# International Manufacturing Networks

## *How do you Reduce the Huge Hidden Costs?*

### Introduction

The organisation of global manufacturing networks is becoming an ever more important issue for international companies. Their development is driven by the desire to expand globally, gain market share, cover new and emergent markets; and all this whilst improving service and delivery and costs.

As manufacturing networks grow, the hoped-for economies of scale are often disappointingly offset by hidden costs. Supply chains develop their own internal system-problems with negative feedback loops self-generated stock. Centralisation distances people from customers, making the business insensitive to local markets. The network requires ever more complex IT systems, procedures and bureaucracy. The roles of people become fractured and unclear. The growing organisation requires multiple reporting lines and matrix structures. People's own sense of responsibility is diluted, and they become frustrated and de-motivated.

The hidden costs of such issues are huge. They are worth millions of pounds. They are the cost of having a chronically 'unhealthy' manufacturing supply network. This dysfunction and the associated cost burden is a significant strategic issue.

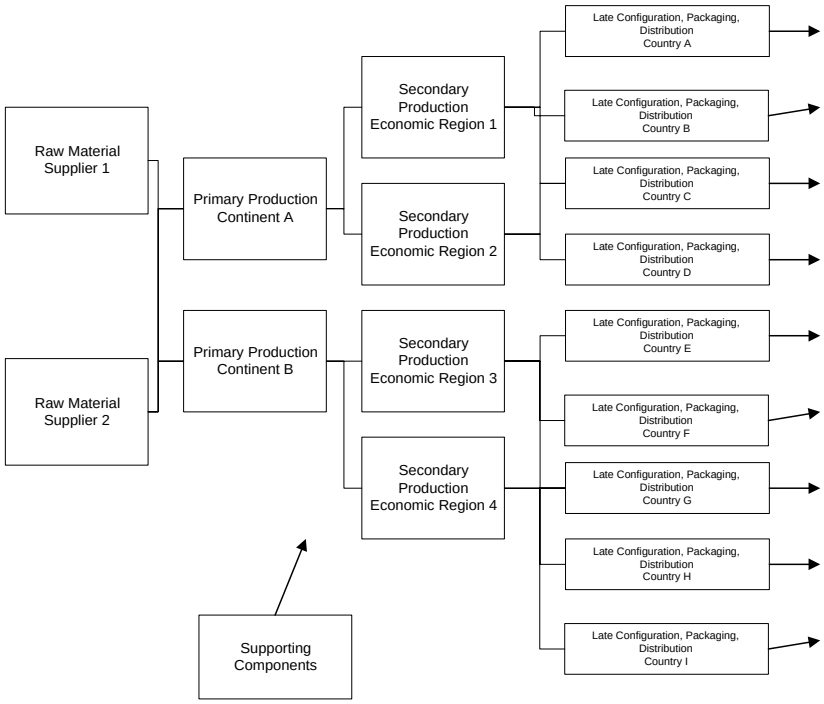
How can we design global manufacturing supply chains as integrated whole systems so that they retain simplicity and responsiveness whilst operating economically? How can we organise it so that regional and site teams have clear units of work to perform, with minimal overlap between themselves and other teams? How do we design it so that the right work is done at the right organisational level? How can we get distant sites motivated and empowered again?

This paper presents a whole systems approach to optimising an international manufacturing network. The approach can improve the efficiency and effectiveness of a network by an initial 10% to 30% across a whole range of key performance indicators and set it up for a much healthier and competitive future.

Please ensure this paper gets into the hands of the person in the organisation that has the responsibility to address this strategic issue; it may really make a difference.

## The Danger of only a Component View of a Network

The diagram below represents an over-simplified international manufacturing network. It is actually taken from a pharmaceutical example. This is the sort of network that might be designed quickly on a blank sheet of paper. Real supply chains however evolve from an historical starting point, step-by-step, in a practical way. Reality is never simple and many complex factors have to be dealt with when managing the development of an international network.




People intuitively understand the difference between a component and a system. Components are usually simple, self-contained items from which a system is made up. Systems behave in more complex ways through the interaction of their components and sub-systems: their relationships, feedback loops and control loops. Examples of systems might be technical systems (e.g. cars or computers), social systems (e.g. families or teams), or biological systems (e.g. you and I). Systems are more than the sum of their parts. A car is more than the pile of its bits. A team is more than a group of individuals.

Complex systems usually have a hierarchy of nested systems, each in turn built up from sub-systems and components. Those that evolve in response to a changing external environment are called 'adaptive systems'. They can develop, grow, even learn and self-replicate.

In systems jargon an extended manufacturing network is an example of a 'complex, adaptive, socio-technical system'. This means that it behaves in a complex, semi-unpredictable way; it evolves over time in response to changing external conditions (market, social, legal, etc.), it has both a technical side (processes, technology, equipment, buildings, procedures, organisation structures, information systems, policies, etc.) and a social side (team behaviours, leadership styles, relationships, culture, consciousness, aspirations, motivations, desires, etc.).

We can view a manufacturing network at a component level, noting individually its various different parts. We could build it up by bolting together carefully selected and separately optimised components. It may then work well, or it may not. Optimising each component separately is very different from optimising the network as a whole. To view a manufacturing network holistically as a 'complex, adaptive, socio-technical system' is what we call taking the 'whole systems' view.

## The Need for a 'Whole Systems' View

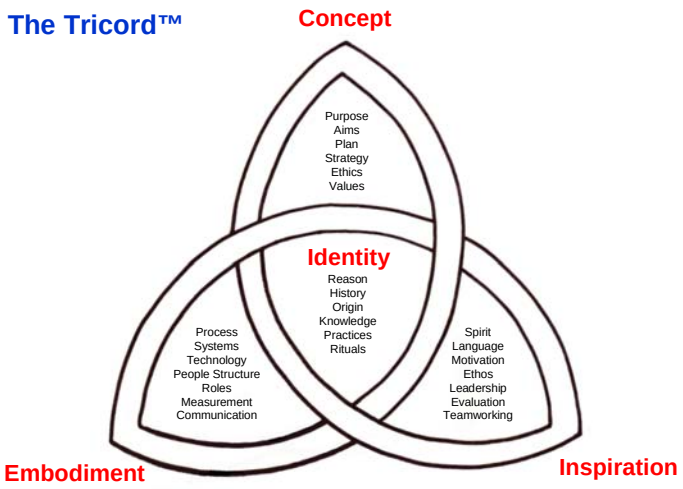
Ensuring that the business manufacturing network works as a whole system is vital for any major international business. The costs of system-wide ineffectiveness are even greater than the failure of one of its major components such as a major plant shutdown at a remote site facility. It manifests itself in chronic poor performance across a whole range of measures. In human terms it's equivalent to the cost of general unfitness and ill health as opposed to that of a specific acute trauma. Over time the cost of the former can be much greater. Big sums can be involved, though they are often hidden and difficult to measure. The symptoms of such 'ill health' are those of un-coordination, ineffectiveness, inefficiency, repeated cycles of emergency action, the need for over-capacity and contingency stocks, customer indifference and lack of motivation and ownership. To patch up the system there are extra management meetings, executive travel and staff de-motivation, lack of ownership and stress. The 'whole system' health of a manufacturing network is the key to sustainable competitiveness for the business. It is a major strategic issue.

In improving a global manufacturing network from a 'whole systems' perspective, each component and sub-system needs to work in conjunction with those around it, and each level of system needs to build on the sub-systems level below to create a total system delivering the overall customer-serving purpose. Many commonly applied approaches to manufacturing networks use tools adopted from factory design and Lean Manufacturing. They work at a component optimisation level, not at the overall whole systems level. What is needed is a whole systems language with which to take an holistic perspective.

One way of thinking about this is to use an analogy of designing a complex building. You would first turn to an architect before engaging the specialist technicians. An architect is somebody whose job it is to design a whole structure for people to live or work within. A technician is somebody who is an expert in specific tools and techniques. To design a complex building you need both a good architect as well as good structural engineers, builders, heating and lighting engineers, interior designers, electricians, plumbers, decorators, etc., etc. The architect's plans ensure all the experts' works are aligned. In organisational design you need both expertise in designing and integrating the whole strategy, structure, systems, culture and style of the organisation, as well as expertise in the detailed design and formation of various sub-systems and components (e.g. IT systems, logistics, production technology, HR systems, financial controls, incentive design, international tax, etc.)

## A 'Whole Systems' Approach to Healthy Supply Networks

Tricordant is a whole systems organisation design consultancy founded to help businesses optimise their organisation or corporate network at the whole systems level. We are organisational architects. We help 'sick' organisations to get well and under-performing businesses to get fit. Tricordant's passion is equipping organisations to be 'whole and healthy'. This means they are also healthy places for whole people to work within.



The company's central model is given by the Tricord™, which describes all the aspects of an organisation, and indeed each of its organisational sub-units, that need to be aligned together for the whole to be healthy. The company web site at www.tricordant.com gives a detailed explanation of the Tricord™ and introduces its use.

Tricordant has a systematic methodology and set of tools to redesign and align an international manufacturing network at the whole system level. It may be applied to all of a company's markets and product value streams or to only to a relatively discrete sub-set of them. There are analytical tools at each stage to engage with the complexity of the issues and reach decisions as to the optimum network design in the circumstances. Unlike some alternative methodologies Tricordant equips businesses with a step-wise approach which can be applied by the business. This is a design process without a hiatus in the middle; the team is not left to intuitively guess likely good options. The approach falls into four phases and is explained in the appendix.

## Benefits – The Scale of the Hidden Costs

The examples below are of work with which the directors of Tricordant Ltd. were personally involved in, both prior to and since establishing the company in 2005. They are of whole systems projects done in major, successful organisations.

### Examples of Benefits

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| Household Product Supply Chain | Clarified how forecasting processes aligned with manufacturing structures and the true aims and purposes of logistics. Delegation to the right level brought motivation. | Reduced warehousing from over 10 to 2 focused on key areas of customer service – saved £10million. |
| Pharmaceuticals Manufacturer | Restored whole systems balance for 700 staff across all organisational levels | Initial savings of £1million p.a. even before efficiency, quality and service benefits started to emerge. |
| Automotive Components Manufacturer | 2,500 employees. Restored order by disciplined production control system. Aligned targets for each whole work team. Kaizen site-wide. Inspirational programme site-wide. | Profitability: 4% to 17%<br>Customer quality: 200ppm to 18ppm<br>Delivery error: 10% to 0.16%<br>Kaizen ideas per month: 800 to 1300<br>Efficiency: 85% to 100.4%<br>Stock accuracy: unknown to 98.5% |
| Government Organisation | 10,000 people across 26 regional sites. Clarified purpose for people and aligned responsibility with the means to deliver. | £40 million savings p.a. identified. |
| Large Acute Hospital | A strategic review of operating theatres led to the implementation of collaborative management processes across surgery, anaesthetics and theatres. | Helped the Trust ensure that immediate financial savings and efficiency improvements of about £1.5m could be implemented sustainably. |

We can offer you a wealth of experience and a stepwise approach, all supported by effective aids. We can help you and your staff to transform your manufacturing network, delivering an initial 10% to 30% of improvements across a wide range of business measures and setting the company and your staff on the path to a much healthier future.

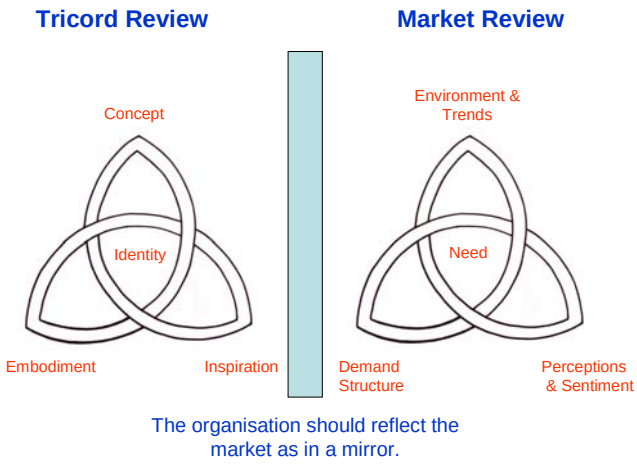
If this article has sparked your interest then one of the Tricordant team will be pleased to visit you, with no obligation, to discuss the approach and its relevance to your business. Please contact Simon Thane, Director, Tricordant Ltd, simon@tricordant.com. Tel: 01558 823927, Mob: 07989 112062.

# Appendix

## Tricordant's Approach to Optimising Manufacturing Networks

### Phase 1: Review of the Current Organisation and the Market Needs by Territory

1) **Tricord Review:** Firstly the current organisation is reviewed. Information is gathered as to the current strategy, structure and culture of the business. A Tricord is populated for the business as a whole and for each of the main locations and functions separately, filling in the main details for each of the four Tricord domains.
2) **Market Review:** Secondly the current market and commercial environment is reviewed and mapped, again using the Tricord™ as a framework to gather and order the information and analyse the essential main differences between each major product market, region or market segment.




This is done through facilitated workshop meetings and interviews. Throughout this phase information on the secondary factors that will also shape the final design are also gathered and documented, e.g. local tax, legal, historical and political issues.

### Phase 2: Network Redesign and Alignment

A multi-level, cross-functional project team is then drawn from across the organisation. They need to have a broad understanding of the core business processes. The team is facilitated by one or two Tricordant consultants who will bring their tool set and their 'whole systems' experience. The team progressively works across the network and through the levels of the organisation, both top-down and bottom-up. The team works initially on the three core business flows: 1) R&D & New Product Introduction, 2) Manufacturing & Supply, and 3) Sales & Marketing. They later review the need to co-organise units from the different flows. They will answer how best to site emerging clusters of functions; regionally or centrally. The network organisation is thus progressively re-aligned. Tricordant has a set of supporting tools that are used to aid the team at key stages in the process.

| **Tricordant's Manufacturing Network Design Tools for Phase 2** | |
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| Right units | A tool for mapping the three primary flow processes: 1) product research, design and New Product Introduction; 2) product manufacture and supply; 3) marketing and sales. Then to systematically identify the right organisational work units and the right boundaries along and between these flows. |
| Right proximity | A tool to judge if there is a need for a regional market to be served from a local production factory, R&D unit, or sales and marketing unit, sited within that region itself. A high score indicates that regional units are required, whilst a low score indicates that a market can be successfully served from afar. |

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| Right grouping | A tool to measure the degree to which two organisational units form part of a single 'higher-level system'. It uses the 3 domains of the Tricord to measure whether two organisational units should be co-organised as a site or facility. A low score indicates units that are suitable to be split at a distance from one another and located on different sites. |
| Right scale | A tool to calculate the appropriate team or site sizes given the technical complexity, social complexity and rate of change of that 'whole work unit'. It works at two levels ensuring that 1) work groups can be teams and that 2) sites can be communities. |
| Right levels | A tool to ensure that tasks are done at the right level within the organisation. This tool ensures sites are given the appropriate degree of freedom and empowerment without losing overall network control and learning. |

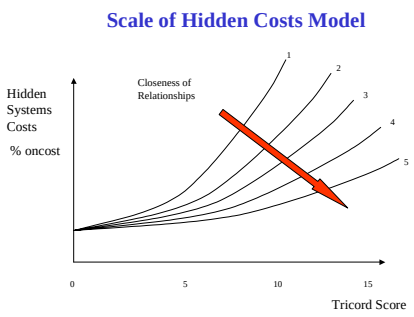
Before starting an initial one or two-day workshop is required to give the team members an appreciation of the approach and these tools, and how they work together, before they are ready to start.

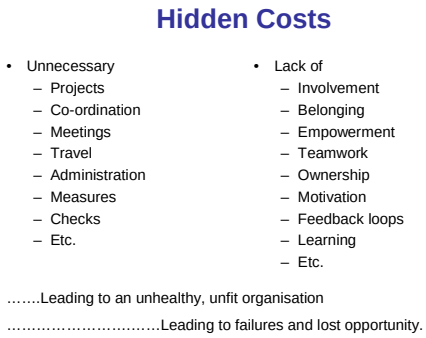
## Phase 3: Evaluation of Alternative Network Options

The phase 2 redesign work by the project team results in a systematically derived and documented proposal for the natural best network options. The secondary factors then need to be mapped onto these and are used to review and refine them.

The final emerging options then need to be evaluated against the balance of required performance criteria, weighted by their importance in achieving the company's goals. Both hard costs and hidden costs then need to be evaluated and balanced against one another.

- Hard Costs - Delivered material cost (assuming any benefits of local sourcing). Labour cost (assuming any lower labour rates, offset by any productivity differences). Overhead cost (assuming local establishment and staff costs). Transport and logistics cost across the network. Cost of quality performance differences. Tax implications.
- Hidden Costs - Tricordant have a model to help the business to scale the hidden cost of organizational division and distance (see diagrams below).




## Phase 4: Change Management Support

Tricordant's support of a client is not complete until a network re-design is implemented and seen to be working effectively on the ground. Tricordant have a broad experience of change management and are happy if needed to support the implementation programme in a flexible way, offering change tools, supportive training, experience and guidance along the journey. We do not jealously guard our intellectual property and materials; rather we want their use to be widespread across a client's organisation. We will leave you equipped to carry on applying the tools and approach as the organisation evolves further.