

Comparison: Group Model Building workshops of two SMEs from the Basque industrial sector

Ruiz M¹, Elorza U, Zabaleta N

Abstract Group Model Building (GMB) is a methodology which involves a target group in the business of model formulation and conceptualization. It is crucial to obtain extended formal models and accelerate group decision support for future model building. In this paper the development of two GMB workshops for two Small and Medium-sized Enterprises (SME) from the Basque Industrial Sector is presented. These workshops focused solely on one problem: the analysis of the commitment of workers to the organization. Each session in each company was of four-hour duration and involved eight workers and two facilitators. This article highlights the importance of involving decision-making agents from each company in the reflection and process of finding solutions for their problem. The results suggest that in spite of the inherent differences and distinct features of each company, both have important similarities when tackling the same problem. These similarities could be translated to a general pattern conceptual model, which could be simulated as a generic (model).

Keywords: Group Model Building, Collaborative Modeling, Industry.

1. Introduction

1.1 Group Model Building (GMB) for managerial decision making

The increasingly competitive nature of the global economy has left many organizations searching for new strategies to build capacity and sustainable competitive advantage. Key to achieving this result is an effective decision making process. Competitive organizations require effective decision making. In this context characterized by dynamic complexity, simulations of social

¹Maria Ruiz Amurrio (e-mail: mruiz@mondragon.edu)
Mechanical and Manufacturing Department. Mondragon University, Engineering Faculty.
Loramendi, 4; Arrasate-Mondragon (Spain).

phenomena have become a scientific paradigm. This corresponds to a framework that creates events which cannot be observed and understood without this science (Sartori R., Ceschi A., Costantini 2015); (Marijn Janssen, Maria A. Wimmer 2015). Decision-makers, such as policy makers, regulators, infrastructure managers, investors, designers, planners, contractors, service providers and operators should take advantage of opportunities provided by simulation in order to build effective decision making models (Respicio et al. 2006).

Decision making processes are fundamental for organizations as they have direct influence on competitiveness and sustainability (Bearth 2015). Therefore, decisions should be made based on evidence, as they are part of more complex systems which are understood to be a set of interconnected interactions. Such a context requires more effective empirical tools to evaluate and predict the consequences of possible decisions (Diaz et al. 2005); (Sterman 2000).

GMB is a form of causal modelling based on system dynamics. Its main strength is its insistence on feedback loops. The different structures within an organization are defined through variables and causal relationships (Stijn Hoppenbrouwers; Etienne Rouwette 2013). Luna-Reyes et al. (2013) define system dynamics Group Model Building as a tool to underpin interdisciplinary theory-building attempts (Luna-reyes et al. 2013); (Rouwette 2000); (Grobler 2013).

GMB is one approach used for developing and simulating formal models of complex systems. The development of such models is characterized by the challenge of achieving effective collaborations whilst dealing with variables such as lack of transparency and inability to assess the hidden assumptions behind a model. In this context GMB is understood as a form of group decision support that involves stakeholders working with a team to solve a focused problem in a complex system (Andersen & Richardson 1997); (G.P. Richardson; D.F. Andersen 1994). GMB, is the phase in which feedback loops are defined.

Patrick (1995) states that dynamic simulation is useful to obtain a better understanding of verbal theories and any unexpected outcome obtained from them. In addition, it contributes to the creation of a synthetic environment to add to our knowledge about a particular phenomenon. In this way it clarifies understanding of decision making dilemmas and provides clearer focus for further empirical research efforts (Luna-reyes et al. 2013); (Patrick 1995); (Forrester 1994).

2. Objectives

The GMB sessions described in this paper were initiated as a result of a project called BATERATZEN. It began in 2010 with the principal goal of aligning people to the strategic needs of the organization, and thus facilitating the development of more competitive organizations. This initiative is supported by the Regional Government of Gipuzkoa (DFG).

The project aimed to assist two SMEs from the Basque industrial sector in order to make more effective decisions in Human Resource Management. Specifically, the objectives now are as follows:

- Compare two GMB sessions with regard to results, effectiveness of the methodology and finding solutions.
- Clarify the differences in definition of outcomes, and provide guidelines for more standardized assessments and reports.
- Assist managers in making more effective decisions and thus retaining worker commitment to the organisation.
- Construct a System Dynamic model based on the two GMB sessions (oncoming task)

3. Methodology

Prior to the GMB sessions, two important steps were undertaken: (i) Planning for the construction conference. One of the facilitators interviewed a number of key people from each company. In these interviews the existence of the problem (commitment to the company) was confirmed, the goal of the GMB workshops was clarified and causal maps of system feedback were defined. In addition, audience and purpose were selected, diverse profiles that are crucial for the daily activity of the company. (ii) Schedule for the day. The public agenda for each GMB session was set to four hours (8.30-12.30).

3.1 Group model building workshops

Two GMB sessions were arranged, one in each of the selected companies. The organisation of these sessions was as follows:

(i) Problem definition. The workshops addressed the same problem in each organisation, so as to facilitate comparison of results. It is important to note that these workshops were developed in “real” organizations with a “real” problem, worker commitment to their organisations. The selected companies are also cooperatives owned by the workers, a factor that may influence decision making and level of commitment. As system dynamics uses modelling at a high level of abstraction, the workshops were limited to defining the causal loops diagrams. The simulation models will be developed as future work by Mondragon Unibertsitatea, in partnership with the companies. (ii) List of variables. Workshop participants were asked to list variables involved in and related to analysis. Variables could be causes or effects of the problem; the relevance lies in the existence of a relationship with the topic of analysis. Lists were drafted individually, and then compared in an opinion exchange. (iii) Identification of influencers. In this step participants chose the influencers that directly influenced

the problem. (iv) Loop creation. Existing loops in the diagram were identified together with their polarities, and names were assigned.

All phases were developed considering the opinions of all participants, and always in consensus. Such agreement is necessary, before adding any concept to the diagrams or defining any loop.

3.1.1 Company A

The Problem definition phase was almost the same for both companies, and involved a brief reflection on the commitment of workers, development of the analysis and definition of time horizon.

Each participant then produced a list of variables related to commitment and then shared them in the opinion exchange, Figure 1.

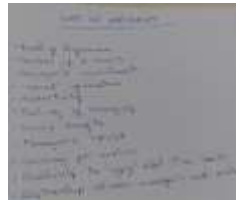


Figure 2. Example of list of variables of one participant in the session

The identification of influencers phase took 1 hour. Most of the influencers were causes (i.e. level or lack of commitment) rather than effects, which required some extra effort on the part of the facilitators to obtain the most accurate and appropriate general diagram, Figure 2.



Figure 3. Initial diagram (language chosen for the information phase was Spanish)

The final phase proved the most difficult, due to the abundance of causes rather than effects. A second round review was necessary to obtain two principal loops defining the general structure, main origin of the problem, and its influences.

3.1.2 Company B

Defining the problem and making the individual lists of variables was almost the same for both companies. The most important differences appeared in the process of defining the influences. Company B had fewer variables and thus fewer influencers were identified. The defined variables were causes and also effects of the problem, this situation was really effective in closing the feedback loops, and also identifying the archetypes required for the future task of developing the simulation model, Figure 3.



Figure 4. Initial diagram (Spanish was also chosen for this session)

In the final phase circular feedback loops were identified: five balancing feedback loops (-) and three reinforcing feedback loops (+). All the variables stuck to the wall from the problem definition phase were included in the diagram, indicating that the session was effective enough to include the contributions from all participants.

4. Results

4.1 Company A

The GMB session in Company A was developed with ease due to the commitment to the process from the participants. All participants were volunteers from diverse decision-making roles within the company, but with a shared goal of increasing the competitiveness of their organisation in the context of the highly changeable Basque industrial sector.

Complete agreement is necessary before adding any variable to the general diagram displayed on the whiteboard. The most debatable points for Company A were related to the concept of “reward” and the criteria established for the “evaluation process” of each worker.

The first and principal loop developed in the GMB session referred to responsibility, one of the most notable reasons identified. This has impact on final results, which in turn influences satisfaction (when better results are gained a general atmosphere of satisfaction is created). Finally, the degree of satisfaction

contributes to the overall commitment. Figure 4 shows the loop resulting from this analysis.

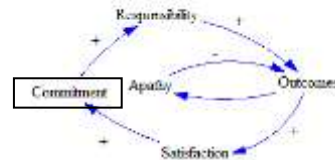


Figure 5. First Loop

The second loop is focused on authority: The type of authority in Company A was linked to management effectiveness (which was negatively evaluated by the group). At the same time, the perceived inexistence of management effectiveness was directly related to a general sensation of “being alone”. Finally, the group identified that workers did not feel supported by their managers (citing the ambiguous answers of managers when requested for help by workers), which leads to a lesser commitment organisation following a specific path that could be seen in Figure 5. The guiding authority in this organisation has demonstrated a tendency to hide problems (directly related to the lack of transparency) which in turn has reinforced a perception of autocratic authority. Participants identified the positive relationship between an effective leadership and the concept of shared goals (the organisation is aligned in respect to strategy and goals). This strategical coherence influences positively commitment.



Figure 6. Second Loop

4.2 Company B

The outstanding feature of the GMB session in Company B was the speed with which the feedback loops were closed. The first part, which focused on finding the causes and effects of the problem, was highly effective as both sides (origin and effects) of all the paths were identified. The key to understanding how commitment could be improved is based on this principal loop in Figure 6.

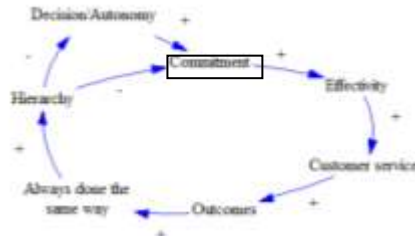


Figure 7. Principal loop

Although different variables are included in the principal loop, the principal factor was identified as “Always done the same way”. Such an approach to managing results in a hierarchical leadership suggests that the decision making of the collective is undermined, leading to a reduction in commitment. At the same time, this philosophy was connected with Taylorism. They stated that this management increases cop-out level of workers. As a result, direction implements some corrective actions such as, order and control. This resolves the problem in the short term however in the expense of the long term.

5. Conclusions

Company A was characterized by the commitment and enthusiasm of the participants, which resulted in the identification of a high volume of “cause” variables for the problem (commitment to the company). This focus on “cause” variables however, resulted in difficulties in defining final closed loops, as the participants did not pay sufficient attention to “consequences”.

In contrast, Company B participants although enthusiastic were more balanced in their approach, and achieved both balancing and reinforcing loops, which will facilitate future work in the construction of a simulation model.

Both sessions analysed in this work have demonstrated the effectiveness of GMB workshops in involving stakeholders in the process of modelling, reflection and seeking solutions. The methodology of this approach implicates the participant in the problem, which effectively captures their attention and increases motivation. In addition, both workshops have proved robust enough to obtain the necessary information to build a reliable simulation model, which is the objective of future work in this project.

Effectiveness of workers has been defined as a direct consequence of feeling committed or not. In both cases type of management has been identified as a crucial influencer for commitment (Authority/Hierarchy). In the line of type of management, Taylorism has been identified as an obstacle for improving commitment for those two companies. Thus, the comparison between the sessions has been extremely useful in identifying similarities between companies from the

same sector. This identification is also the key to creating a standard and transferable template, which will form the basis of the final simulation model, to find solutions for industrial sector companies with the same problem.

Acknowledgements

We would like to thank the Regional Government of Gipuzkoa (GFA) for their support in the development of this project. Special thanks to the Department of Economic, Rural and Territorial Development of GFA in the context of BATERATZEN (OF-267/ 2015).

References

- Andersen, D. & Richardson, G., 1997. Scripts for group model building. *System Dynamics Review*, 13(2), pp.107–129.
- Bearth, M.A., 2015. *Employee Contributions to Organizational Decision-Making Processes and Outcomes*.
- Diaz, R.M., Pichler, F. & Arencibia, A.Q., 2005. Theory Building with System Dynamics, EUROCAST 2005. *10th International Conference on Computer Aided Systems Theory*.
- Forrester, J.W., 1994. System dynamics, systems thinking, and soft OR. *System Dynamics Review*, 10(2), pp.1–14.
- G.P.Richardson; D.F.Andersen, 1994. Teamwork in group model building. *System Dynamics Review*, 11(2), pp.113–137.
- Grobler, J.D., 2013. *Diversity in Decision Making for Competitive Advantage*.
- Luna-reyes, L.F. et al., 2013. Group Model Building to Support Interdisciplinary Theory Building. *International Conference of the System Dynamics Society*, pp.1–17.
- Marijn Janssen, Maria A.Wimmer, A.D., 2015. *Policy practice and digital science: Integrating complex systems, social simulation and public administration in policy research*.
- Patrick, S., 1995. The dynamic simulation of control and compliance processes in material organizations. *Social Perspective*, 38(4), pp.497–518.
- Respicio, A., Antunes, L. & Balsa, J., 2006. Decision Support for Public Tax Policies through Social Simulation.
- Rouwette, D.F.A.J.A.M.V.G.P.R.E.A.J., 2000. Group Model Building: Problem Structuring, Policy Simulation and Decision Support.
- Sartori R., Ceschi A., Costantini, A., 2015. On decision processes in businesses, companies and organizations computed through a generative approach: The case of the agent-based modeling. *International Journal of Business Research*.
- Sterman, 2000. *Business Dynamics: Systems Thinking and Modeling for a Complex World*.

Stijn Hoppenbrouwers; Étienne Rouwette, 2013. A dialogue game for analysing group model building: framing collaborative modelling and its facilitation. *Radboud Repository*, p.144.

