Evaluation of group model building in a strategy implementation context: a New Zealand government case study

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Abstract

This paper presents the results of a group model building intervention to support the implementation of an organisation strategy in a New Zealand government department. Four separate three-hour 'qualitative system dynamics' workshops were conducted with department employees.

Many authors have advocated the use of systems thinking in strategy development, but few have specifically explored its use to support strategy implementation. The strategy implementation literature reports similar success factors to the outcomes reported in group model building, suggesting potential applicability.

A range of survey methods were used to evaluate changes in communication quality, insight, consensus and commitment to conclusions, which are associated with effective strategy implementation. Post-workshop survey results showed significant increases in all four outcome areas. Comparing work samples from before and after the workshops showed new insights and increased consensus.

This paper represents work in progress, as not all of the survey tools used have been fully validated. Further research on the study cohort at the later date may provide insight into the longevity of the reported changes.

Keywords: Systems thinking, qualitative system dynamics, group model building, strategy implementation

INTRODUCTION

Strategy implementation has the same success factors as the reported outcomes of group model building. Interpersonal success factors (Skivington and Daft 1991) for strategy implementation are communication quality (Hambrick and Cannella 1989), insight (Wind and Floyd 1990), consensus (Floyd and Woolridge 1982), and commitment to conclusions (Kim and Mauborgne 2005). A review of 107 papers revealed that these are the main outcomes reported in group model building interventions (Rouwette et al 2002).

Implementation Success Factors

Literature on the nature of strategy implementation and the reasons for its success and failure is not well organised (Noble 1999, Yang 2008).

Skivington and Daft (1991) proposed that strategy implementation literature could be divided into two broad categories; structural views, and interpersonal process views. Structural and control elements, as emphasised in early strategy implementation literature (Miles and Snow 1978, Hrebiniak and Joyce 1984, Drazin and Howard 1984, Gupta 1987) are direct tools available to executives in shaping their organisation. However, as strategies are executed by people, a range of interpersonal and cognitive factors may also be critical (Noble 1999).

Noble (1999) proposed that these two categories could be further divided into a number of sub-categories, which closely align to the "CICC" model developed by Rouwette et al (2002); communication quality, insight, consensus and commitment to conclusions.

Communication Quality
Many authors (Argyris 1989, Sandy 1991, Workman 1993, Kim and Mauborgne 2005) identify communication between managers and staff as the cognitive hurdle that any strategy must overcome. Different authors have focussed on vertical communication between leaders and staff (Fidler and Johnson 1984, Robertson and Gatignon 1986, Johnson and Frohman 1989) and horizontal communication between peer groups (Hambrick and Cannella 1989). This study includes both managers and subject experts.

Insight
Several authors (Floyd and Woolridge 1982, Floyd and Woolridge 1982, Hrebiniak and Snow 1982, Hrebiniak and Joyce 1984, Robertson and Gatignon 1986, Redding and Catalanello 1994, Bonoma and Crittenden 1998, Baum and Greve 2001, Tang 2011) explore the role of autonomous behaviours in generating novel insight, and conclude that the success of strategy implementation is positively linked to staff innovation.

Consensus
The degree of unanimity and agreement of a group is positively associated with implementation success (Floyd and Woolridge 1982, Schweiger, Sandberg and Rechner 1989, Wind and Floyd 1990, Noble 1999). Low agreement is associated with implementation failure (Guth and MacMillan 1986 and Huy 2011).

Commitment to Conclusions
The level of dedication to implementation can be measured in both intensity (Nutt 1983, Woolridge and Floyd 1989, Kim and Mauborgne 2005) and durability (Nutt 1983, 1986 and 1990, Bourgeois 1980, Bourgeois and Brodwin 1984). This paper considers only the intensity of dedication, but proposes further investigation into durability. Whitney and Smith (1983) find that the hand-over of strategy from senior to middle management can be problematic – middle management may be apathetic to strategies they have not been involved in developing. This study includes only employees that were not involved in the creation of the strategy.

Systems Thinking

Systems thinking is a scientific field of knowledge that explores systems as a set of interacting or interdependent components forming an integrated whole (von Bertalanffy 1950, Senge 1990). Proposed interventions developed through system thinking are not automatically adopted by an organisation (Rouwette and Vennix 2006). This may be due a lack of understanding of prevailing politics (Greenberger et al, 1976), or a lack of ownership by the client (Stenberg 1980). As a result, some practitioners experimented with involving client groups in the modelling process (Richardson et al 1994). These approaches are now commonly referred to a "group model building" (Rouwette et al 2002) or "participatory modelling" (Rouwette and Vennix 2006).

Systems Thinking and Strategy

Systems thinking has been applied to many disciplines and subject areas (Mingers and White 2000, Andersen et al 2007). One area in which systems thinking has been particularly prevalent is in strategy development (Pidd 2004). Some have argued that the reason for this applicability is the complex and interrelated choices that strategy presents (Broman et al 2000, Aligica 2005, Houchin and MacLean 2005).

Many have examined this from a rational planning perspective; that strategy is a complex problem to be solved through development of a plan (Dyson 2004, Powell and Coyle 2005), Rouwette (2011) examines the use of systems thinking as a problem structuring method for strategy development. Others have viewed strategy as a learning opportunity, and used systems thinking as s tool for supporting this (Lyneis et al 2001, Bianchi and Montemaggiore 2008). Others have used systems thinking as a tool for understanding the different mental models held among managers. (Porter and Kramer 2006, Ormerod 2008)

Although there is a significant volume of literature describing the applicability of systems thinking in strategy development, far fewer authors have examined the use of systems thinking in strategy implementation, though Sterman (2000) describes this as an area for future research.

Snabe and Größler (2006) describe the contribution that a quantitative model (created by the modeller) can make to understanding and refining a strategic decision (structural view of strategy implementation). This paper instead focuses on the contribution that staff participation in the development of a qualitative model can

have on communication quality, insight, consensus and commitment (interpersonal process view of strategy implementation).

EXPECTED OUTCOMES

Based on Andersen's (1997) review of the existing model building literature, Rouwette et al (2002) identified four outcomes that were generally described as beneficial. These were (increases in): communication quality, insight, consensus and commitment to conclusions ("CICC").

Other authors have looked for additional positive outcomes from group model building (Huz et al 1995 and 1997). These have focussed on differentiating between the level (individual, group, organisation, methodology) at which outcomes are observed (Rouwette et al 2002, Huz et al 1995).

The interpersonal/process view (Skivington and Daft 1991, Carroll 1993) of strategy implementation focuses on group dynamics, for which there are many notable evaluation methods. Frameworks such as "SYMLOG" (System for the Multiple Level Observation of Groups – Keyton 1999) and "BECM" (Being, Engaging, Contextualizing and Managing Matrix – Bell 2011) provide alternate methods for understanding group dynamics. However, the close relationship between success factors described in strategy implementation literature and the CICC framework make it particularly suitable for use in this study.

CASE STUDY

A group model building intervention was applied to a case study organisation. The organisation is a large government department in New Zealand.

The organisation completed the formation of a corporate strategy, and then began planning for how this would be implemented. Particular concerns from senior staff included:

- The strategy may be poorly understood, or there may be difference in interpretations.
- No plan exists for the actions that the organisation should take to realise the intent set out in the strategy.
- Those responsible for implementing the strategy did not participate in its development, and therefore may not feel a sense of ownership.

Middle managers and subject matter experts were split into four groups (based on subject area), and each completed a group model building activity to determine what actions should be taken to realise part of the strategy. The activity consisted of a three hour workshop to complete a qualitative model with a novice group. The model was a causal loop diagram, applying the methodology described by Maani and Cavana (2007). The causal loop diagram was chosen over other systems tools as it is simple for a novice group to use.

Systems thinking literature often focuses on the models or the conclusions from a workshop (Stenberg 1980, Richardson et al 1994, Snabe and Größler 2006). However, the main focus of this intervention was to achieve changes in interpersonal and social

factors (communication quality, insight, consensus and commitment to conclusions) associated with effective strategy implementation, rather than creating planning outputs.

METHODOLOGY

Most studies used anecdotal or descriptive evidence in evaluating group model building – only a small number attempted quantitative assessment (Rouwette et al 2002). This study used content analysis (Holsti 1969, Cavana et al, 2001) of work samples (before and after the workshop) and a range of (quantitative and qualitative) survey tools to evaluate whether the four outcomes (communication quality, insight, consensus and commitment to conclusions) had been produced.

A total of 52 people attended the four workshops, with a total of 40 completed surveys.

Work samples

Schön (1979), Lakoff (1980), McCardel (2009) and Franco and Rouwette (2011) all stress the comparison between pre-intervention and post-intervention thinking. Participants were twice asked to list the four actions they thought were most important for the organisation to take to achieve the strategy outcome in their workshops – once immediately before and again immediately after the workshop.

Questionnaire

This study uses a questionnaire that contains three types of information: quantitative data (Likert scale questions, and ratings of different components), qualitative data, and demographic data.

Likert questions

The thirty Likert-scale questions have been developed by other authors (Pers. comm. Etienne Rouwette 2011). Rouwette (2011) combined questions from existing modelling literature including Vennix (1993) and Dooley et al (2000).

Questions concerning communication were assessed for scale reliability using Cronbach's alpha, with results of 0.82 (Vennix and Rouwette 2000) and 0.69 (Rouwette 2011). In the current study, Cronbach's alpha was 0.77.

Cronbach's alpha for questions concerning insight was 0.76 for the current study.

Questions concerning consensus have a Cronbach's alpha of 0.84 (Vennix and Rouwette 2000) and 0.60 (Rouwette 2011) in previous studies. For the current study, one question had a correlation of less than 0.20 to the rest of the scale, and was removed (Allen and Yen 2002). The remaining questions have a Cronbach's alpha of 0.77 for the current study.

Questions concerning commitment have a Cronbach's alpha of 0.88 (Dooley et al 2000) and 0.56 (Rouwette 2011). For the current study, Cronbach's alpha was 0.74.

Questions concerning usefulness of individual components

Participants are then asked to evaluate the usefulness of individual components of the model building process, and assess them on an 11 point scale ("was of no use whatsoever" – "contributed very much", Rouwette, Vennix and Felling 2009). Seven questions were chosen based on the steps identified by Maani and Cavana (2007).

1. The opportunity for open and extensive discussion
2. The presence of a designated facilitator
3. The use of behaviour-over-time graphs (line graphs)
4. The identification of variables (sticky-labels)
5. The use of causal diagrams
6. The identification of leverage points
7. The use of structured agenda

Qualitative Feedback on Workshop Participation

The questionnaire included the opportunity for participants to contribute handwritten suggestions to improve the process (Rouwette 2011).

Demographic Data of Workshop Participants

The questionnaire also included demographic data (age, gender, education, length of employment, level within the organisation).

Table 1: Respondent demographics

Age	Mean: 45 years	Range: 31-64 years
Length of employment	Mean:10 years	Range: 1-40 years
Gender	27 males	13 females
Rank	21 managers	19 non-managers
Education	Post-graduate qualification: 29	No post-graduate qualification: 11

RESULTS

Results from the Likert questions were analysed using a Kolmogorov-Smirnov test (Stephens 1974), which showed that the results are normally distributed. A mean score of higher than neutral was recorded for all four outcome areas (communication quality, insight, consensus and commitment to conclusions), with a Student's t-test (Stephens 1974) 2-tailed significance of less than 0.001 (compared to "a/d = neither agree nor disagree"). This indicates that the participants feel the process contributed to an increase in these areas.

Table 2: Likert questionnaire results by outcome-area

	n	Mean	Standard Deviation
Communication	40	4.04	0.77
Insight	40	3.81	0.75
Consensus	40	3.68	0.70
Commitment	40	3.66	0.72

Questions that asked participants to compare the workshop with normal meetings also followed a normal distribution. Again, a mean score of higher than neutral was recorded for all four outcome areas (communication quality, insight, consensus and commitment to conclusions), with a Student's t-test 2-tailed significance of less than 0.001 (compared to "a/d = neither agree nor disagree"). This indicates that the participants felt the process were more effective than a hypothetical "normal" meeting.

Table 3: Likert questionnaire results compared to a normal meeting

	n	Mean	Standard Deviation
Communication	39	3.96	0.82
Insight	39	4.07	0.73
Consensus	39	3.82	0.83
Commitment	39	3.50	0.78

Questions that asked participants about different elements of the workshops also followed a normal distribution. For six of seven questions, a mean score of higher than neutral was recorded with a Student's t-test 2-tailed significance of less than 0.001 (compared with "0 = did not obstruct, but was of no use either").. For the seventh question, there was no significant result (significance of 0.03). This indicates that the participants felt that opportunity for open discussion, presence of a facilitator, identification of variables, use of causal diagrams, identification of leverage points and use of structured agenda all contributed the overall effect of the meeting. The participants did not feel that the use of behaviour-over-time graphs contributed to nor obstructed the sessions.

Table 4: Questionnaire results for different workshop elements (11-point scale: -5 to +5)

	n	Mean	Standard Deviation
Opportunity for open discussion	37	3.26	1.69
Presence of a facilitator	37	3.10	1.41
Use of behaviour-over-time graphs	*30*	*1.59*	*1.30*
Identification of variables	40	3.43	0.93
Use of causal diagrams	39	3.43	1.15
Identification of leverage points	38	3.45	1.14
Use of structured agenda	35	3.03	1.58

Demographic data was compared with the results from the questionnaire (results for communication quality, insight, consensus and commitment to conclusions, and results for each of the workshop elements). There were no significant findings for gender or length of employment with the organisation.

Participants years and older were more likely (p-value less that .01) to rate causal loop diagrams and the identification of leverage points as contributing to the outcomes of the workshop, but these were seen as positive elements by both age groups.

Table 5: Relationship between age and questionnaire results for different workshop elements (11-point scale, -5 to +5)

	Over 45			Under 45			P-value
	n	Mean	SD	n	Mean	SD	
Use of causal diagrams	18	3.61	1.04	17	3.00	1.22	<0.01
	Over 45			Under 45			P-value
	n	Mean	SD	n	Mean	SD	
Identification of leverage points	18	3.89	0.83	17	3.00	1.32	<0.01

Non-managers were more likely to rate the presence of a facilitator and the use of a structured agenda as contributing to the outcomes of the workshop, but these were seen as positive elements by both managers and non-managers.

Table 6: Relationship between manager/non-manager role and questionnaire results for different workshop elements (11-point scale, -5 to +5)

	Manager			Non-Manager			P-value
	n	Mean	SD	n	Mean	SD	
Presence of a facilitator	20	2.85	1.60	19	3.33	1.24	<0.01
	Manager			Non-Manager			P-value
	n	Mean	SD	n	Mean	SD	
Use of structured agenda	20	2.85	1.72	19	3.18	1.51	<0.01

Participants with post-graduate qualifications were significantly more likely to report that the workshops contributed to consensus and commitment to conclusions, though both participants with and without post-graduate qualifications believed the process led to an increase in these areas.

Table 7: Relationship between education-level and questionnaire results for consensus and commitment to conclusions

	Post-graduate			Under-graduate			P-value
	n	Mean	SD	n	Mean	SD	
Increased consensus	29	4.20	0.44	11	3.83	0.49	<0.01
	Post-graduate			Under-graduate			P-value
	n	Mean	SD	n	Mean	SD	
Increased commitment to conclusions	29	4.48	0.59	11	4.09	0.41	<0.01

Participants were twice asked to list the four actions they thought were most important for the organisation to take to achieve the strategy outcome in their workshops – once immediately before and again immediately after the workshop. These were coded using a longitudinal quantitative text analysis (Holshi 1969). There were far fewer distinct coded data points in the post-workshop actions (distinct coded data points per workshop), and most of the post-workshop actions were not found in the data from before the workshop (codes only found in post-workshop text).

Less answers were volunteered post-workshop – the significance of this result is unclear (see conclusion).

Table 8: Comparison of suggested actions before and after workshops – coded text analysis

	Mean pre-workshop	Mean post-workshop
Coded data points per workshop	39	25
Distinct coded data points per workshop	30	10
Codes only found in post-workshop text		16

Participants were asked to describe the three best features, three most disappointing features, and make three suggestions for how to make the workshops better. These were coded and analysed. The most popular features were the participants ownership of the causal loop diagrams (identify by 18 of 33 participants), the communication between participants (15 of 33), diverse participants (12 of 33) and the presence of a facilitator (10 of 33).

The duration of the workshop (3 hours) was identified by participants as too short (6 out of 24 participants), too long (3 of 24) and about right (1 of 24).

The only repeated suggestion for improvement was that pre-reading should have been provided to participants so they knew what to expect from the workshop process (7 out of 22 participants). Other suggestions included “more guidance on identifying variables”, “reduced scope”, “ensure…all the right people (are present)”, and “bigger room”.

CONCLUSIONS

The literature describing strategy implementation is fragmented and poorly supported by quantitative evidence (Noble 1999). Strategy implementation literature identifies communication quality, insight, consensus and commitment to conclusions as success factors associated with effective strategy implementation. Group model building is associated with these outcomes (Rouwette et al 2002).

A large number of studies on systems thinking interventions use qualitative and anecdotal data (Mingers and White 2010). Only a relatively small number attempt quantitiative assessment (Rouwette et al 2002). The CICC questionnaire framework is a promising tool that has now been used in part or full across several studies (Rouwette 2011).

This study, with 40 respondents across four workshops, strongly suggests that group model building can produce reported success factors for strategy implementation. Participants reported an increase in all four outcomes (communication quality, insight, consensus and commitment to conclusions) through a survey questionnaire. Participants reported that these outcomes were achieved better and more quickly that in a “normal” workshop. Written responses indicate that diverse participation, open communication and model ownership were important components of the workshop.

Content analysis before and after the workshop showed new ideas (insight) and increased consensus between participants. Most concepts ("suggested actions") described by participants after the workshop could not be found in the pre-workshop content.

Unexpectedly, in the post-workshop content, participants volunteered fewer "suggested actions" (by 35%). One explanation may be that identifying leverage points in the system (places where minimum effort produces maximum outcome) encouraged participants to focus on the "critical few" rather than listing many possible solutions.

The survey is based on participants' self-assessment of the outcomes that have occurred. Content analysis provided a separate measure of insight and commitment that was consistent. In an earlier study, Rouwette (2011) found consistent results between semi-structured surveys of participants and the questionnaire used here.

While this study is limited by the sample size (40 participants), the use of common assessment tools allows easy comparison with other studies. Rouwette 2011 also reported that participants believed that participation in the workshop process improved communication quality, insight, consensus and commitment to conclusions.

The 23 Likert questions have been used in other studies and have been assessed for scale reliability. Other assessment tools have not been validated. There was agreement between results obtained through the Likert survey questions and the work samples.

This research provides a single case study that suggests group model building can contribute to effective strategy implementation. Further evaluation is required to determine whether the changes observed are persistent, or whether the changes in attitudes filter through the organisation (beyond the workshop participants).

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