

# DEVELOPING A RESEARCH MODEL FOR PROJECT OUTCOME EVALUATION

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The construction procurement process is initiated by the client organisation in response to the environmental stimuli. Project performance is a complex construct that reflects the criteria and value judgements adopted by the evaluators. This paper develops a research model for the evaluation of project outcome underpinned by goal setting theory and expectancy value theories. Project outcome is perceived to be of two levels which are affected by project complexity and goal commitment. The model examines the relationship between goal commitment, project complexity and the perceived outcome based on the behaviour-performance-outcome paradigm.

Keywords: Evaluation, expectancy, performance, project complexity, outcome.

## INTRODUCTION

Much previous research has focused on identifying critical success factors as well as defining criteria for project success which often include budget performance, time performance, technical performance, client's satisfaction and contractor's satisfaction (e.g. Ashley et al 1987, Pinto and Slevin 1988). It is implicit in these definitions that satisfaction is a goal to be achieved and, therefore, an attribute of project success. However, these definitions do not subscribe to the theoretical construct of the behaviour-to-outcome process which has been tested extensively in the field of psychology. Satisfaction is an affective state, i.e. of the emotions. It results from acts and the level of goal attainment which these acts have achieved. If an act is successful, one experiences satisfaction, joy or pleasure; if it is unsuccessful, one experiences dissatisfaction or suffering or displeasure. These emotions provide individuals' motivations to act because they anticipate the future based on past experience to provide an expectation and an incentive for future outcomes. Project participants thus learn from their past experiences and anticipate future project performances.

This paper develops a framework for project outcome evaluation from Naylor et al's (1980) act-to-outcome model in order to examine how goal-directed behaviour leads to performance which is ultimately assessed by the evaluators.

## PERCEPTION AND EVALUATION OF OUTCOME

A cognitive theory of behaviour assumes that people are rational (for the most part) and that as a systematic generator of behaviour, people's actions are explained best in terms of conscious, thinking acts on the part of the individual (Naylor et al 1980).

In Naylor's (Naylor et al 1980) model, behaviour is defined as an 'ongoing act' or process. The basic unit of behaviour in the act-to-outcome model is called the *act*. An act has two defining dimensions, the amplitude (total commitment to an act as defined by the amount or quantity of individual time and effort allocated by the individual to

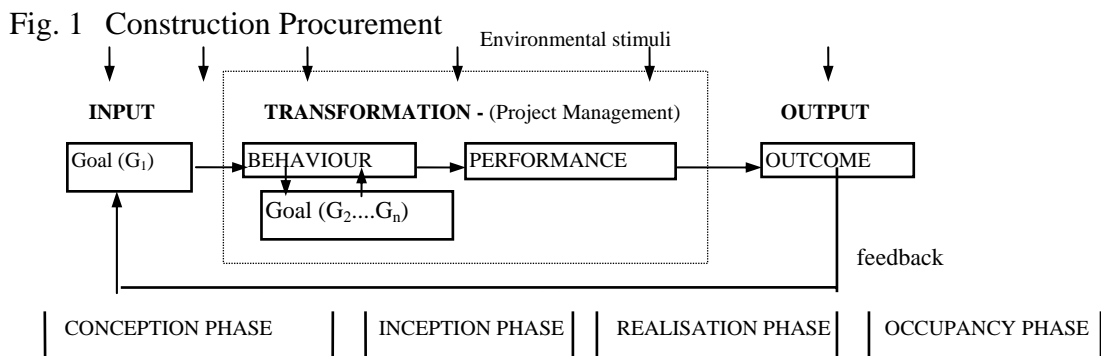
the task of performing that act), and the direction (the specific kind of activity or process being carried out). The perceptual process is the way in which cognitions are created. Cognition may arise directly from the external world of the environment via primary sensory processes and is defined as “a perception (and therefore a conscious awareness) of a state of the environment or of one’s self or of a relationship among states (contingencies).” (Naylor et al 1980 p. 16). Perceptions can, therefore, be either of external states (environment) or internal states (self). Under this cognitive model, human beings are assumed to be rational and choose those options that maximise the greatest positive, or least negative, affect.

The role of perception and evaluation is dependent upon two sets of contingencies (Naylor et al 1980): (1) performance-to-evaluation contingencies and (2) evaluation-to-outcome contingencies.

The performance-to-evaluation contingencies are broken down into two components: the self evaluation and perceived others’ evaluation. Self-evaluation represents the way the individual evaluates his/her own performance; the perceived others’ evaluation reflects how the individual perceives others in the environment evaluate him/her. These sets of perceived contingencies will be different for different evaluators and specifying these contingencies would specify the perceived evaluation system by indicating perceptions of (a) what products are measured and (b) the relative importance of these products in the evaluation system of that evaluator.

Evaluation-to-outcome contingencies reflect the external reward system as perceived by the individual. These indicate which dimensions of performance are being considered and the relative importance of each in determining the actual level of outcomes the individual receives. Different evaluators may perceive different contingencies which are capable of change as the individual gains more experience in the environment or as the environment itself changes, eg. how the individual values the rewards given may change over time.

The behaviour-performance-outcome (B-P-O) paradigm provides a framework for the evaluation of the construction procurement process (Liu 1994, 1995) in fig. 1.



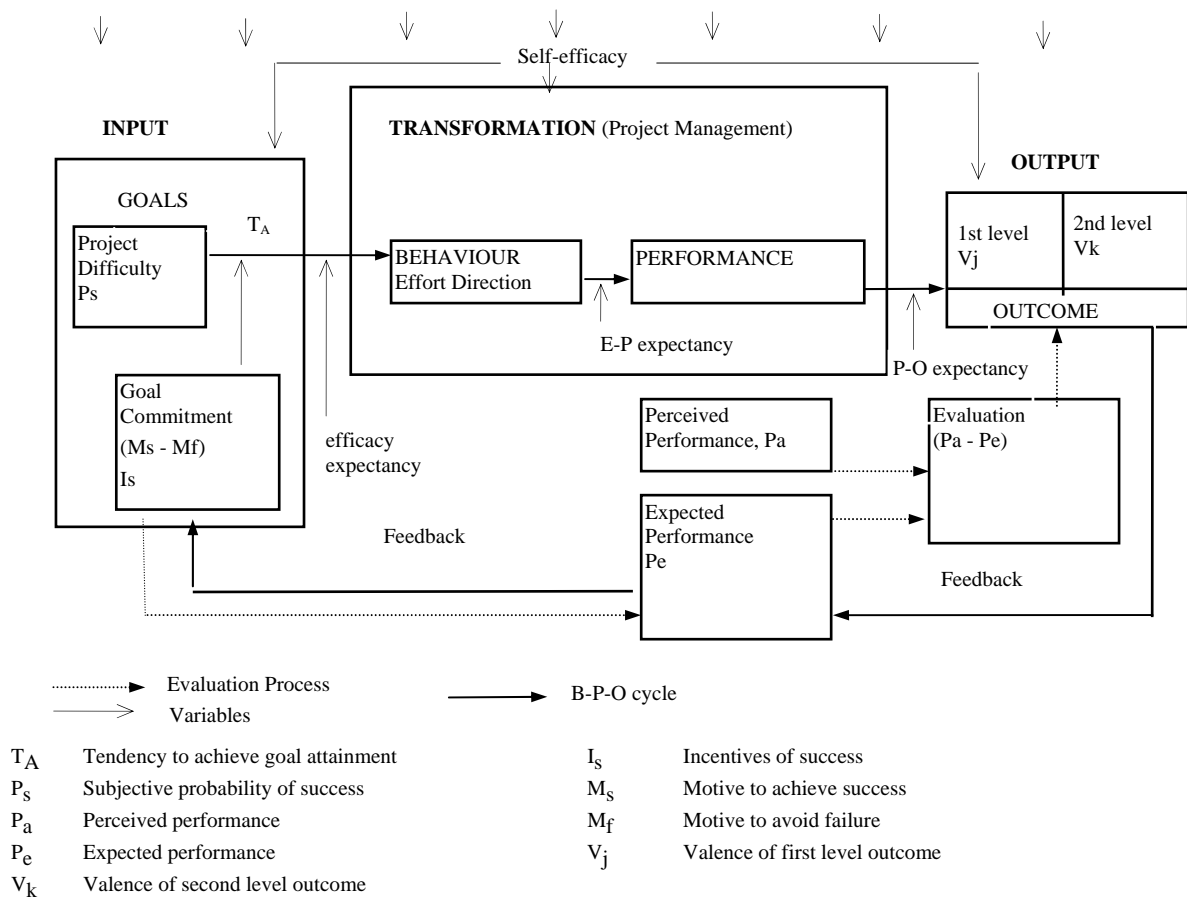
Environmental influences are transmitted to the potential client through his/her importation of information, energy and materials from the environment; the actions of these influences impact on clients’ decisions. The project conception process will entail the consideration of each alternative within the environmental context and a decision will be made on the basis of the influence of the external factors. The goal/objective  $G_1$  of the potential client sets off a series of decisions which determine subsequent behaviours or acts. At the end of the conception phase, the decision may involve acquisition of real property. The project inception process will receive inputs from the environment and will transform them in its task of identifying the appropriate

intermediate decision (choosing among alternatives such as buying, leasing or constructing a new building, represented by  $G_2$  to  $G_n$ ); should the decision involve construction of a new building, then the necessary behaviours (or acts) will transform the decision into actions which bring about the product. Subsequently, the product (and, indeed, the process) can be assessed by the participants (and others).

## DEVELOPING A RESEARCH MODEL

The B-P-O cycle can be developed into a research model for the evaluation of project outcome underpinned by motivation theories (e.g. Vroom 1964, Atkinson 1964, McClelland 1971). A systems approach is adopted to present a holistic view of the input-transformation-output process in fig. 2.

Fig. 2 Research Model - Project Outcome Evaluation  
ENVIRONMENTAL FORCES



The definition of the terms used in the model (fig. 2) are as follows:

### Efficacy Expectancy

The perceived likelihood that one can execute the behaviour successfully to produce the required outcome.

### E-P expectancy (effort-performance expectancy)

The perceived likelihood that effort expended towards goal attainment will lead to the successful accomplishment of that goal.

### **Incentive**

A potential reward, i.e. identifies what will be granted if some desired behaviour is performed, synonymous with Vroom's (1964) first level outcome (Campbell et al 1970 p. 345).

### **Instrumentality**

The extent to which the individual expects a particular outcome will lead to other outcomes.

### **Level of Aspiration**

The level of future performance in a task which an individual, knowing his/her level of past performance in that task, explicitly undertakes to reach.

### **Motive**

The disposition within the person to strive to approach a certain class of positive incentives (goals) or to avoid a certain class of negative incentives (threats) (Atkinson 1982).

### **P-O expectancy (performance-outcome expectancy)**

The perceived likelihood that the successful accomplishment of the behaviour will result in the securing of the desired outcomes or rewards. (See Lawler 1971)

### **Self efficacy**

Self perceived performance capability (Bandura 1986).

### **Valence**

The strength of an individual's preference for a particular outcome. (Campbell et al 1970). It is the utility or the attractiveness of the outcome.

The theories underpinning the model are goal theory and expectancy value theories. The two major elements in goal theory are goal difficulty and goal commitment. They affect performance in the following manner:

Goal Difficulty:

- *Hard* goals lead to greater task performance than medium or easy goals, i.e., there should be a positive, monotonic relationship between goal difficulty and task performance (Locke et al 1981, Mento et al 1987). Goal specificity per se does not facilitate task performance because goals can be specific and easy.
- The relationship between goal difficulty and performance is contingent on a cognitive component, i.e. feedback, which yields information about goal progress. Individuals, knowing how they have performed, will adjust their effort exerted in order to reach their goals -- as in managerial control actions, by adjusting resources etc., to achieve a project completion date.

Goal Commitment:

- Goal commitment refers to one's attachment or determination to attain any goal. Given sufficient variance (in the measurement of commitment), goal commitment and performance are related positively (Erez 1986, Erez and Arad 1986).

There are several versions of expectancy value theories, each emphasising on slightly different aspects. The basic postulate is that motivation is a multiplicative function of expectancy and valence of outcome. Both McClelland (1971) and Atkinson (1964)

start from the principle that human behaviour is determined by two needs: one for success and one for avoiding failure. Thus the individual's tendency to engage in a task (motivation) and to complete it successfully ( $T_A$ ) may be regarded as the result of a conflict between the tendency to achieve success ( $T_S$ ) and the tendency to avoid failure ( $T_f$ ).

$$T_A = T_S - T_f$$

The tendency to engage in a task ( $T_A$ ), i.e. motivation, depends on:

- Motive for success ( $M_S$ ):

$M_S$  is taken as a relatively stable personality dimension and is usually referred to as the need for achievement (n-Ach) (Atkinson 1983 a). The tendency to achieve success ( $T_S$ ) is the product of  $M_S$ , the subjective probability of succeeding in the task ( $P_S$ ) and the incentive value of success to the individual ( $I_S$ ).  $T_S = M_S \times P_S \times I_S$

According to Atkinson (1966),  $I_S$  and  $P_S$  are interdependent, i.e.,  $I_S = 1 - P_S$ .

- Motive to avoid failure ( $M_f$ ):

$M_f$  is often referred to as 'fear of failure', and is a personality dimension.  $M_S$  and  $M_f$  are considered to be independent. The tendency to avoid failure ( $T_f$ ) is the product of  $M_f$ , the subjective probability of failure ( $P_f$ ) and the incentive value of failure ( $I_f$ ). If  $I_f$  and  $P_f$  are interdependent, i.e.,  $I_f = -(1 - P_f)$  where  $P_S + P_f = 1$

- Since both  $I_S$  and  $P_S$ , and  $I_f$  and  $P_f$  are related, the value of success or failure depends on the expected degree of difficulty of the task i.e., the value of success will be higher in a difficult task than in a simple task. Similarly, failure will strike harder in tasks with a low probability of failure than in complicated tasks with a higher probability of failure. An individual's eventual behaviour is considered to be the result of his motivation to succeed in a task and his fear of failing to accomplish it, ( $T_S - T_f$ ).
- For those whose  $M_S$  is greater than  $M_f$ , the motivation to engage in a particular task and to complete it successfully is strongest when faced with tasks of intermediate difficulty. The fear of failure will then be strongest, too. This is because Atkinson assumes  $I_S = 1 - P_S$ , so  $T_A$  is highest (viz. .25) when  $P_S$  as well as  $I_S$  equal .50; every other value of  $P_S$  will lead to a lower product. (A similar argument holds for  $P_f$ .) Since  $P_S + P_f = 1$ , the simplified formula is :

$$\begin{aligned} T_A &= T_S - T_f \\ &= (M_S \times P_S \times I_S) - (M_f \times P_f \times I_f) \\ &= (M_S - M_f) [P_S \times (1 - P_S)] \end{aligned}$$

Vroom's expectancy theory (1964) points to two different types of outcomes, first level and second level (instrumentality). According to Vroom (1964), expectancy is a probability estimate (values from 0 to 1) and instrumentality relates to a correlation between outcomes (hence varying from -1 to 1). First level outcomes refer to the working behaviour itself and the resulting performance. These outcomes gain valence provided that they cause a second level of outcomes, i.e. certain rewards that lead to satisfaction. First level outcomes (e.g. a particular level of performance) are considered as a function of the expectation that certain efforts will lead to the level of performance as well as to the valence of that performance level. Therefore, the valence of the *success* of the project depends on how much *satisfaction* it can bring.

## **PROJECT OUTCOME**

Project outcome is shown as the end phase of the B-P-O cycle in the research model. This phase is reached via the perception/evaluation route, i.e. the P-O process goes through the individual's cognitive evaluation of the product. The following explains the P-O process:

- Evaluation --- ( $P_a - P_e$ ) where  $P_a$  = perceived performance and  $P_e$  = expected performance
- Outcome

Evaluation --- ( $P_a - P_e$ )

The level of aspiration affects one's perception and, therefore, evaluation. Thus it pertains to goal striving and the perceived difficulty of the goals that one wishes to attain.

Because many goals (of different levels of difficulty) are possible in all these situations, level of aspiration involves a choice between various goal alternatives. Other things being equal, individuals are more likely to accept or choose a given goal (goal choice) when they have high rather than low expectations of reaching it (Mento et al 1980). Such expectations evidently stem from self perceptions about ability on the task in question (Mento et al 1980) or from self efficacy and inferences from past performance (Lopes 1976, Wilsted and Hand 1974). Individuals are more likely to become more confident and to set higher goals after success and to become less confident and to set lower goals after failure, although failure may lead to higher goals in pressure situations (Forward and Zander 1971).

Performance is measured against evaluation standards. The discrepancy between the expected performance and actual performance (i.e., the goal/performance discrepancy) gives the level of goal attainment which is the evaluation of the outcome. Feelings of success and failure are determined primarily by the attainment or non attainment of the goal. Perceptions of success and failure involves subjective, rather than objective, levels of attainment. The subsequent aspiration level is, in part dependent upon the prior goal/performance discrepancy (subjective success or failure).

A project claimant's past experience and past successes and failures in similar projects will determine his/her expectation of current project's performance, or the expected performance  $P_e$ . The project claimant compares the perceived performance  $P_a$  with the goal levels expected to be reached (or expected performance)  $P_e$ , if there is no difference between the two (i.e. goal/performance discrepancy is zero), then goal attainment is completely achieved and the project is a success. Expected performance is determined by the individual's motive and the level of aspiration. The motive and the level of aspiration determines outcome evaluation through the expected performance.

The performance-outcome process is acted upon by the individual's performance-outcome expectancy as described in the Campbell-Dunnette-Lawler-Weick model (Campbell et al 1970). The performance-outcome expectancy leads to first level outcome, and the outcome-outcome expectancy leads to second level outcome, i.e. satisfaction). Atkinson (1982 p. 25) argues that "in assuming that the utility of an incentive will vary as a function of the strength of the motive for incentives of that class, we discover then a sound basis for predicting that the expected utility, and hence performance, will be greater for persons who have strong motives when the objective

circumstance (in this case the incentive offered) is the same for everyone. This suggests that the strength of a motive determines the capacity for satisfaction in goal attainment".

### Outcome

The major feature of the model is that there are two levels of outcome, project success and participant satisfaction. According to Vroom's (1964) expectancy theory, the force (or motivation) to perform act  $i$  is equal to the product of the expectancy that act  $i$  will be followed by outcome  $j$  and the valence of outcome  $j$ .

$$F_i = f_i \left[ \sum_{j=1}^n (E_{ij} V_j) \right] (i = n + 1 \dots m)$$

$f_i > 0; i \in \Phi, \Phi$  is the null set  
 where  
 $F_i$  = force to perform act  $i$   
 $E_{ij}$  = strength of expectancy ( $0 \leq E_{ij} \leq 1$ ) that act  $i$  will be followed by outcome  $j$   
 $V_j$  = valence of outcome  $j$

However, the valence of outcome  $j$  to the individual is related to the valences of all other outcomes and his/her conceptions of its instrumentality for the attainment of these other outcomes. (The valence of the *success* of the project depends on how much *satisfaction* it can bring).

$$V_j = f_j \left[ \sum_{k=1}^n (V_k I_{jk}) \right] (j = 1 \dots n)$$

$f_j > 0; I_{ij} = 0$   
 where  
 $V_j$  = the valence of outcome  $j$   
 $I_{jk}$  = the cognised instrumentality ( $-1 \leq I_{jk} \leq 1$ ) of outcome  $j$   
 for the attainment of outcome  $k$

## SELF-EFFICACY

Self-efficacy in Bandura's (1986) social-cognitive theory refers to the individual's overall or total judgement of performance capability, and therefore reflects the individual's ability, past performance, prior successes and failures and the conclusions the individual has reached about total capability based on such information. The stronger the perceived self-efficacy, the more challenging the goals people set for themselves (Taylor et al 1984). Self-efficacy affects motivation directly through the mobilisation and maintenance of effort (Bandura & Cervone 1983) and it will, therefore, exert an influence in all stages of the research model.

## PROJECT DIFFICULTY AND GOAL COMMITMENT

Project difficulty has two dimensions: goal difficulty and task difficulty. Goal difficulty refers to the "proficiency measured against a standard" and therefore is related to goal levels being set, e.g. complete the project within 18 months instead of 20 months. Task difficulty refers to the "nature of the work to be accomplished" (Locke and Latham 1990 p.26) and is reflected as project complexity.

In the research model, it is postulated that the perceived project difficulty will affect the individual's expectancy or subjective probability of success ( $P_S$ ) of the project. This expectancy reflects the individual's assessment of his/her performance capability and therefore behaviour is adjusted (in terms of effort and direction) to attain the goal. The amount of effort or the direction of his/her action is the motivational force and therefore  $P_S$  has to combine with incentive ( $I_S$ ) and motive ( $M_S$ ) to determine behaviour.

Many conceptual definitions of goal commitment have been proposed (see Tubbs and Dahl 1991 for a review). A committed person is thought to adopt a specific performance goal and to persist in attempts to reach it even through difficulties. Integrating this with motivation theories regarding task engagement, effort expenditure and persistence (Atkinson 1964, Campbell and Pritchard 1976, Steers and Porter 1991), *goal commitment represents an individual's judgement that entails the individual choosing a goal and then maintaining that choice over time*. Erez and Zidon (1984) found that as commitment declined in response to increasing goal difficulty, performance declined rather than increased. Goal commitment therefore affects the relationship of goal difficulty and performance in the sense that normally difficult goals will lead to higher performance but this will only happen when the individual is committed to the goal.

Thus it is postulated that four major factors determine goal commitment, i.e. (1) authority, (2) peer influence, (3) incentives and (4) motive. Authority of the person-in-charge has been sufficient to guarantee high goal commitment (French and Raven 1959). Commitment to high goals will occur when there are peer models performing at a high level (Bandura 1986, Earley and Kanfer 1985). Goal commitment is high when working to attain the goals is perceived as instrumental in gaining other valued outcomes (Mento et al 1980). Goal commitment is also related to the individual's motive to reach the goal, since motive is defined as a disposition to strive for a particular kind of goal state or aim or kinds of satisfaction (Atkinson 1983 b).

Therefore, in construction project management, the *authority* of the Project Manager, *peer influence* of project team members, *incentives* of goal attainment (project success) as well as the individual's *motive* will affect his/her commitment to the project.

## DISCUSSION

The major issues which arise from the research model regarding satisfaction can be summarised as:

- *Hard goals increase performance*. There is a positive monotonic relationship between goal difficulty and task performance (Locke et al 1981, Mento et al 1987) and is contingent on feedback.
- *Low goals increase number of successes*. By definition (success is goal attainment) and by logic, it is easier to attain low goals and thereby the number of successes. Satisfaction with performance is positively associated with the number of successes experienced, increased number of successes will increase satisfaction (Locke 1965). This seems to be the case only when the same task can be repeated many times (like tossing dice in the psychological experimental setting) so that the increased number of successes relates to the same task, and is therefore not applicable to construction procurement where each project is of a bespoke nature.
- *Satisfaction depends on the perceived instrumentality of the level of goal attainment*. Satisfaction can be viewed as the result of a positive appraisal of the task against a person's value standards. If internal and external rewards provide the individual with what s/he wants or values or considers appropriate or beneficial, the individual experiences satisfaction (if the job is appraised as blocking or negating one's values, dissatisfaction is experienced). Satisfaction is not a result of the person alone or of the task alone but of the person in relation to the task, the task as appraised by the person. The degree to which the work is seen



as rewarding is dependent on the degree to which the task possesses four core attributes: (personal) significance, feedback, responsibility/autonomy, and identity (as a whole piece of work) (Hackman and Oldham 1980). In general, empirical studies support this theory with regard to work satisfaction (Locke & Henne 1986). Participant satisfaction therefore results from the level of goal attainment of the construction project as appraised by the participant.

- *Task complexity limits the positive effects of goals on performance and hence satisfaction.* The effect of increased goal difficulty (i.e. hard goals improve performance) is more pronounced in simple task than in complex task. In construction projects, project difficulty is expressed in two components, project complexity (task complexity) and goal difficulty. Therefore it is argued that hard goals are more likely to increase project performance in less complex projects only.
- *Goal commitment entails the individual choosing a goal and then maintaining that choice over time.* Challenging goals lead to high performance only if the individual is committed to them (Erez and Zidon 1984).

## CONCLUSIONS

Goal commitment and project difficulty are important elements in the research model. The moderating effects of goal commitment and project complexity on the evaluator's perceived outcome through the behaviour-performance process need to be investigated. In construction projects, a common complaint is that the client's brief is inadequate as a document to communicate the goals to the project participants. This will have an adverse effect on goal commitment. One serious block to goal commitment in organisations is the existence of different personal agendas among the various top managers (Donaldson 1985). In an organisation where power differences are less severe and where legitimate authority is not clear, getting a group of executives to commit to a single set of goals can be difficult (Kotter 1982). Perhaps the greater the conflict between coalitions, the less committed each will be to the official organisational goals and the less likely it is that the official goals will be translated into operative goals. Research is needed on the importance of goal commitment at the client's organisation level as well as the project operational level and the factors that explain why some individuals commit to goals while others do not.

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