative Problem Solving Techniques, allied to an open trusting culture, contributes to greater profitability. Many UK companies would appear to be slipping behind in this regard, and as a result are losing productivity. The article suggests that in addition to strengthening internal innovation processes, UK companies will need to learn to manage creativity across organisational boundaries, in support of greater out-sourcing and collaborative product development. The greater application of Creative Problem Solving Processes and promotion of the skills required to succeed with them, must therefore be a priority for the late 90's and beyond.

INTRODUCTION

A recent trend in manufacturing industry has been the move away from in-house provision of processes and services toward outsourcing. The drivers for this are clear:

- As products and processes become more complex and technologically advanced, so it is more difficult (and risky) for a company to attempt to be 'expert' at all the areas involved in making and/or delivering its products and services.
- Complex processes usually require very high levels of capital investment and with ever shortening product life-cycles, companies are finding it harder to remain competitive without investing heavily in the production equipment necessary. Clearly, this is easier to support in companies who specialise by 'process' rather than by 'product'. To profitably co-exist such organisations must be able to innovate both up and down the supply chain and even across it, co-ordinating their efforts with fellow suppliers.

The communications processes involved are analogous to those in a 'Matrix Management' organisation, but with the added problem of organisational barriers such as differing cultures (and sometimes languages!). This article proposes that in order to be successful in the next millennium, manufacturing companies will need to develop techniques and processes for harnessing creativity and innovation through their entire supply chain. It then looks at some of the 'seeds which may already be sown', how these need to be developed in the coming years and what opportunities this presents.

THE FUTURE OF THE 'SUPPLY CHAIN'

Many companies are now trying to develop closer supplier partnerships with a declining number of suppliers, whilst increasing the outsourced component of the manufactured products and looking outside for many of the support services also. One area which is yet to be affected by outsourcing is that of procurement itself, including the management of inventory and suppliers. I propose that in the near future, specialist organisations will be required to provide the service of sourcing materials and components and delivering them 'Just-in-Time' to the production line of the customer organisation. Such companies would be responsible for the value of the inventory held by their client and for monitoring and improvement of supplier performance.

In order to be successful in this environment, firms offering such a service will need to be able to innovate successfully in a variety of cultures and be able to 'tap in' to innovative ideas coming from the client company and its suppliers.

Once well established, such organisations would enjoy a position of strength due to their accumulated specific commodity knowledge and potential access to scale economies. For the past six months I have been researching Creative Management, and have been exposed to a number of Creative Problem Solving Techniques and processes for enhanced management of innovation. Having started using these techniques within my own company, I have started to consider how the processes might be used by our suppliers and jointly between our companies to exploit cost-saving opportunities. In order to persuade the supplier base to adopt the processes, I have investigated what effect the use of these processes might have on business performance.

CURRENT TRENDS AND METHODOLOGIES

A search through current general business literature on supply chain management and on innovation and creativity, revealed little comment on the problems of integrating the creative style between customers and suppliers. This indicates that there is little current activity in this field.

In order to compare the levels of creativity and innovation within the principal suppliers to my company with that found in a selection of the most forward-looking companies in the UK (those who are members of the Anglo JIT Club), a questionnaire was sent to 25 JIT Club members and 15 current suppliers. From these 15 responses were received, split as 6 suppliers to 9 JIT Club members.

Devising the questionnaire required a balance between ensuring a strong link with creative management concepts, but whilst also keeping to language and questions which the recipients would not only understand, but be prepared to answer candidly. The selection of the eight CPS techniques was especially difficult in this respect and I ended up with those which I felt would be most broadly familiar. I also limited the general company statistics questions to those which I felt had most bearing on the 'culture' of the organisation, and hence was most likely to correlate with creative activity. As a performance measure I chose 'return on sales' as one which would demonstrate the 'effectiveness' of the companies operation, without distortion by asset values, whilst normalised for company size.

ANALYSIS OF RESULTS

The analysis of these responses is shown below, with statistical inferences drawn first across the whole set of responses, then split between the two groups. Finally, observations are drawn on connections between leadership and organisational culture with the innovation level.

Company Profiles

The 'vital statistics' for the respondents were as follows:

Turnover	<£1m	£1-10m	£10-50m	>£50m
	0	3	6	6
ROS %	<15%	15-5%	5-10%	>10%
	1	5	5	4
No. Employed	<100	100-500	500-5000	>5000
	4	6	5	0
% Managers	<5%	5-10%	10-20%	>20%
	2	7	6	0
Year Founded	to 1900	1900-39	1939-70	1970 on
	2	2	4	7

As you can see, the companies approached come from a broad and representative spectrum. A list of the respondents and their core products is available on request. Although the response rate to the survey was low, the same spread of sizes and types of firm was present in both supplier and JIT halves of the sample.

Awareness Of CPS Techniques

The level of awareness of CPS techniques was as follows:

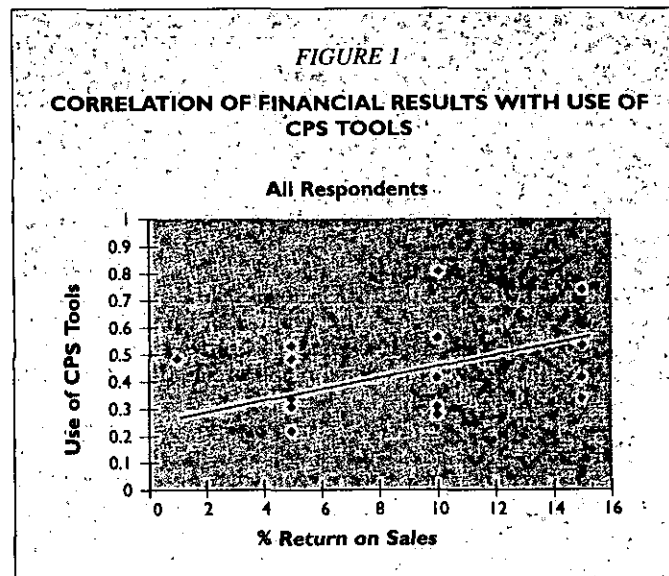
TABLE 2
USE OF CREATIVITY TECHNIQUES

TECHNIQUE	ALL	SUP	JIT
Brainstorming	3.47	2.50	4.00
Fishbone Diagram	2.67	1.83	3.22
Brainwriting	1.47	1.17	1.67
Nominal Group	1.33	1.33	1.33
Superheroes	1.40	1.17	1.55
Storyboards	1.93	1.83	2.00
Scenario Planning	1.80	1.83	1.77
Expert Groups	1.67	1.50	1.67

In the above table, the score ranges from:

- 1 = Not heard of the technique, to
- 5 = Part of the company training programme for all levels of employee.

As you can see, only the first two (well reported in the general business literature) are known to most respondents. There is, however, a markedly lower awareness in all cases from our suppliers. Comparison of the individual company results with return on sales is shown in Figure 1. This shows a correlation, indicating that companies using CPS techniques were likely to be more profitable.



Innovation Stimulus

Studies of US Corporations [5] have shown that those which have sustained a high frequency of output in innovative products have in common the use of a structured process for stimulating and then exploiting innovation amongst their workforce. In order to gauge how far UK companies have come in developing such processes, the questionnaire asked whether the respondents used one of the four most common innovation management processes. The results were as follows:

TABLE 3
SUGGESTION SCHEME PROCESSES

PROCESS	YES	NO
Suggestion Scheme	6	9
Quality Circles	6	9
Office of Innovation	0	15
Intrapreneurship	5	10

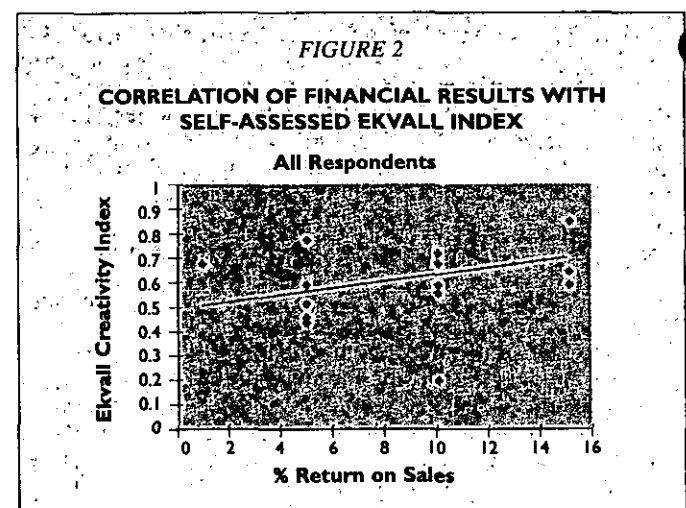
Comments associated with the responses from more than half of the companies using suggestion schemes and quality circles indicated that they were not very successful. All comments from 'Intrapreneurship' companies indicated strongly positive results. Surprisingly, the 'Office of Innovation' used very successfully by companies such as 3M, was not used by any of the respondents.

Organisational Culture

Culture is a major influence on Creativity and Innovation, and to measure this I have borrowed a method first used by Goran Ekvall to study Swedish organisations. In each case the respondents answered on a scale of 1 to 5, where 1 is considered less favourable to innovation. Again, it is clear from the tables that the suppliers have climates which are less innovative than the JIT Club members questioned. Also, when plotted against return on sales for each company (Figure 2), a correlation emerged which supported the intuitive expectation that Innovative organisations are more profitable.

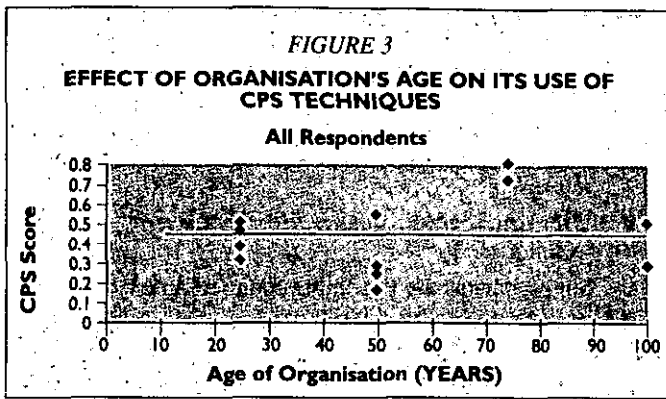
TABLE 4
EKVALL INDICES

PARAMETER	AVE	SUP	JIT
Challenge	3.93	3.17	4.44
Freedom	3.27	2.17	4.00
Idea Support	3.13	2.00	3.89
Trust	3.33	2.50	3.77
Dynamism	3.00	2.50	3.22
Playfulness	2.00	1.67	2.22
Debates	3.20	2.83	3.44
Conflicts	2.87	2.67	3.00
Risktaking	2.33	1.83	2.67



Age of Organisation

It has been the experience of many change practitioners (myself included) that older organisations are harder to change than newer ones. This would, one supposes, limit the creativity of such companies. Figure 3 shows the use of CPS techniques plotted as a function of organisational age. The data shows no correlation between the age of the organisation and its apparent

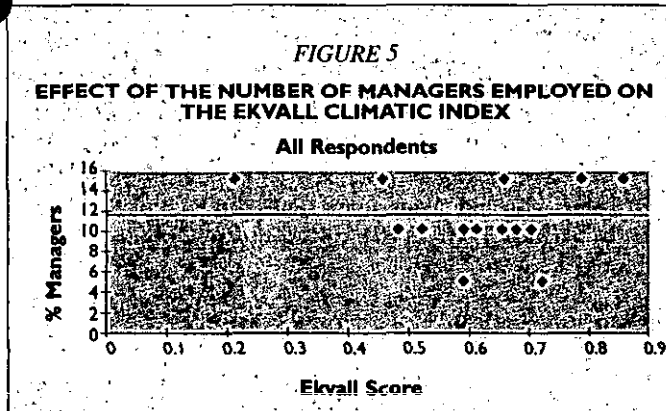
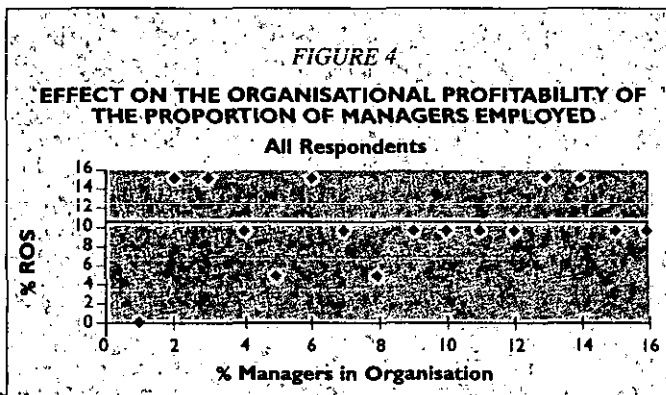


use of CPS techniques, suggesting that older organisations are no less able to make use of these processes than their younger counterparts.

Organisational Effectiveness

Whilst some allowance must be taken for the type of industry, a good indicator of the level of 'responsibility deployment' within an organisation is its proportion of managers to other staff. Clearly, an organisation with more devolvement of decision-making to operational staff needs fewer managers. On the assumption that such devolvement makes a company

more profitable, Figure 4 shows the return on sales for the organisations surveyed, as a function of managerial percentage. Disappointingly, the data shows no conclusive evidence for either a greater Ekvall index with lower management percentage (Figure 5), or any greater return on sales with lower management percentage.



Management Credibility

Interestingly, by dividing the responses into 'High Ekvall' (>29/45) and 'Low Ekvall' Organisations (<28/45), a clear difference can be seen in the type of comments made regarding the CEO. All seven of the High Ekvall company respondents supported and praised their CEO. Only two out of the nine Low Ekvall company respondents felt able to do this. This emphasises the connection between the leadership ability of the CEO and the company culture.

Alternatively, there may be a reverse effect where people who feel good about their senior management, would see their company as a more open, creative place. A common theme in the 'Low Ekvall' respondents was a desire to allow the middle managers more autonomy. In his book *Thriving on Chaos* [11] Tom Peters quotes Rosabeth Moss-Kanter thus; *'Powerlessness Corrupts, Absolute Powerlessness Corrupts Absolutely'*.

It is interesting that almost all the respondents to the questionnaire (who happened to be middle managers in the main) complained of a lack of autonomy as a constraint to innovation. What may be required are leaders who exhibit the human equivalent of what Peters and Waterman [13] observed in successful companies and described as 'Simultaneous Loose-Tight Properties'. The apparent contradiction in being 'autocratically participative' - forcing decisions down the organisation. One is forced into the conclusion that to be a successfully innovative organisation, a company must be made up of people who are good at being free-thinking creators mixed with thick-skinned and patient 'systematisers' led by a clear-headed organiser with a strong sense of purpose. All of which points to establishing the right mix of KAI Innovators and Adapters [12].

Most established organisations however, are quite tightly bound to employees who do not necessarily fit this mould. One can have more choice with more flexible employment practices, and with higher levels of outsourcing (there are fewer laws relating to employment of supplier companies). How many companies include a 'Cultural or Employee Profile' in their supplier evaluation?

It is interesting to see that quality circles are poorly regarded in many of the firms surveyed. This is consistent with the dangers exposed by Shea [2], who offers the following as reasons for their failure;

- Running out of problems to solve
- Lack of support
- Lack of change
- Development of a 'What's in it for me' attitude.

This result is a little disheartening since the proposal to work jointly with suppliers on issues of common benefit is highly analogous to the intra-company quality circle.

APPLICABILITY OF RESULTS

Some care is required in interpreting the result. The higher ROS figures may not be in themselves a result of the greater use of CPS techniques, or the more innovative culture. Such companies certainly use many techniques (such as JIT itself) to enhance their profitability.

Another area for caution is in the role of the recipient. Those closer to the top of the company will tend to see their organisation (and its management) in a more favourable light ie more innovative and may have had more opportunities to learn about CPS processes. By its very nature, the JIT Club membership list has more senior contacts than does our supplier database. This may have influenced the results also. This could be overcome (as by Ekvall) by questioning a cross section (or even all) the employees in an organisation.

Because Ekvall's paper [4] does not go into great detail about his questioning techniques, I was forced to improvise a scoring scheme around the bald categories. For this reason, the results obtained cannot be directly compared with those obtained by Ekvall himself. Broadly speaking, the same trends are evident, especially in the difficulty clearly felt by respondents with how to regard 'conflict' (good or bad). I have included as appendices some detail graphs of the responses to the 'quantitative' questions, which I did not use in the management report for the sake of brevity.

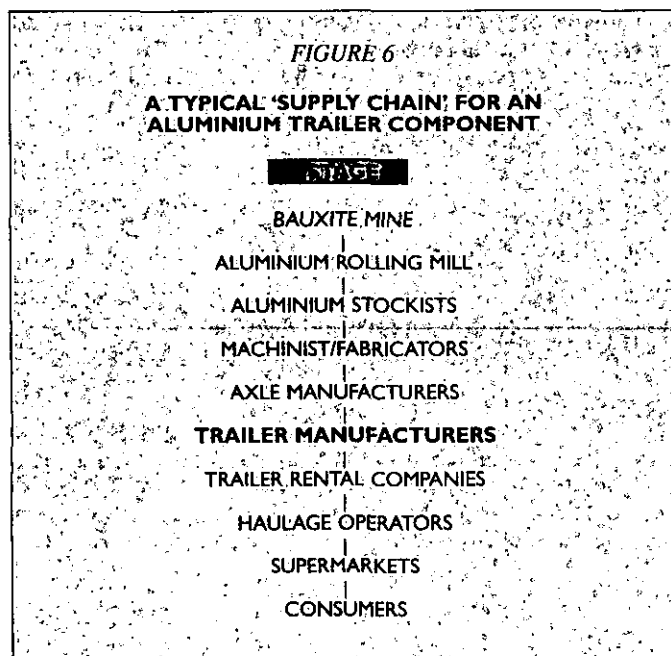
Another hoped for benefit of a closer relationship with suppliers and of higher levels of outsourcing is proposed by Clark and

Fujimoto [3]. New products can be developed much more quickly and cheaply if appropriate parts of the design are 'sub-contracted' to the company who is to supply them. Many UK companies are currently trying to raise the level of new product development after years of stagnation, and realising that the integration of suppliers is key to their companies success. Indeed, the beauty of using suppliers in this way allows them to apply to your products lessons learnt in the development of those of your competitors... a neat extension of Peters' concept of 'Creative Swiping' [11].

INTRODUCING CREATIVITY AND INNOVATION STIMULI TO SUPPLY CHAINS

As with most supplier development issues, the greater use of CPS techniques and higher levels of innovation in the supplier can be stimulated by the use of such techniques jointly in meetings between customer and supplier. However, used 'carelessly' this can have disappointing results. The American philosopher Charles Sanders Pierce stated that 'an idea does not necessarily have to lead to immediate sensory verification, it is enough if it gives meaning to our conduct' [7].

It is the absence of immediate verification which leads to many ideas being discarded, but even in ones own organisation it is hard to define specific 'conduct' to illustrate an idea. Between two organisations, with different cultures (institutionalised ways of interpreting events and actions) this will be still more difficult. So, how does one translate an idea from a person in one organisation in a way that it can be understood and accepted by another organisation?.



With the type of supply structure described above, the 'Supply Chain' is more a 'Supply Matrix', with many interactions and links not recognised by the 'chain' analogy. If maximum benefit is to be gained from the use of creativity and innovation in the Supply Matrix, then these interactions must be recognised and optimised.

John Naisbitt (author of Megatrends) [8] underlines the growing complexity of supply relationships in the future by stating 'As the world integrates economically, the component parts are becoming more numerous and smaller and more important. At once, the global economy is growing while the size of the parts are shrinking'. It is possible that eventually, if we follow the 'professional entrepreneur' mindset espoused by Tom Peters [9] and others, each employee will operate independently of his corporation (as a free agent). Clearly we are a long way from this situation, but when it comes, we will all need to be increasingly creative, and be highly adept at managing our own Innovation, as well as that of our suppliers and customers.

CONCLUSIONS

The conclusion of this article is that:

- Those companies which make better use of creative problem solving processes make better financial returns.
- UK firms could make greater use of creativity techniques.
- Supply chains are becoming more complex.
- There is an increasing need to innovate jointly with other companies.
- There is an opportunity for CPS processes to assist in making supply chains more productive, when used as part of out-sourcing and product development processes.

REFERENCES

- [1] O'Connor, B.J : "Supply Chain Competition" *Manufacturing Engineer*, Vol 76 No. 4 August 1997 pp183-185 (IEE, London).
- [2] Shea, G.P : "Quality Circles: The Danger of Bottled Change" *Sloan Management Review*, Spring 1986. pp22-46.
- [3] Clark, K. & Fujimoto, T. : "Reducing the Time to Market. The Case of the World Auto Industry" *Design Management Journal* 1(1), 1989 pp49-57
- [4] Ekvall, G. : "The Organisational Culture of Idea Management : A Creative Climate for the Management of Ideas" From Henry, J. and Walker, D (Eds) '*Managing Innovation*', London, Sage 1995, pp73-79.
- [5] Mitchell, R. : "Masters of Innovation : How 3M Keeps it's New Products Coming" *Business Week* April 10, 1989 pp58-63
- [6] Wack, P. : "Scenarios : Uncharted Waters Ahead" *Harvard Business Review* 1985 pp73-89.
- [7] Urmason, J.O & Ree, J : '*Concise Encyclopedia of Western Philosophy and Philosophers*' London, Routledge pp228-230.
- [8] Naisbitt, J : "*Global Paradox*" London, Nicolas Brealey, p16
- [9] Peters, T. : '*The Tom Peters Seminar*' London, Pan p93.
- [10] Bryant, J. : "*Problem Management*" Chichester, Wiley 1989 pp.263-5
- [11] Peters, T. : "*Thriving on Chaos - Handbook for a Management Revolution*", London, Pan 1988.
- [12] Kirton, M.J. : "*Adaptors & Innovators : Styles of Creativity and Problem Solving*", London, Routledge 1989.
- [13] Peters T. and Waterman, R.H. Jr : "*In Search of Excellence*", New York, Harper & Row, 1982.

About the Author

Christopher J. Stangan is an Associate Member of the Institute of Operations Management. He graduated from Reading University in 1982 with an Honours Degree in Physics with Mathematics and following a period of Research and Development at British Telecom Research Laboratories. He began specialising in Manufacturing Management with BT&D Technologies in Ipswich. He completed his MBA with the Open Business School in 1992 and is currently Supplier Development Manager with Crane Fruehauf, the UK's leading supplier of articulated semi-trailers. Throughout his career he has focussed on how people respond to change, especially that linked to Manufacturing Strategies such as JIT, TQM and Outsourcing.