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A Soft Approach to Solving Hard Problems in Construction Project Management

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Abstract
Construction projects are faced with a challenge that must not be underestimated. These projects are increasingly becoming highly competitive, more complex, and difficult to manage. They become 'wicked problems', which are difficult to solve using traditional approaches. Soft Systems Methodology (SSM) is a systems approach that is used for analysis and problem solving in such complex and messy situations. SSM uses "systems thinking" in a cycle of action research, learning and reflection to help understand the various perceptions that exist in the minds of the different people involved in the situation. This paper examines the benefits of applying SSM to wicked problems in construction project management, especially those situations that are challenging to understand and difficult to act upon. It includes relevant examples of its use in dealing with the confusing situations that incorporate human, organizational and technical aspects.

Key words
Construction Project Management, complex systems, problem solving, Soft Systems Methodology.

1. Introduction

The management of construction projects is a challenge that must not be underestimated. Such projects are becoming more complex, they are subject to constant change, and the industry environment is highly competitive and cost critical. The challenge becomes greater where joint ventures, partnerships and sub-contracting agreements are involved. The ad hoc and tradition approaches to construction management often fail to perform in these situations, and managers need to consider adopting alternative approaches to solve these 'wicked problems'.

Soft Systems Methodology (SSM) is a systems approach that is used for analysis and problem solving in complex and messy situations. SSM uses "systems thinking" in a cycle of action research, learning and reflection to help understand the various perceptions that exist in the minds of the different people involved in the situation. It is particularly suited to complex management systems, and seeks to evaluate as many different options as possible. This approach is applicable to many domains; including change management, planning for health and medical systems, information systems planning, human resource

management, analysis of logistics systems, and expert systems development. More specifically, SSM is being used in research associated with knowledge management, project management, and engineering and construction management.

2. Nature of Problems in Construction Project Management

Construction is a tough business, and construction industry is often viewed as being stubborn, risk averse, and old fashioned. This industry has a culture that generally resists any new adoption and diffusion of innovation, be it a new innovative technology or innovative process Barthorpe et al. (2000). Building and civil construction organisations, made up of contractors, subcontractors and specialist contractors, are different when compared with other innovative organisations in various industries. Construction is a very demanding and stressful process (Lingard and Sublet, 2002). The construction team works long hours and is constantly under pressure to meet deadlines in order to save them from liquidated damages. Experimenting with new ideas and seeking innovative alternatives are often considered as endeavours that increase uncertainty and may put at risk the project success. Such a culture of risk avoidance has led to the situation where people are not bothered to think of performing innovatively.

However, research in construction related disciplines have produced a number of innovative processes, products and technologies. These innovations include technologies that have the potential to boost low productivity levels of the construction industry, if adopted and diffused properly within the construction practice. Unfortunately, the adoption and diffusion of these innovations are usually met with severe resistance in the construction organisations and 'culture' of the industry is usually blamed for this (Latham, 1994; Department of Environment, Trade and the Regions, 1998; Department of Industry Science and Resources, 1999). Most of these innovations go unnoticed by the practitioners. Only few innovations can penetrate through the resistive culture of the building and construction industry after making successful headway in other industries (e.g. Total Quality Management, Information Communication Technologies (ICT), Knowledge Management etc.). Resistance to change, stiff culture, lack of motivation and reward systems, weak leadership, strategy and vision, absence of learning mechanisms, lack of awareness about the direction of construction research and not foreseeing the immediate benefits of adopting innovations lead to this discrepancy and gap (Gann, 2001; Santos *et al*., 2002; Oglesby *et al*., 1989; Bresnen and Marshall, 2001). All these characteristics suggest that this industry sector is confronted by 'wicked problems' (Green, 1999; Ballard 2002).

3. Wicked Problems

The concept of wicked problems originated in the work of Rittel and Webber (1984) that examined the societal problems that planners face. Becker (2002) defines problems as being wicked in the sense that they are very difficult to solve. Wicked problems typically have a dense web of inter-related factors, making it very difficult to understand how one decision will impact decisions in other areas. This class of problem often exists in dynamic and uncertain environments that generate significant risk. Further more, Becker (2002) observes that conflict arises from wicked problems where there are competing claims, especially where 'good outcomes' are traded off against 'bad outcomes' within the same value system. Figure 1 provides an overview of the nature of wicked problems.

Wicked problems can take many forms and exist in a wide variety of settings. Gustafsson (2002) describes the design and management of the physical setting for organisational change as a complex process that is a wicked problem. Similarly, Savage *et al.* (1991) give as an example the challenge of establishing a socially responsible and effective organisation within a turbulent global economy. Lang (2001b) states that knowledge work deals with wicked problems, especially where the 'problem space' is continually changing and complex judgments are required. Other wicked problems are the typical challenges commonly faced in software design, government and social policy formulation, and strategic planning in organisations (Buckingham Shum, 1997). Furthermore, the presence of multiple stakeholders

complicates situations and exacerbates the wicked problems. The response to wicked problems, suggested by Gustafsson (2002), is to adopt a holist open systems approach that recognises that all the parts are inter-related and can affect each other. Lang (2001a) recommends that wicked problems should be addressed through a process of discussion, debate and deliberation among team members, leading to compromise and the reconciliation of different viewpoints and perspectives. Bryson *et al.* (2002) recommend that stakeholder analysis is particularly useful for turning wicked problems into problems that can be solved, and are worth solving.

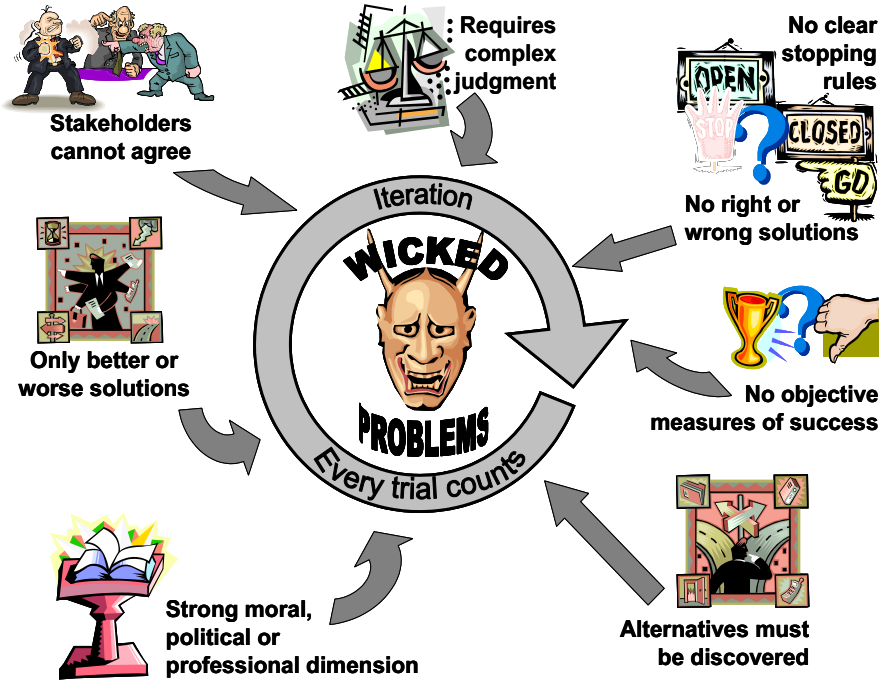

Figure 1. The Nature of Wicked Problems
(Adapted from Rittel and Webber, 1984)

Finally, Barry and Fourie McIntosh (2001) recommend that Soft Systems Methodology (SSM), which incorporates systems thinking and systems concepts, is an approach that provides the opportunity for incremental improvement that is needed to address wicked problems. In particular, SSM offers a framework to involve all the stakeholders in a continual learning cycle. It offers an empirically based theoretical foundation for thinking about, analysing, and responding to wicked problems.

4. Soft Systems Methodology

Soft systems thinking seeks to explore the 'wicked' and 'messy' problematic situations that arise in human activity. However, rather than reducing the complexity of the 'mess' so that it can be modelled mathematically (hard systems), soft systems strive to learn from the different perceptions that exist in the minds of the different people involved in the situation (Andrews, 2000). This interpretive approach is strongly influenced by Vickers' (1968, pp. 59, 176) description of the importance of appreciative systems in dealing with human complexity. Checkland (1999), and Checkland and Scholes (1990) have attempted to transform these ideas from systems theory into a practical methodology that is called Soft Systems Methodology (SSM). Checkland's premise is that systems analysts need to apply their craft to problems of complexity that are not well defined, and that SSM attempts to understand the wicked and fuzzy world of complex organisations. This is achieved with the core paradigm of learning (Checkland, 1999, p. 258).

Soft Systems Methodology (SSM) may be used to analyse any problem or situation, but it is most appropriate where the problem "cannot be formulated as a search for an efficient means of achieving a defined end; a problem in which ends, goals, purposes are themselves problematic" (Checkland, 1999, p. 316). Soft Systems Methodology, in its idealised form, is described as a logical sequence of seven steps (Checkland, 1999, pp. 162-183). These are illustrated in Figure 2.

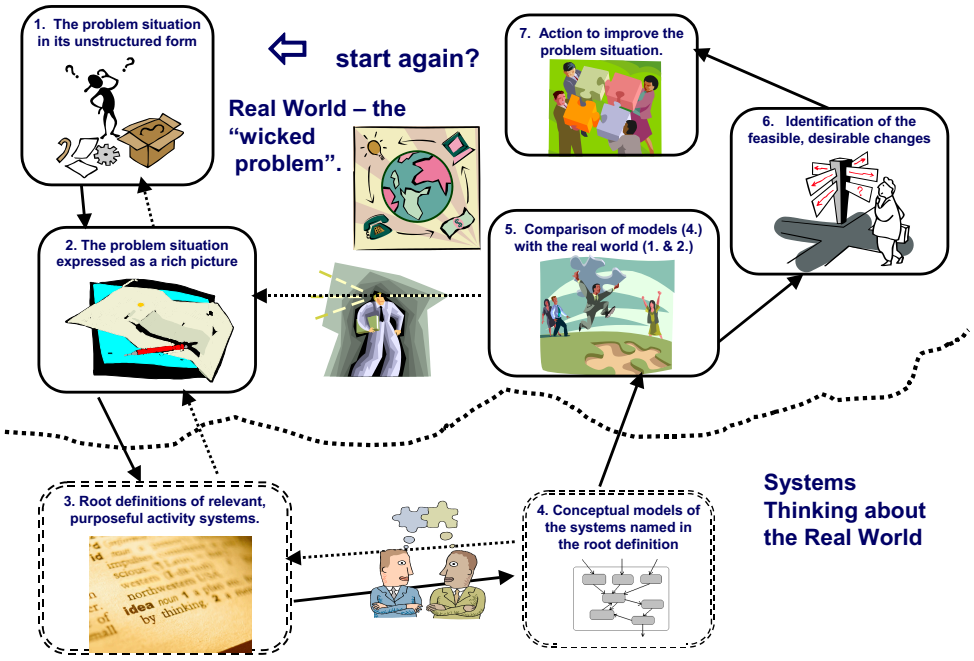

Figure 2. Summary of SSM as a seven-stage process
(Adapted from Checkland, 1999: pp. 163, and Checkland & Scholes, 1990: pp. 28)

It is most important to note that the sequence is not imposed upon the practitioner; a study can commence at any stage, with iteration and backtracking as essential components. SSM encourages investigators to view organisations from a cultural perspective. Therefore the component parts that are human beings determine the essential characteristics of organisations. These "people-components" can attribute meaning to their situation and define their own purpose for the organisation.

5. Applying SSM to Problems in Construction Project Management

Industries with entrenched traditional structures, including the building, construction and engineering industries, are under particular pressure to review their working practices. In this context, Elliman and Orange (2000) recommend SSM as an approach to facilitate effective change and to improve work practice. In particular, SSM is able to stimulate debate and capture the vision for the future of participants. They observe that a soft systems approach allows the exploitation of individual and socially constructed group knowledge and experience. Green (1999) also identifies wicked problems in the building and construction industries and suggests that the potential of SSM lies in the early stages of a project to assist stakeholders to achieve a common understanding of the problem situation. Cushman *et al.* (2002, p.3) observes that "Construction is ultimately a very complex, multi-disciplinary activity and there is a need to integrate the kind of design and management processes in terms of skill and the knowledge that people bring." To achieve this, Cushman *et al.* have used SSM's rich pictures and root definitions to identify responsible actors, key transformations, and the knowledge resources that are appropriate to the

needs of a construction company. Venters *et al.* (2002) further describes how SSM can be used to develop conceptual models that identify patterns in knowledge activities. Such patterns can be used to provide a basis for technical design and organisational and social intervention. Based upon the need to address the wicked problems in the construction industry, the following model to apply SSM has been developed (Figure 3) and is being incorporated into investigations into innovation and knowledge management in the construction and building industry.

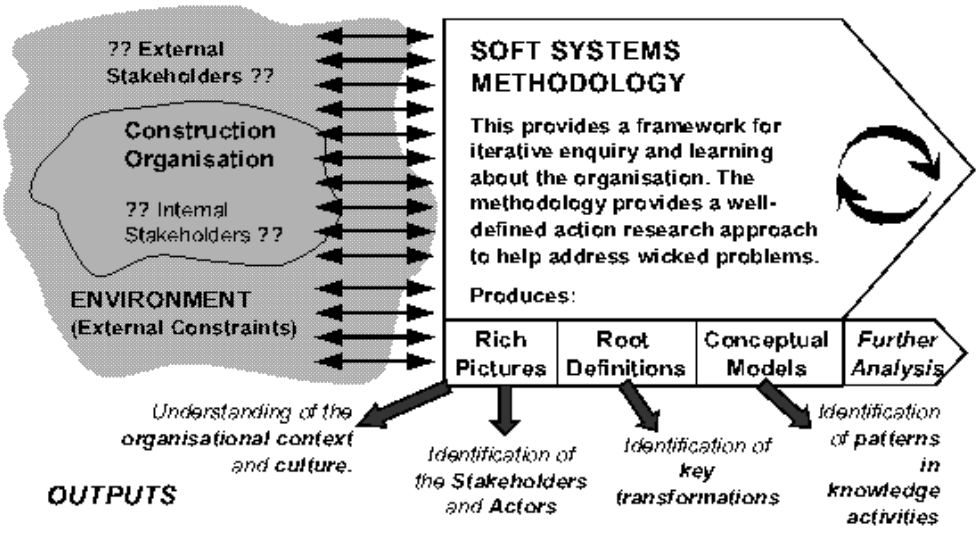

Figure 3. Applying SSM to the Construction Industry

6. Conclusions And Further Work

This paper has examined the benefits of applying SSM to problems in construction project management, especially those wicked problems that are challenging to understand and difficult to act upon. It includes relevant examples of its use in dealing with the confusing situations that incorporate human, organizational and technical aspects. SSM encourages group learning and is ideal as a group decision-making approach. It is strengthened by the active participation by different participants and stakeholders, and encourages joint ownership of the problem solving process. Finally, SSM is recommended where an organisation is seeking to achieve changes in workplace culture and transformation into a learning organisation.

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