

40 Breakthrough Industrial and Process Engineering Strategies

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Suggested topic area – Design and Control of Production Systems for goods and services

Abstract

The paper describes the application of systematic innovation methods within the industrial and process engineering arena. Central to the successful application of these methods is the recognition of the importance of challenging the trade-offs and compromises that continuously hamper improvements to systems. The paper presents a list of the known strategies for challenging such trade-offs in ways that result in win-win solutions. The basis for the findings is the analysis of over two million successful innovations from across all fields of human endeavour. In addition to presenting examples of each of the win-win strategies, the paper provides case study examples showing how the method is being deployed in real life process engineering and implementation situations.

Introduction

In their attempts to conduct business for effectively, the large majority of organisations adopt innovation strategies built on trade-off and compromise, in which one aspect of business performance is improved at the expense of another. A systematic programme of research to identify and distill the best practices has shown that those organisations that sought to challenge and eliminate the compromises and contradictions that their contemporaries assumed were unchallengeable or fundamental, have achieved considerably better business performance (Reference 1). Building on a preceding study involving over 1500 person years of research examining the dynamics of system evolution from across all fields of human endeavour, the paper shows that all compromise eliminating solutions so far observed – including those seen throughout the business world – can be derived from 40 basic strategies (Reference 2). The paper goes on to examine these 40 strategies for breakthrough business innovation in the context of their relevance to the trade-offs and compromises present in the industrial and process engineering arena.

The paper provides a list of the 40 known strategies alongside real world and hypothesised future examples of those strategies in action. A final section of the paper examines a real case study problem and demonstrates how the strategies can be used to help generate deployable and effective win-win solutions in the networked economy.

Existing Theories and Work

Whilst the idea of achieving trade-off eliminating, win-win business solutions has long been seen as an attractive goal, there has been little research effort expended in trying to distill the generic elements present in those cases where such an outcome has been achieved. A failure to recognise that at an abstracted level all business have to solve very similar problems (most organisations involved in improving their time to market for example have done so at the expense of something else – for example increased cost or reduced specification or, more commonly, increased risk) has traditionally meant that the good solutions from one sector take a long time to transition to others.

The distillation of compromise-eliminating practices across all fields of engineering and science have revealed that all win-win solutions have emerged from – so far – just 40 inventive strategies. A recent programme of research has demonstrated that businesses and managers are using precisely the same 40 strategies when they have achieved win-win solutions. In the technical arena, the 40 inventive strategies have already begun to prove their worth in accelerating the transfer of good solutions from one discipline to another. In this arena it has been shown that win-win solutions can now be achieved in a much more systematic and disciplined fashion. In the business model design arena generally and the process engineering arena specifically, there has thus far been little if any exposure to the 40 known inventive strategies and consequently any win-win solutions have tended to emerge in a piece-meal fashion. The systematic deployability of good solutions from other sectors to those interested in concurrent enterprising forms the basis of the paper.

Research Approach

The approach adopted in the research has involved the systematic trawling of the management, engineering and scientific literature in search of win-win solutions. Thus far, over 2 million such solutions have been recorded since analysis first commenced in 1946. In each case, the research team – which currently totals 25 full-time researchers – examines a solution in order to identify the compromise that has been challenged (for example, where a business has successfully challenged a time versus risk conflict or a quality versus cost conflict) and the inventive strategy or strategies that have been used in achieving the solution. Each solution has then been placed within a matrix of contradictions intended to offer a means of enabling users in other fields to identify a contradictory pair of business requirements and be able to immediately observe – and hence use – the inventive strategies that have been successfully used by others that have already solved a similar contradiction.

Findings

The findings of the research – which is ongoing in order to ensure that new solutions are fed into the contradiction elimination database as they emerge (Reference 3) – are that businesses that are successfully challenging the conflicts and contradictions associated with concurrent enterprising are using precisely the same 40 inventive strategies found in other sectors.

The research has further identified examples of all of the known 40 strategies being used in an industrial and process engineering setting, albeit some are used much more frequently than others.

The main implication of the findings is that provided a business can identify what contradictions it is facing, a prioritised list of the inventive strategies to systematically identify paradigm-breaking win-win solutions can be generated. Win-win solution concepts are thus systematically achievable.

By way of example of the form of each of the 40 strategies, and examples of their application, Strategy Number 4 is one known as 'Asymmetry'. The Asymmetry strategy has been variously interpreted in the following ways by innovators that have successfully used it to achieve a win-win solution in a situation where trade-off would normally have been the strategy used:-

A. *Change the shape of an object or system from symmetrical to asymmetrical.*

Examples:

- (Proportionately) more 'Plan' or more 'Study' in the Deming PDSA cycle
- Skewed normal distributions.
- Budget for different departments individually rather than using a constant percentage increase or reduction for all departments
- More 'customer' in the customer-supplier relationship
- Where a B2B relationship is viewed as 'symmetrical', introduce asymmetries by, for example, adding 'complementor' organizations into the relationship

B. *If an object or system is asymmetrical, **change** its degree of asymmetry.*

Examples:

- 360° appraisals
- Use of a 'constructed crisis' strategy as a means of getting people working in a unified manner
- More equitable 2-way dialogue between management and workers
- Shift away from calendar-influenced sales bias (e.g. shift from annual to bi-annual car registration dates (to reduce August sales peak), greetings card companies, etc.)
- Honda's 4M – 'man maximum, machine minimum' product design philosophy.
- Bigger customer focus groups/Internet focus groups
- On-line, web-cam shopping – 'one store serves the world'
- Collaboration with 'complementor' organisations when competing for business with other directly competitive companies

In addition to listing the other 39 breakthrough strategies, the paper also describes how their apparently generic nature has been deliberately chosen to work in tandem with the disparate idea-connecting manner in which the human brain operates when being creative (Reference 4). The key in the case of the Asymmetry strategy, for example, if it is suggested as a potential solution to a given business contradiction is to connect to symmetries in the existing system and explore what happens when they are turned into asymmetries.

The paper describes how a number of leading edge organisations are beginning to deploy the 40 inventive strategies to systematically achieve tangible bottom-line business benefit. In addition to presenting the 40 strategies plus examples, the paper includes real world case study examples of their use to generate breakthrough business concept innovations in the context of a globally networked economy business situation.

Conclusion

The large majority of enterprises conduct their business using traditional trade-off and compromise perspectives of the world. The overwhelming research evidence suggests that the most successful enterprises do not use such strategies when they are looking to improve the way they conduct their business. The research evidence further suggests that taken across every field of human endeavour there are thus far just 40 known strategies through which compromises and trade-offs can be challenged and eliminated. The paper brings these 40 strategies together in the specific context of concurrent enterprising for the first time anywhere. Their adoption in our increasingly networked economy can be expected to pay significant dividends for those organisations that seek to adopt them.

References

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