A Grey Simulated Model For Urban Strategy Planning On SocioEconomyEnvironmentR&D

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Abstract

This paper is concerned with urban strategy planning on macro SocioEconomyEnvironmentR&D. Based on Grey System Theory, a urban grey simulated model (UGSM) has been established. The base run shows that it is high efficient in system action fitting. Taking a city as an example, some strategy policy tests are illustrated and main conclusion are presented.

Total Quality Management - Managing Change in Manufacturing: Contrasting the Problem Solving Approach in a Quality Cost Related Initiative with Soft Systems Methodology.

Introduction

In a high-level lecture, 'Beyond Total Quality Management', delivered by Russell Ackoff in September, 1992 (Ackoff, 1992), an example, relating to the massive inventory carried within the numerous vans of a repair company, was used to illustrate the control of previously uncontrolled variables. The simple example encapsulated a number of areas of concern which interest researchers within different fields related to management research, particularly Total Quality Management. In the Ackoff example, there were obvious communication difficulties, the costs involved were, essentially, Quality Costs, there was a decided lack of understanding of the system and, there was no appreciation of the world views of the participants. In this particular case, if the operator did not carry inventory he could not effect repairs. However, the operator's wage was made up from the repairs he effected. He would only use up to fifteen parts a day - yet he had to carry more than a thousand! If he didn't, it meant, in the main, at least a two hour round trip to collect parts.
Philip Crosby, in 'Quality is Free' (1979), extols the benefits of asking the operators on the shop floor "what the problem really is". By doing this he not only gains a feel for the problem area, but the possible solutions begin to form in his mind. Further into the monograph, under the sub-heading of 'Error-Cause Removal', Crosby highlights a number of difficulties relating to communication between the shop-floor operators and management. One key point is that an operator is expected to provide the solution when he or she brings the problem to management's attention.

These examples are not isolated. In most organisations, communication difficulties occur which prevent not only problem solving but inhibit identification of problem areas in the first place. This paper seeks to illustrate how Soft Systems Methodologies could have been used, and could still be used, in an organisation, Company X, which is striving to be the best in their particular field. That is in the sense of world-wide leadership for the products they produce.

The paper will, first of all, provide a background to the company and what they are trying to achieve. This will be followed by a brief description of Total Quality Management and, in particular, the role of Quality Costs based on a longitudinal study in this manufacturing environment. The problem identified and 'solved' by the team will then be investigated and contrasted with SSM. Finally, potential uses for SSM within this organisation will be suggested.

The Company

Company X is a supplier of consumables to the steel industry world-wide. Their products are an integral part of the steel making process and are an essential item in casting as well as the transference of molten metal. The products are relatively sophisticated and are produced through a combination of old and new technologies.

The company is part of a major multi-national and employs approximately 90 people on the site where the current study is taking place. Around 30% of the employees fall into the general categorization of Management/Administration and the others can be categorized as Operators, working within different sections of the works.

Broadly speaking, the organisation can be described as a 'traditional industry' which has developed from the brickmaking industry, and they are situated in a geographical location which has a long association

with ceramic material production. In recent years changes (related to a TQM initiative) have taken place, and are still taking place, which have improved many aspects on the site. These include:

i Achieving registration to BS5750, part 2/ISO 9002, in 1989 and, since then, there has been incremental planning as well as the implementation of a continuous improvement programme.
ii The successful recruitment of managers, and trainee managers who hold, for the industry, high levels of educational qualifications eg there are eight individuals in the Management/Administration group who have obtained at least one degree.
iii Investments in equipment and machinery and subsequent improvements in output and quality.
iv Involvement in Investors In People (IIP) programmes to improve the education and training of the whole workforce.

Total Quality Management and Quality Costs

"TQM is the system of activities directed at achieving delighted customers, empowered employees higher revenues, and lower costs." (Juran and Gryna, 1993)

In Japan, from 1950, a quality chain reaction model was used by senior management, particularly in manufacturing, to bring the concept of quality improvement to all levels of employees (Deming, 1982). This simple model illustrated that if organisations improve quality, costs will decrease and productivity will improve - which ultimately leads to more jobs.
In recent years a great deal of interest in quality issues has been stimulated worldwide with the introduction of the Baldrige Award in the United States and the European Quality Award. Fourteen of the top European companies signed a Letter of Intent in September, 1988, which founded The European Foundation for Quality Management. The Foundation, (EFQM), acts as a catalyst and is actively promoting Total Quality Management to top companies throughout Europe. TQM is the process of continuous improvement and involves analysing key areas to be addressed by the company or organisation, planning for improvements, executing these plans, constant monitoring, and making changes which will improve the performance. Every organisation is different and therefore has different requirements from a TQM programme. A number of common areas which tend to be addressed are relationships with suppliers, personal development and involvement of personnel, and determining the true cost of quality of products or services.

There has been a growing awareness of the importance of the "customer", internally as well externally to organisations (Schoenberger, 1990) and Company X has also been coming to terms with this. Greater emphasis is now being placed on customer satisfaction and more effort is being expended on broader quality concepts which includes a greater emphasis on employee participation. Collectively, these activities form the part of the basis of what is known as Total Quality Management or TQM.

A key requirement in ensuring the success of a TQM program in an organisation is commitment. TQM is a long-term strategic issue which is about continuous improvement in all areas of the organisation's activities and which is driven by commitment from top management and subsequently involves each individual employee. Although commitment is a prime requirement, a systematic approach to the achievement of TQM improvements is also necessary. The organisation also requires an infrastructure of people, systems and ongoing training which will allow it to meet the demands of the marketplace.

In 'BS 7850: Total quality management, Part 1. Guide to management principles' (BSI, 1992), it states that "Total quality management assures maximum effectiveness and efficiency within an organization by putting in place processes and systems which will ensure that every aspect of its activity is aligned to satisfy customer needs and all other objectives without waste of effort and using the full potential of every person in the organization." Thus it can be see that the philosophy of TQM is intertwined with pragmatic elements to achieve the organisation's goals in a dynamic environment.

The three major components of TQM (which are being addressed in Company X) are:

* A quality assurance system
* Quality tools and techniques
* Teamwork

(Mortiboys and Oakland, 1991)

One major basis for a quality assurance system is the ISO 9000 series (BS 5750: 1987), 'Quality Systems'. Certification to this standard is being heavily promoted, not only in the UK, but in the USA, throughout Europe and many other parts of the world. This quality system standard tends to be a good starting point for TQM, as a fairly robust administrative system can be put into place and developed subsequently. Historically, Quality Standards began with the military and although the British Standard was originally oriented towards manufacturing, other standards have been issued which give guidance to Service Organisations (BS 5750: Part 8:1991; ISO 9004-2:1991) and Software Development (BS 5750: Part 13:1991; ISO 9000-3:1991).

The 'Quality' tools and techniques associated with TQM range from the very simple such as tally charts and histograms, to complex, dynamic, project control eg implementing Quality Function Deployment (QFD) (Bossert, 1991) which involves all functions of the organisation in improving the product or service for the customer. One source of the current drive and interest in these tools has been the success of Japanese industry in controlling processes. The work of certain authors, such as Ishikawa, has done much to bring new concepts to maintaining quality standards, eg 'Guide to Quality Control' was first published in 1971 and includes techniques such as "Pareto Analysis" and "Cause and Effect diagrams".

'BS 7850: Total quality management, Part 2. Guide to quality improvement methods' (BSI, 1992), includes explanations and examples of tools and techniques. This part was issued to give guidance on implementing continuous quality improvement. If both parts of the standard are combined, then guidance on the "people" element of TQM emerges, eg training and education, and involvement. Through teamwork, complex problems can be tackled which would be too big for individuals to solve. Complex problems which may be too big for individuals to deal with, eg on the interface between departments, could be addressed by a multi-disciplinary team. Recommendations for change or improvement are more likely to be accepted (Oakland, 1989). Changes and improvements can be obstructed due to culture problems within the organisation (Atkinson, 1990) and, although this can be looked on as a management of change issue, attitudes may have to be changed in individuals, work groups or sections of management.

Crosby argues that "Quality is Free" (1979) and what he means by this is that the costs of achieving quality are offset by the savings in quality improvements and thus pay for implementation. As stated in BS 6143 Part 2: 1990, 'Guide to the economics of quality. Part 2. Prevention, appraisal and failure model', quality costs are important regardless of whether the organisation is in the manufacturing or service sector (BSI, 1990). One estimate regarding the value of Quality Costs to UK establishments was that it cost the UK approximately 10% of the gross national product, or £10 billion, in 1978 (DPCP, 1978). These costs can be used as an integral part of a TQM programme.

The term "Quality Costs", even though guides are available, tends to be very difficult to define and it can mean different things to different organisations and even individuals within the same organisation can have a different understanding. The definition of Quality related costs, from BS 4778, (BSI, 1991) is "Cost in ensuring and assuring quality as well as loss incurred when quality is not achieved", and these costs can be classified into three main categories; Prevention, Appraisal and Failure. This is known as the PAF model and has been used in one form or another since the 1950s (Juran, 1951; Feigenbaum, 1961). The aim of a quality cost improvement programme is to shift the costs from the failure category to prevention. The British Standard, BS 6143 Part 2, makes it clear that to be successful in business requires financial planning and control. The standard has been put under scrutiny and constructively criticised for a number of reasons including the difficulties in its implementation (Porter

and Rayner, 1992). However, it does make users aware that; firstly, "failures, however caused , reduc profits" and secondly, "preventative quality control activities and the appraisal of quality standards cos money to operate". As a basis for quality improvement, a quality cost system can play a significant rol and can become an important tool to be used in the management of the organisation (Campanella, 1990) The two main methods tend to be the PAF model or the Process System Model (BS 6143, Part 1).

The categories of PAF include the following:

i Prevention Costs arise in the course of preventing, investigating or reducing the risk o nonconformities or defects. May include:
* Quality Planning
* Supplier Assurance (numbers of organisations now seeking single sources of supply this is extremely important as purchased items may account for up to 60% of manufacturing organisation's total costs) (Brown and Cousins 1992)
* Quality Training
* Quality Improvement Programmes

ii Appraisal Costs are associated with the cost of evaluating the achievement of quality requirements. May include:
* Inspection and testing
* Laboratory acceptance testing
* Analysis and reporting of test and inspection results

The final cost category, however, tends to be the most important one - as the sub-categories can have serious internal and/or external consequences. Studies have shown that Quality Costs can lie betwee 10-20% of turnover and that 65% of these costs can come from Failure Costs (Dale and Plunkett, 1992) Failure Costs can be divided into Internal and External sub-categories.

iiia Internal Failure Costs are regarded as the costs arising within an organisation due t nonconformities or defects at any stage of the process. These costs occur prior to dispatch o delivery. May include:
* Scrap
* Waste
* Rework and repair

IIIb External Failure Costs may be crucial. These are the costs which arise after delivery to customer/user and are due to nonconformities or defects. May include:
* Complaints
* Warranty Claims.
* Concessions (deviations)
* Recall costs
* Product liability
* Loss of sales

The Process model approach has been developed to apply quality costing to any process or service (BS 6143 Part 1, 1992) and is applied in much the same way as IDEFO. Quality Costs can also be regarded as;

a) the Cost of Conformance (COC) ie the cost of achieving the required standard or specificatio for the product or service supplied by the organization and
b) the Cost of Non-Conformance (CONC) where specifications are not being met and failures occur at various points in the supply cycle.

The role of the Quality Assurance (QA) Manager.

The Quality Assurance manager in Company X, working in a TQM environment, is therefore involved in a variety of activities which involve systems, people and techniques to achieve organisational objectives. The purpose of the Quality Cost programme may be to address say, high cost problems, identify cost reduction targets, determine performance measures, or some combination of these. The costing strategies employed can range from measuring and monitoring all identified quality costs - to costing specific Quality Improvement Projects and/or activities.

Generally speaking, the QA Manager has to balance key considerations which arise in the collection of quality costs, which include:

i Determining the relevance of the data which is going to be collected.

ii Assessing the ease of collection and determining whether improvements to present systems require too much disruption.

This obviously requires a reporting system, or mechanism, and should be designed to meet end-user needs ie internal as well as external. However, a number of difficulties arise in reporting quality costs and perhaps the key issue is "what" to report to the users of the information. It may be easier to begin afresh with a new Quality Cost system than attempt to extract costs from the existing system. Quality assurance personnel in the US have been urging accountants to become more involved in order that quality cost measurements could be incorporated into the accounting system and, at the same time, motivate management to take action (Morse, 1993). Improvements can be facilitated by using performance measures such as the profile of development costs and the nature of the costs such as waste but the usefulness of the exercise must be communicated to gain full cooperation. Furthermore, by establishing the system, the planning and control of future quality costs becomes possible; budgets can be monitored and reduction targets set.

Continuous Improvement Through People (CITP) Teams and the problem to be addressed.

Company X has been used as an integral part of a study into the underlying causes of Quality Costs for the last three years. From a questionnaire developed by the researcher in the early stage of this longitudinal study, it emerged that a very high proportion of employees would like to take part in aiding the Company with quality improvements. The researcher concentrated on key areas such as communication, training and education, and perceived individuals' problems within the Company.

The management team, under the local leadership of the General Manager, recognised the need for the 'personal development' of individuals as part of a continuous improvement programme. This led to the group looking at the 'Investors In People' initiative which, they envisage, will lead to the granting of the IIP Standard. The summary reports from the researcher's analyses were used as an initial guide to determine training, as well as educational, needs which helped individuals and met company goals.

The primary objective of the IIP involvement was to change attitudes - leading to culture changes - which, in turn would improve quality and reliability and secure a competitive future for the company.

Investing in staff development was not just confined to high-level, value added, training. Basic educational needs in the form of a Numeracy course was also taught, by an outside organisation, to some operators. The theory being that, in the longer term, these individuals would be able to contribute to the collection, display, and possibly even analysis of quality-related data. Only a dozen or so employees took part and it emerged from later research that more people would like to be involved in a similar course.

Individuals, mainly from the Management/Admin group, were allowed day-release facilities to pursue qualifications which would primarily aid them in their jobs: the Quality Assurance team are a good example of this. Other staff members attended evening classes and a small number investigated part-time degrees in business subjects.

The Management Team met, off-site, to discuss important issues which included 'Team Skills' 'Effective Leadership', and 'The Concept of continuous Improvement'. The facilitator, in a report to the company and the funding body, wrote, "The seminars helped build trust and teamwork within management and they have continued to work as a cohesive team throughout."

However, a major effort was also made in the development of teams which were given the mission of aiming for continuous improvement by providing solutions to problems the company already faced. Unlike quality circles, these teams were hand-picked individuals with special skills and knowledge. The first team was comprised of five members from engineering, technical, and lathe machining. Three members came from the management/admin group, including a senior manager and a foreman, and the other two from the operators group.

From the outset the problem to be tackled was identified by the management team. The CITP team was introduced to problem solving and identification of solutions which were essentially aimed at team based problem solving. Training began in earnest for them with guidelines on conducting effective meetings. They were taught brainstorming techniques and the use of the 'Fishbone' diagram to determine cause and effect. The team was dealing with a structured problem, ie one which had been fairly clearly defined and passed to them by the management team. A member of the management team was also a member of this first CITP team.

The problem addressed the issue of recycling lathe grindings from a standard product. The ground material had previously been treated as waste, and this project would also look at re-using material in subsequent standard batches, in ways in which it would comfortably meet the specification.

A similar problem had been investigated some years before and a satisfactory solution had not been forthcoming. However, changes in the technology employed, process improvements and tightening of specifications meant that solutions were a possibility. Over and above this, changes and improvements involving people management meant that a wider range of skills and knowledge would be available. Each member of the team had a specific role to play, and the responsibilities they were given included liaising with others in the company who had something to contribute.

The CITP team determined that the current waste figure for the year was variable, Z. After further favourable testing which showed that the desired outcome could be successful, the team then moved on to ways of meeting the set objectives. Thus, the problem had been defined. The team tackled this by designing a machine which would separate particles from the grinding process and subsequently discharge these into relevant containers which, in turn, would be re-processed. From the internal study, it was estimated that 85% of the material was recyclable and 15% was irrecoverable process waste.

The team calculated development costs, running costs and estimated savings. The key figures are the following:

Cost of separation -	£A per annum
Maintenance of sub-process -	£D per annum
Waste from grinding stage (variable) -	Z kg per annum
Proportion of recoverable material -	.85Z kg per annum
Proportion of unusable material -	.15Z kg per annum
Cost per kg of raw materials -	£Y
Annual waste - raw materials -	£ZY per annum

Savings per annum - £((.85ZY)-(A+D))
NB without investment cost of machine

Break-even point of operation would be the point at which the value of recovered raw material equals the cost of recovery (this sets at zero the environmental value of recycling).

The team made presentations of the proposed solution to the management team on-site and senior managers from the parent organisation. The senior management and the facilitator, quite rightly, were delighted by the above outcomes from the exercise as a whole. However, when the situation is examined from another perspective, say SSM, questions arise which highlight greater problems within the organisation.

SSM and the Problem

Soft systems methodology (Checkland, 1981; Patching, 1990; Checkland and Scholes, 1991; Wilson, 1992) was not applied to the problem by either the management team or the CITP team. However, certain similarities do exist between stages in SSM and methods employed. SSM, in the broadest sense, would be used to compare the 'Real World' situation with the 'Systems World'. The designated analyst or, in this case, the management team, would carry out some form of fact finding say, by discussion or even the use of critical examination. They would form some kind of conceptual model - perhaps not openly expressed - but, nevertheless valid and based on great experience plus relevant knowledge. The conceptual model required a transformation to the defined process - within a human activity system - which would result in savings of one sort or another. Developing an understanding of the situation is very important as disagreements could occur between the two groups and only realise some of the potential in the problem solving stage (Flood, 1993). The key weakness may be that the 'problem' was defined or, in effect, a 'hard' problem was defined in order that a solution found and a successful outcome achieved. The defined problem, ie dealing with the grindings and recycling them, is only a small part of a multi-stage process. There are roughly 14 key stages and within these, sub-stages (some with variations). Quality related costs feature, in one way or another, in each of these stages. The knock-on effects through the system lead to a multiplicity of 'downstream' problems and recycling grindings is just one of these problems! The key question arises: is the 'real' problem being addressed?

SSM could be used here in two ways: firstly, from the perspective, or view, of the management, in that they had identified a problem and a satisfactory solution was subsequently engineered; secondly, that the management used SSM from the outset and a problem sub-set was dealt with, ie without losing sight of the system and the effects on the sub-systems.

The basis of SSM modelling may come from relevant viewpoints and, in the following examples, these will vary. Firstly, the hard problem approach may include views from:

* The General Manager
* The management team
* The CITP team
* The Facilitator
* The operators who will operate the system
* Operators who are asked for their opinions

Secondly, by taking a more open - or softer approach, views from a wider group may be considered:

* Head Office/Shareholders
* The General Manager
* The management team
* The CITP team

* The Facilitator
* The operators who will operate the system
* Operators who are asked for their opinions
* Technical department
* Marketing (including the customers'view)
* End users
* Quality Assurance
* Production Planning
* Health and Safety representatives

These two perspectives are now explored in order.

Perspective 1:

Stage 1: Problem situation unstructured

From the management education/training process, a number of outputs emerged which included identifying areas for improvement within the manufacturing process. Initially, therefore, the problem situation was unstructured.

Stage 2: Problem situation expressed

A number of problem situations were expressed and, after debate, the recycling situation was expressed in such a way that the first Continuous Improvement Through People team could tackle this.

However, the management team, when dealing with stages 1 and 2, effectively passed on a 'hard' problem for the CITP team to solve.

Stage 3: Root Definition of relevant system

Developing the mnemonic CATWOE from the management team's perspective is not clear cut but the following may provide some insight.

C The clients or customers may, in fact, be the management team themselves as they, in turn, report to a head office.

A The CITP team reports to the management team and they will have to provide a working solution. Is this the real category for the CITP team?

T The transformation of what was previously waste to what could be a usable raw material is part of the transformation. Operating practices will also have to change.

W This example is limited to the worldview from the perspective of the senior managers. The problem has been defined for the CITP team - what would they question?

O The owner of the system could be the CITP team. Because of the nature of the problem and the fact that a success is required the CITP team is not only in a position to offer solutions but could also show that a solution is not viable.

E The environment in this sub-system relates to other sub-systems in the manufacturing process. However, the environment is also the business world and the community in which the organisation operates.

Root Definition

Structuring the problem the way they did meant that the management team's root definition could have been say "savings were to be made by separating particles from the grinding sub-

system and recycling the appropriate material: this operation would, in turn, become an essential part of the sub-process."

Stage 4: Conceptual Models

The Key model envisaged by the management team may just have measured savings in cost terms.

Stage 5: Real world/Systems world comparison

The CITP team dealt with what they could achieve in the 'real' sense as compared with the systems world. Changes in technology and more consistent product meant that the problem could now be addressed in the 'real' world as opposed to the conceptual notions of some years previously.

Stage 6: Feasible/Desirable changes

The CITP team members discussed feasibility with key players, eg those who would operate the solutions. Costings of the alternatives, together with projections of savings, were compared in order to provide solutions which, in some way, would meet desired changes.

Stage 7: Action to improve

The final action to meet the desired changes was ratified by senior management. The CITP team were very aware of the requirements for training, the development of procedures and establishing ownership of the solution with the operators.
Feedback from the process was obviously regarded as vital and it was established that monitoring procedures would be in place in order to determine any corrective action.

An interesting conjecture would be to ask what the management team are actually doing? Are they trying to solve a problem by using a CITP team or is the CITP team launch and establishment the real system under investigation? If we accept the above scenario in that they were addressing the structured sub-process problem which, in turn, was part of a human activity system then perhaps we can step back a bit for perspective 2.

Perspective 2:

Stage 1: Problem situation unstructured

The management team are aware that they have a number of process problems - some of these are interrelated. In the last year, major efforts have been made in education, as well as training, for all staff. Feedback, in a number of forms, has raised the awareness of the management team and they now expect to solve problems as part of the continuous improvement process. Quality cost issues have been brought to the fore due to the involvement of the Quality Assurance Manager. Initially, therefore, although the problem situation is unstructured the dynamic nature of the process is understood.

Stage 2: Problem situation expressed

The problem of the recycling situation is expressed in a much wider context. As part of another process improvement initiative, ie design and tooling changes, less material was now in the manufacturing system but a problem still remained. Therefore, the issue of the recycling problem is, in effect, a soft system problem as it will require changes to be made upstream in

the process as well as downstream - and people can solve these issues. The recycling situatior could be expressed in such a way that the first Continuous Improvement Through People tean could tackle this and highlight other changes.

Stage 3: Root Definition of relevant system

The CATWOE mnemonic from the management team's perspective, could be expressed in the following way:

C The clients or customers may, in fact, be the management team themselves as they, in turn, report to a head office.

A The actors ultimately will be those individuals who operate the system. Although the CITP team reports to the management team more involvement from final end-users could be sought.

T The transformation is not just about waste cost savings. It is about process improvements and developments in operating practices. Upstream and downstream.

W The worldview, from the perspective of the senior local managers, would take into account where in the system the problem lay and what rewards, as well as effects, solving it would bring ie for internal as well as external customers.

O Ultimately the owners of the system are the shareholders. However, the owner of the problem is the management team. It is up to the local management to improve the outputs from the system.

E The environment in which this sub-system exists relates to other sub-systems in the manufacturing process. Internally, questions will be raised when alterations are made to the sub-process - which will lead to changes in other sub-processes. Externally, the marketing environment, which includes agents and end-users, will notice product improvements which are more than cosmetic. The working environment will improve due to less dust in the atmosphere.

Root Definition

Structuring the problem the way they did meant that the management team's root definition could be, including appreciating the CITP initiative, say, "determine the extent of the problem which results in the excess material on products, assess savings which could be made by grinding, separating, and recycling the appropriate material particles; the solution would, in turn, become an essential part of the sub-process until further process improvements could be made."

Stage 4: Conceptual Models

The model envisaged by the management team could include environmental improvements such as time expended on cleaning or the amount (in weight) of dust extracted from the process. Other issues such as quality cost savings may be contrasted and evaluated.

Stage 5: Real world/Systems world comparison

The CITP team could deal with the immediate technical problem in the 'real' sense as compared with the systems world. Changes in attitude and the groundwork for potential involvement from operators in this and future initiatives could be determined during this phase.

Stage 6: Feasible/Desirable changes

The CITP team members discussed feasibility with key players eg those who would, in time, operate the solution(s). However, the development of the CITP teams is also a desirable change and the benefits reaped from this initiative would be monitored.

Stage 7: Action to improve

The final action to meet the desired changes was ratified by senior management. The CITP team were very aware of the requirements for training, the development of procedures and establishing ownership of the solution with the operators.
Feedback from the process was obviously regarded as vital and it was established that monitoring procedures would be in place in order to determine any corrective action.

Summary

On reflection, a number of outcomes were identified by the facilitator and reported to the senior managers:

i The Project was a success
ii Team members were encouraged by success
iii The Management Team were encouraged by the success
iv Team members wished to continue on to other projects
v Other teams were to be formed
vi Individuals wished to develop personal skills
vii Management skills were improved
viii Attitudes shifted and improved within the Company
ix Flexible CITP teamwork worked!
x Windows of opportunity opened for further development.

The purpose of introducing the Soft Systems Approach was not to openly criticise the way the problem had been handled but to introduce the management team to a different approach which would allow them to view the problem from a different perspective. Further, by incorporating this approach into the TQM programme, then more of the workforce could be involved in continuous improvement projects. It would allow the views (worldviews) of individuals to be expressed, in such a way that their perceptions of what is going on in the company could be viewed objectively by the management, and used as a way forward.

The approach taken by the management, in addressing the identified problem the way they did, essentially meant that they were trying to optimise output and recovery from a process sub-system. The SSM approach would have led them to question more vigorously why they needed to solve this problem. In Quality Cost terms, this would mean eliminating an internal failure cost and creating a much less costly prevention cost.

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