Developing A Theory of Action for Group Model Building Facilitation– Insights from the Field of Action Science

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Summary

Group model building (GMB) is an approach of engaging stakeholders as participants in the process of building system dynamics models to address complex problems. Among the roles supporting the modeling session, the facilitator is the most crucial for the success of the session; to facilitate GMB sessions, facilitators need several skills and attitudes, and it was stated that the attitudes are more important for the effectiveness of the facilitator (Vennix, 1996). However, even if GMB facilitators are taught to hold those attitudes, it doesn't mean that they are able to do so during their facilitation, especially when difficult situations such as conflict emerge in their sessions. The inability of a GMB facilitator to put the attitudes into action could be explained from the "theory of action" perspective.

A theory of action is a theory stating what an individual has to do to achieve its intended results, and it includes several elements such as values, assumptions, and action strategies (Argyris & Schön, 1974). From the theory of action perspective, although Vennix (1996) suggested several attitudes needed by GMB facilitators, there is a lack of elaboration on the values, assumptions, and action strategies needed for the facilitators to put those attitudes into action. Accordingly, the purpose of this research is to develop a theory of action for GMB facilitation in order to help GMB facilitators to get a grip of the attitudes mentioned in Vennix (1996) and to be effective when facilitating GMB sessions.

Narrative inquiry was employed as the research strategy, and interviews with GMB facilitators were conducted to collect the cases of difficult situations in their past GMB sessions; the rationale for focusing on difficult situations is that it is the difficult situation where facilitator's effectiveness might be challenged the most.

14 Cases were collected from the interviews. Each case was analyzed by applying the framework of theory of action, and the values, assumptions, and action strategies underlying the facilitator's response to the difficult situation were derived. At the cross-case level, five response types were identified by comparing the facilitators' responses in the 14 cases, which include: 1) confrontation avoidance, 2) unilateral control, 3) unilateral protection, 4) information sharing and joint decision-making, and 5) self-refraining. Besides, common patterns were identified in several cases which were categorized into different response types, which include: 1) concern about

image or success, 2) framing of the participant's behavior as opposition, 3) emergence of ideas about how a facilitator should behave, and 4) reflection on the alternative response to the situation after the session.

By reviewing the literature in the fields of system dynamics (including GMB) and action science, a theory of action for GMB facilitation was derived, and the theory was revised based on the insights derived from the empirical findings in this research. Finally, several suggestions based on the literature review and empirical findings were provided for GMB facilitators and GMB training, and directions for future research were proposed.

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1. Introduction

1.1. Research Background

Group model building (GMB) is an approach of engaging stakeholders in the process of building system dynamics models, with the goals of learning about their problems in complex systems, building consensus, and creating commitment to address the problems (Hovmand, 2014; Van den Belt, 2004; Vennix, 1996). In a GMB session, the participants are supported by a team which may include five roles, the facilitator, the modeler/reflector, the process coach, the recorder, and the gatekeeper (Richardson & Andersen, 1995, p. 114). Among these roles, the facilitator is the most visible in the process, whose responsibility includes eliciting the participants' understanding of the problem, assisting in model construction, and supporting the participants to derive their insights from the model (Richardson & Andersen, 1995; Vennix, 1996, p. 133). Vennix (1996) even argued that the facilitator is the most crucial role, as "the behavior of the facilitator will either turn the project into a success or an utter failure" (p. 133).

As a GMB facilitator, one needs several skills such as group process structuring and conflict handling; besides, a GMB facilitator needs several attitudes such as authenticity and neutrality (Vennix, 1996). Although the attitudes are relatively intangible compared with the skills, Vennix (1996) stated that they are more important for the effectiveness of a GMB facilitator (p. 264). Since Vennix (1996) didn't define the effectiveness of a GMB facilitator explicitly, this research defines the effectiveness as the extent to which a GMB facilitator is able to support the participants to achieve the goals of the session (i.e., learning, consensus, and commitment). GMB facilitators are taught to hold those attitudes, yet it doesn’t mean that they are able to do so during their facilitation, especially when a difficult situation emerges in a GMB session. In this research, a difficult situation is defined as a situation where a GMB session unfolds in an unexpected way and makes a facilitator feel that the situation is challenging and that something needs to be done to manage the situation.

One of the possible reasons of a GMB facilitator’s inability to put the attitudes into action lies in the facilitator’s “theory of action” (Argyris & Schön, 1974). Theory of action is a concept from action science, whose goals are to contribute to knowledge that serves action and promote learning and reflective practice (Argyris, Putnam, & Smith, 1985, p. 36; Schön, 2016; Smith, 2015, p. 143). According to Argyris and

Schön (1974), a theory of action is a set of interconnected propositions of deliberate human behavior (Argyris & Schön, 1974, p. 6), and this definition is adopted in this research. Examples of deliberate human behavior include teaching, communicating, model building, and facilitation. For an individual who holds a theory of action, it is a program stating what the individual has to do to bring about the intended results (Argyris et al., 1985, p. 81). An individual's theory of action usually follows the form of "in the situation S, if you want to achieve consequence C, under assumptions a_1... a_n, take action A" (Argyris & Schön, 1974, p. 6). Assumptions are ideas taken for granted about self, others, the situation, or the connections among the action, the consequence, and the situation (Argyris & Schön, 1974, p. 7). Other elements of a theory of action are values and action strategies; the former are what the individual seeks to satisfy and uses as indicators to assess the desirability of the consequence (Argyris et al., 1985, p. 84), and the latter are courses of action intended to reach the individual's desired consequence (Argyris et al., 1985, p. 85). How a GMB facilitator's theory of action may be related to the facilitator's attitude can be illustrated in the following example. If a GMB facilitator holds "minimizing generating or expressing negative feelings" (Argyris & Schön, 1974, p. 68) as a value and has an assumption that raising sensitive issues has a high risk of upsetting the participants, when the facilitator notices a participant implicitly mentions a sensitive issue, one action strategy the facilitator may employ is to "cover up" the issue by pretending that the sensitive issue is not mentioned at all. In this situation, the facilitator may not be able to hold the attitude of authenticity, which is described as "being yourself and displaying genuineness in interaction with other people" in Vennix (1996, p. 1 48).

Theories of action could be divided into two types, "espoused theories of action" (espoused theories) and "theories of action-in-use" (theories-in-use), whose definitions given by Argyris & Schön (1974, p. 7) are also adopted in this research. An espoused theory is a theory of action that an individual claims to hold (Argyris & Schön, 1974, p. 7); in GMB facilitation, it includes the attitudes and the behavioral principles that a facilitator claims to hold. For example, some facilitators may state that they will be open and ask questions to understand the participants' concern if they are challenged by the participants in GMB sessions. A theory-in-use is a theory of action that is put to use by the individual, and it cannot be understood simply by asking the individual; instead, the theory-in-use must be inferred from the individual's observable behavior (Argyris & Schön, 1974, p. 7), such as a GMB facilitator's

physical behavior, words, and tones used in a GMB session. According to the definitions of the two types of theories of action, it is not surprising that an individual's espoused theory may be incongruent with its theory-in-use (Argyris & Schön, 1974, p. 23). In fact, what people do often differs from what they espouse (Argyris et al., 1985, p. 82), and this phenomenon is also recognized in GMB literature (Vennix, 1996, p. 146). In addition, the degree of incongruence between the two theories of action may be higher when an individual faces higher threat (Argyris, 1974, p. 23); therefore, if GMB facilitators face higher level of threat in difficult situation, they may be less able to behave in the way that is consistent with the attitudes they espoused. Accordingly, based on the statement made by Vennix (1996) that attitudes are more important than skills for the effectiveness of GMB facilitators, it can be derived that GMB facilitators' effectiveness will face a higher level of challenges when difficult situations emerge in GMB sessions. For example, even if a GMB facilitator is taught and claims to embrace the attitudes such as neutrality, integrity and authenticity, the facilitator may become defensive or try to manipulate the participants when facing difficult situations, and the consequence might be the participants' resistance to the process or withdraw from the session.

It requires learning for a facilitator to master GMB, which includes acquiring relevant knowledge and methods, whereas Argyris and Schön (1974) argued that a "theory of action has not been learned in the most important sense unless it can be put into practice" (p. 12). Accordingly, when an individual acquires knowledge or methods of GMB facilitation, the individual's espoused theory for GMB facilitation is improved; for the individual to learn GMB facilitation in the most important sense by Argyris and Schön (1974, p. 12), it is necessary to make the theory-in-use more aligned with the espoused theory for GMB facilitation.

Individuals may face some challenges when trying to learn and be more effective in GMB facilitation. For example, they may be unaware of their theories-in-use. According to Argyris and Schön (1974), "people tend to be unaware of how their attitudes affect their behavior" (p.viii). This tendency indicates the importance of being self-reflective, which is also mentioned by Vennix (1996, p. 146). Nevertheless, even if they are able to be self-reflective, deficiencies in the theory of action described in GMB literature may impede learning. To begin with, Vennix (1996) gave descriptions about what GMB facilitators have to do in the text for the attitudes he suggested; for example, Vennix suggested that facilitators should refrain from airing their opinions

verbally and non-verbally so as to be neutral; however, the descriptions might be too scattered around the text for facilitators to derive a clear set of action strategies for putting those attitudes into action. In addition, Vennix (1996) stated what consequence would be brought about if facilitators behave in a certain way; for instance, if facilitators ask questions to clarify a matter, misunderstanding could be prevented (p. 149); however, there is a lack of description about the values the facilitators could strive to satisfy and use as indicators to assess the desirability of the consequence. Furthermore, although Vennix's (1996) description for the attitudes does includes several assumptions, while those assumptions are relatively implicit; for example, he put the following statement in the text for the attitude of inquiry: "This (displaying an attitude of inquiry) can best be accomplished if you convince yourself of the fact that what you now consider to be true and thus real, could turn out not to be true or real tomorrow" (p. 150), which could be regarded as an assumption that "what I know might not always be true"; however, this assumption may not be explicit enough for facilitators to be aware that it is an assumption to hold during their facilitation. Accordingly, GMB facilitators may consider the attitudes listed in Vennix (1996) important, whereas there is a lack of explicit elaboration on the values, assumptions, and action strategies that could help the facilitators to get a grip of those attitudes.

In summary, if there is a lack of clear description about the theory of action for GMB facilitation, how could GMB facilitators have clear espoused theories for GMB facilitation? In addition, how could the facilitators be aware of their theories-in-use? Finally, how could they know to which goal (espoused theories) their theories-in-use should be adjusted so as to reach congruence? Accordingly, this research aims to fill the gap in the knowledge of GMB facilitation by studying the theories-in-use of GMB facilitators and developing a theory of action for GMB facilitation in order to contribute to the learning of GMB facilitators. As the effectiveness of a GMB facilitator might be challenged the most when a difficult situation emerges in a GMB session, while it is the very situation where the facilitator's effective response (including observable behavior and internal thinking) might be needed the most, this research focuses on the difficult situations in GMB sessions when studying the theories-in-use of GMB facilitators.

1.2. Research Objectives

According to the reasoning above, the objectives of this research are as follows:

1) To understand the responses of GMB facilitators to their difficult situations in GMB sessions and the theories-in-use underlying the responses;

2) To derive a theory of action for GMB facilitation based on both the literature in system dynamics (including GMB) and action science, and on the insights from the empirical study on GMB facilitators' responses to their difficult situations.

1.3. Research Questions

Based on the research objectives, the research questions were formulated as follows:

1) What are the responses of GMB facilitators to their difficult situations?

    a. What are the action strategies used by GMB facilitators to respond to difficult situations?

    b. What assumptions do GMB facilitators hold in difficult situations?

    c. What values do GMB facilitators hold in difficult situations?

2) What is a theory of action for GMB facilitation that could help facilitators to be effective?

1.4. Theoretical Relevance

Rouwette (2016) reviewed previous studies on GMB and derived four waves of research, including the different applications of GMB and their effectiveness (Rouwette, Vennix, & Mullekom, 2002; Scott, Cavana, & Cameron, 2016), the change in participants' mind and how the change in mind is linked to behavioral change (Richardson, Andersen, Maxwell, & Stewart, 1994; Rouwette, Korzilius, Vennix, & Jacobs, 2011; Thompson, Howick, & Belton, 2016), the individual behavior of participants during the modeling process such as information sharing (McCardle-Keurentjes, Rouwette, & Vennix, 2008), and the interaction among participants during the modeling process (Adriaans, 2014; Black & Andersen, 2012; Van Nistelrooij, Rouwette, Vestijnen, & Vennix, 2012). The four waves of GMB research show that not only the behavior of participants but also the mind of participants has become the focus of investigation. The focus makes sense, as one of the purposes of system dynamics is to help people to change their mental models from the ones with "a reductionist, narrow, short-run, static view of the world" to the ones with "a holistic, broad, long-term, dynamic view" (Sterman, 2000, p. 18).

However, when it comes to GMB facilitators, previous studies focused primarily on the behavior or the more tangible part of the world; examples are the scripts (e.g., Andersen & Richardson (1997)) and techniques (e.g., Supusepa (2015)) that could be applied in GMB facilitation. This phenomenon leads to a puzzle: If people's behavior is influenced by their mental models, why does GMB facilitators' mental models receive little attention in the previous studies?

Accordingly, by studying the theories-in-use of GMB facilitators in their difficult situations, this research focuses on the GMB facilitators' mental models and could reveal how the GMB facilitators make sense of the situations, their reasoning underlying their action, and partially fill the gap in the studies of GMB.

1.5. Practical Relevance

The insights from this research will contribute to the practice of GMB, and the contribution includes improving the effectiveness of GMB facilitators and promoting the more prevalent use of GMB because of the following reasons.

Vennix (1996) emphasized the importance of GMB facilitators' attitudes as introduced earlier; other scholars have also stressed the importance of the attitudes. To promote the widespread use of system dynamics, Visser (2007) stated that the further development of group facilitation skills and attitudes may be equally important compared with the improvement of model quality, as "the quality of personal interaction may be as decisive for the success of simulations as the quality of the models" (p. 461).

Many scripts have been developed for the standard process of GMB (Andersen and Richardson, 1997; Hovmand et al., 2011). Although these scripts prescribe the steps GMB facilitators have to take to achieve specific objectives, it is still possible that GMB sessions may unfold in many unexpected and unplanned ways. These uncertainties indicate the need for improvised facilitation in GMB sessions, which was described by Andersen and Richardson (2010) as one of the three "complementary legs" of GMB in addition to teamwork and scripts. When there are less step-by-step instructions in a script for GMB facilitators to follow, their theories-in-use would play a more important role in their behavior and effectiveness.

Human beings are facing "grand challenges" (Cagnin, Amanatidou, & Keenan, 2012), which are large in scope and are composed of multiple wicked problems (Rittel &

Webber, 1973). As these challenges are usually dynamically complex in addition to their large scope (Kwakkel & Pruyt, 2015), it requires approaches that could facilitate the collaboration among multiple stakeholders and the understanding of dynamic complexity to address the grand challenges; GMB is one of the approaches that could meet the requirement. Besides, as different stakeholders tend to have different values, it can be expected that difficult situations such as conflict may emerge when those stakeholders try to work together to address the challenges. If GMB is expected to play a more active and important role in addressing the grand challenges, it would be important to keep improving the effectiveness of GMB, which was in fact proposed by Sterman (2000) as one of the future challenges for system dynamics (p. 899). Therefore, it would be important to improve the theories-in-use of GMB facilitators in order to improve the effectiveness of GMB in addressing grand challenges.

Accordingly, by studying GMB facilitators' theories-in-use and deriving the theory of action for GMB facilitation, it is expected that this research could help improve the effectiveness of GMB facilitators, especially in situations that are difficult or require the facilitators to improvise. Furthermore, the improved effectiveness of GMB facilitators' would facilitate the more prevalent application of GMB, thereby allowing GMB to play a more important role in addressing the grand challenges faced by human beings.

1.6. Thesis Outline

This research is intended to study the theories-in-use of GMB facilitators and to develop a theory of action for GMB facilitation, and the outline of this thesis is as follows. To begin with, the research topic was briefly introduced in this chapter. Second, the theoretical background of this research is given in Chapter 2, where the literature in the field related to this research is reviewed and a preliminary version of theory of action for GMB facilitation is derived. Chapter 3 introduces the methodology employed in this research, which includes the research strategy, data collection, and data analysis. Afterward, Chapter 4 presents the results of the empirical study. Finally, the conclusions and discussion of this research are presented in Chapter 5, which includes the contribution to knowledge and practical implications, limitations of the research, and the directions for future research.

2. Theoretical Background

This chapter is intended to provide the theoretical background of this research. In the first three sections, the fundamentals of system dynamics, group model building (GMB) and action science are introduced. The fourth section elaborates upon two types of theories-in-use, Model I and Model II, whose development is one of the most important contributions from action science. Afterward, the challenges faced by GMB facilitators in GMB sessions and the difficulty in implementing the attitudes suggested in Vennix (1996) are examined from the perspective of action science in the fifth section. The sixth section presents the conceptual models illustrating an individual's learning about GMB facilitation. Finally, a preliminary theory of action for GMB facilitation was derived in the seventh section.

2.1. System Dynamics

As a basis of GMB, system dynamics is a discipline applying computer simulation in integrating the existing fragmented knowledge about a complex system into a connected whole, thereby investigating why the system behaves in a certain way over time (Forrester, 1997). The goals of system dynamics include assisting in people's learning about complex systems, identifying high-leverage policies for solving complex problems in a sustainable way, and building shared understanding (Sterman, 2000; Sterman, 2002).

System dynamics was developed by Jay Forrester during 1950s (Meadows, 1980, p. 30), and it first emerged as "Industrial Dynamics", which was intended to address complex problems in corporate systems such as fluctuation in the production-distribution system and instability in the employment level of a company (Forrester, 1961). Later on, the approach was applied in urban systems to study problems such as urban stagnation and unemployment (Forrester, 1969); afterward, it was applied in studying the dynamics of the world system in order to understand the interaction among population growth, diminishing natural resource and capital investment (Forrester, 1971b). Nowadays system dynamics has been applied in various issues such as education, healthcare, and climate change (Pruyt, 2013).

According to Forrester (1961), there are four foundations in system dynamics (p. 14). The first foundation is the theory of information-feedback system, which focuses on how a system's output due to the past decision influences the system's future decision

(p. 14); the second foundation is the knowledge of decision-making processes, which originated from the practical experience of decision-making during military operations (p. 17); the third foundation is the experimental model approach to studying complex systems, which means using digital computers to conduct simulation experiment in the virtual world to better understand the behavior of systems (p. 17); the fourth foundation is the development of digital computer, which makes computation with higher speed and lower cost more available (p. 18).

The four foundations of system dynamics reflect the worldview of this paradigm, and the first element is its understanding of complexity including combinatorial complexity and dynamic complexity; the former refers to the multiplicity of components of a system and the latter denotes the variation in system behavior emerging from the interaction among the system components (Sterman, 2000, p. 21). The second element of the system dynamics worldview is the limited mental capacity of human beings, which leads to the selective perception of the reality (Sterman, 2000, p. 23), bounded rationality that causes people to choose the sub-optimal options (Simon, 2000), and the misconceptions of feedback of a complex system (Sterman, 2000, p. 27). Seeing the complex systems, system dynamics tends to make sense of the complexity from an endogenous point of view (Richardson, 2011, p. 221), which makes up the third element of system dynamics worldview. The endogenous point of view denotes that the dynamic behavior of a complex system emerges from its causal structure within a certain system boundary (Meadows, 1980, p. 31; Richardson, 2011, p. 221). Accordingly, when facing a recurring problem of a system, systems dynamicists tend to look for explanation within the system's internal structure (Meadows, 1980, p. 31), and this tendency makes feedback loop, a central concept when system dynamicists try to make sense of a complex system (Meadows, 1980, p. 31; Sterman, 2000, p. 12).

The process of system dynamics modeling is divided into several stages in different ways in system dynamics literatures such as Richardson and Pugh (1981) and Sterman (2000); nevertheless, a general pattern can be derived from those literatures (Luna-Reyes & Andersen, 2003). The process starts from problem definition, where the problem of interest is identified in the form of a reference mode behavior (Sterman, 2000, p. 90). The second stage is model conceptualization, where the structure of a model is sketched by identifying the variables that act as causes or effects of the problem and the interrelationships among the variables; this model structure is

considered a dynamic hypothesis of the problem (Sterman, 2000, p. 94). After the model structure is constructed, the next stage is model formulation, where the values of parameters are inserted into the model and the relationships among the variables are formulated as equations. The next stage following model formulation is model testing, which includes analyzing the behavior of the model and evaluating its usefulness. The final stage is policy formulation and implementation, where potential policies for addressing the problem are designed and assessed, and the insights derived from the model are conveyed to the relevant agents in the problem in order to facilitate further discussion. Although the process seems to be linear, in fact it is an iterative process, where the results of the later stages can be used to revise the work in any of the previous stages (Sterman, 2000, p. 87).

2.2. Group Model Building (GMB)

As introduced earlier, GMB is a system dynamic modeling process where multiple stakeholders are actively involved in order to integrate their perspectives and even facilitate their collaboration to address a complex problem. The engagement of multiple stakeholders indicates the recognition of social complexity, which reflects the number and diversity of agents involved in a problem (Conklin, 2006).

The importance of engaging stakeholders in model building has been recognized in the field of system dynamics for a long time (Richardson, Vennix, Andersen, Rohrbaugh, & Wallace, 1989; Roberts, 1977; Vennix, Gubbels, Post, & Poppen, 1988). One of the most significant steps was made by Vennix (1996), which introduced the framework of GMB projects and the skills and attitudes needed for facilitating GMB sessions. In addition, the book was considered by Lane (2006) the biggest step in melding analytical power of system dynamics with "a deep understanding of the social dimension of the modeling process." (p. 569).

Richardson and Andersen (1995) introduced the five roles in the supporting team in a GMB session. The facilitator is the most visible role and has been introduced in the previous chapter (see section 1.1). The job of the modeler/reflector is to assist the facilitator and the group in constructing and formulating the model, to assure the quality of the model, and to reflect back to the group the important information indicated by the model structure and behavior. The process coach is the one who monitors the group dynamics and assures the quality of group process. The recorder is responsible for taking the notes of what the group, modeler/reflector, and facilitator

said during the session. The gatekeeper is the one who is part of or closely related to the client group, and the role is responsible for helping with preparation before the session (such as problem setting and identifying potential participants) and ensuring the communication between the client group and the supporting team; in addition, the gatekeeper may act as a participant during the session. Although there are five roles in the supporting team, it is not necessarily that the team has five members, as some roles may be combined and be played by one member.

Two major categories can be derived from the previous development in GMB facilitation, and the first category is the development of scripts (Andersen & Richardson, 1997; Hovmand et al., 2012). Andersen and Richardson (1997) suggested that the GMB process be divided into small pieces of “scripts” (p. 107); these scripts can act as “building blocks” of GMB sessions and allow facilitators to choose the scripts they need in order to design their sessions. Later on, the format of scripts was standardized and a collection of scripts named “Scriptapedia” was published so as to facilitate the use, documentation, and the further collection of scripts, thereby facilitating the training and studies on GMB (Hovmand et al., 2011; Hovmand et al., 2012). The second major category is the integration of GMB process with other approaches. One group of those approaches includes facilitated modeling approaches other than GMB, such as strategic options development and analysis (Ackermann & Eden, 2010; Herrera, McCardle-Keurentjes, & Videira, 2016) and soft systems methodology (Rodriguez-Ulloa & Paucar-Caceres, 2005); the other group includes the approaches for policy design and assessment, such as multi-criteria decision analysis (Videira, Antunes, & Santos, 2017) and policy making methods (Ackermann, Andersen, Eden, & Richardson, 2011).

In addition to the two major categories, there are techniques and skills suggested to be applied by GMB facilitators when they are in action. For example, Andersen and Richardson (2010) developed the principles and techniques for improvised GMB facilitation, and Supusepa (2015) studied the potential of applying mediation intervention technique in GMB. Besides, some authors suggested the skills (Franco & Montibeller, 2010, p. 494; Vennix, 1996, p. 151) and tips (Hovmand, 2014, p. 70) of GMB facilitation based on literature review or their practical experience.

Attitudes for practicing GMB have also been covered in the previous literatures. In addition to the facilitator’s attitudes suggested by Vennix (1996, p. 147), Akkermans

(1995) suggested the attitudes needed for working on a GMB project (p. 63); one of the most significant differences between these two sets of attitudes is that the former is for facilitators who are supposed to be substantively neutral to the content in GMB sessions, while the latter is for consultants who still treat the client as a content expert but doesn't constrain themselves with the concern of neutrality. There is a limited number of studies on the attitudes of GMB facilitators, and the only study that was discovered during the literature review in this research is the one conducted by Visser (2007); he approached GMB facilitation by analyzing the interaction between a facilitator and a participant from the perspective of a communication theory and pointed out the impossibility of strictly neutral facilitation (p. 460) and the importance of integrity (p. 461). At the end of the paper, Visser (2007) called for further development of skills and attitudes for GMB facilitation (p. 461), which is a source of motivation for this research.

According to the aforementioned previous studies in GMB facilitation, it seems that GMB facilitators' attitudes haven't received much attention, even though it has been stated that attitudes are more important than skills (Vennix, 1996); therefore, this phenomenon leads to one of the intentions of this research to contribute to the further development of GMB facilitators' attitudes.

2.3. Action Science

Action science is founded by Chris Argyris and Donald Schön (Friedman & Rogers, 2008). According to Smith (2015), the name of action science reflects its dual commitment (p. 143); on one hand, the word "action" represents the commitment to produce knowledge that is actionable so as to transform practice (p. 143); by "actionable knowledge" action scientists mean the knowledge that specifies the action needed to achieve its intended consequence (Argyris, 1996); on the other hand, the word "science" represents the commitment to the rigorous process of knowledge production by applying the principles of scientific inquiry (Argyris et al., 1985, p. 34; Smith, 2015, p. 143). To fulfill this commitment, action scientists seek to establish communities of inquiry in the communities of practice by creating conditions that are conducive to rigorous and reflective inquiry, making the community members able to "design and implement their intentions in everyday life" (Argyris, 1982, p. 469).

Theory of action is one of the core features in action science (Friedman & Rogers, 2008; Lipshitz, 2000). From the perspective of an observer, a theory of action can be

used to explain why an individual behaves in a certain way; in addition, the theory can also be used to predict how the individual may behave in a certain situation (Argyris & Schön, 1974, p. 5). From the perspective of the individual, a theory of action specifies what the individual has to do to bring about the intended outcome (Argyris & Schön, 1974, p. 6). Therefore, a theory of action can serve not only as a theory of explanation and prediction but also as a theory of control (Argyris & Schön, 1974, p. 6).

In the previous chapter, it was introduced that a theory of action could be an espoused theory or theory-in-use. In addition, a theory of action could be task-related or relationship-related; the former is the technical theory of action employed by an individual to perform a task, while the latter is the interpersonal theory of action used by the individual when interacting with other individuals (Argyris & Schön, 1974, p. 164). If it requires a high level of interpersonal interaction for an individual to perform a task such as teaching, a significant portion of the technical theory of action is also the individual's interpersonal theory of action. As a GMB facilitator has intensive interaction with the participants when facilitating a GMB session, it can be derived that there is a high level of interpenetration between the technical and interpersonal theories of action in GMB facilitation.

Theory of action is a hypothetical construct; however, it is useful for learning, reflection, and generating actionable knowledge (Lipshitz, 2000; Friedman & Rogers, 2008). For example, by making its theory-in-use explicit, individuals can be aware of what cause their ineffectiveness and perform conscious criticism (Argyris & Schön, 1974, p. 14). In addition, if there are more desirable alternatives to espouse, the individuals could be able to compare their theories-in-use with the espoused theories, shifting the theories-in-use toward the espoused theories in a conscious way (Argyris & Schön, 1974, p. 15).

In addition to theory of action, another core feature is framing, which is an individual's sense-making mechanism that determines what to ignore, what to focus, and how the selected data are organized into meaningful patterns (Friedman & Rogers, 2008; Schön, 2016, p. 40). Action science focuses on how individuals frame problems (problem setting) and how they frame their roles (role frame) (Argyris et al., 1985, p. 282; Schön, 2016). When individuals frame their problems, they set the boundary of the problem and determine what goes wrong (Schön, 2016). When the individuals frame their roles, they decide how to see themselves in the situations (Argyris et al.,

1985, p. 283). Therefore, the framing of problems and roles will influence the individuals' response to the problematic situations (Argyris et al., 1985, p. 280). Because of the features of framing, it is understandable that individuals' framing is interrelated with their theories-in-use (Argyris et al., 1985, p. 47).

The final core feature to be introduced is learning. Action science seeks to change the status quo by inducing learning (Argyris et al., 1985, p. 79), and there are mainly two types of learning in action science, single-loop learning and double-loop learning, both of which are defined according to how an individual's theory-in-use changes in response to the mismatch between the current and desired situation (Argyris & Schön, 1974, p. 19). In single-loop learning, changes happen primarily in an individual's action strategies; in double-loop learning changes involve the values and the basic assumptions associated with an individual's perceptions and thinking (Argyris, 1977; Argyris, 1982, p. 103; Lipshitz, Friedman, & Popper, 2006). Accordingly, when an individual undergoes a single-loop learning process, different action strategies are employed to address the mismatch and to satisfy the same set of values, while the "basic setting" of the individual's thinking and framing is left untouched (Argyris & Schön, 1974, p. 19). In contrast, when the individual responds to the mismatch by examining and changing the values and basic assumptions, the learning becomes a double-loop one. In this situation, the individual starts to frame and think about the same situation in a different way, and the changes in the "basic setting" of the individual's master program may in turn cause the individual to change its action strategies (Argyris & Schön, 1974, p. 19).

The concepts of action science have been brought to the field of system dynamics, such as espoused theory, theory-in-use, single-loop learning and double-loop learning (Isaacs & Senge, 1992; Sterman, 1994), and some researchers have even tried to integrate action science approach with system dynamics for organization intervention (Edmondson, 1996; Senge, 1994). Therefore, the fact that action science is not new to system dynamics implies the feasibility of applying action science in the research on the attitudes of GMB facilitators.

2.4. Model I and Model II Theories-in-use

Although there are technical and interpersonal theories of action, Argyris and Schön's studies focus especially on the interpersonal arena, since an individual's interpersonal theory-in-use can largely influence the individual's ability to perform rigorous and

reflective inquiry for double-loop learning, which is crucial when the environment is full of complexity and uncertainty (Lipshitz, 2000). After many years of research, Argyris and Schön identified two types of interpersonal theories-in-use, Model I and Model II (Argyris & Schön, 1974; Argyris & Schön, 1978). Argyris and Schön have introduced the two interpersonal theories-in-use multiple times in their publications, and there are some differences in the wording and description among different publications, although the core concepts are generally the same. With the intention of providing a comprehensive overview, the version of Model I and Model II to be introduced was derived from multiple publications by Argyris or Schön.

2.4.1. Model I

Model I theory-in-use includes four governing values. The first value is “be in unilateral control over others”, which means striving for unilaterally defining the task and avoiding others’ influence (Argyris, 2004, p. 8; Argyris & Schön, 1974, p. 66). The second value is “win and do not lose”, which is the intention to win, because not achieving or changing the goal is considered a sign of weakness (Argyris, 2010, p. 63; Argyris & Schön, 1974, p. 66). The third value is “minimize generating or expressing negative feelings”, which is the tendency to prevent self or others from generating or expressing negative feelings (Argyris & Schön, 1974, p. 67). The final value is “be rational”, which means the emphasis on being objective and intellectual and not getting emotional (Argyris & Schön, 1974, p. 67).

In addition to the four governing values, four action strategies are identified. The first strategy is “advocate one’s position and unilaterally control others”, which means that an individual makes others accept his/her position by persuading or cajoling others and prevents them from changing the situation (Argyris, 1976). The second strategy is “own and control the task”, which means claiming ownership of the task and exerting unilateral control so as to ensure the task to be done (Argyris, 1976; Argyris & Schön, 1974, p. 70). The third strategy is “unilaterally protect yourself”, which includes making inference without explaining the reasoning or referring to the observable data so as to protect oneself from others’ scrutiny; another way of self-protection is ignoring one’s incongruity and impact on others and the situation (Argyris & Schön, 1974, p. 71). The final strategy is “unilaterally protect others from being hurt or upset”, which is implemented by withholding or distorting important while threatening or embarrassing information and assuming others need to be protected (Argyris, 1976; Argyris &

Schön, 1974, p. 71).

Argyris and Schön (1974) predicted that an individual employing the above action strategies would cause several consequences (p. 72). For example, if the individual tends to unilaterally control others and protect him/herself while the behavior is not accepted by others, the individual would be considered defensive (Argyris & Schön, 1974, p. 73). If other people also behave based on Model I, they would respond defensively to the individual's behavior, resulting in a defensive interpersonal and group dynamics (Argyris & Schön, 1974, p. 73). Besides, the individual's theory-in-use would be self-sealing, as the individual would consider it too risky to confront or test the theory-in-use publicly (Argyris & Schön, 1974, p. 76); in this situation, the individual's learning would be relatively single-loop if any (p. 76). Furthermore, the individual's long-term effectiveness would decrease, since without double-loop learning the individual will not be able to adapt him/herself to new situations where new values are needed (Argyris & Schön, 1978, p. 65).

Several main assumptions of Model I were identified by Argyris and Schön (1974). The first assumption is "it is a win/lose world", meaning that the individual thinks that everyone in the world strives to win and is aversive to losing (p. 79). The second assumption is "other people behave according to the assumptions of model I", which means that the individual thinks other people have Model I as their theories-in-use (Argyris & Schön, 1974, p. 80). The third assumption is "rational behavior is most effective", which is the counterpart of the governing value "be rational" (Argyris & Schön, 1974, p. 80). The fourth assumption is "public testing of assumption is intolerably risky", as the individual is worried that testing assumptions publicly might cause embarrassment and threat (Argyris & Schön, 1974, p. 80).

2.4.2. Model II

Model II theory-in-use includes three governing values. The first value is "valid information", which means the intention to provide relatively observable data or correct report of thoughts to others; in addition, an individual with this value also tries to create conditions for others to do the same (Argyris & Schön, 1974, p. 86). The second value is "free and informed choice"; an individual with this value seeks to help him/herself and others to choose the options that are feasible and truly desired (Argyris, 1970, p. 18; Argyris & Schön, 1974, p. 88). The third value is "internal commitment", which means an individual internalize a decision and feels responsible

for the decision and the resulting implications (Argyris, 1970, p. 20); in addition, the individual also has a sense of ownership and is willing to monitor how the decision is implemented in order to make corrections if needed (Argyris, 2004, p. 10).

There are four action strategies in Model II. The first strategy is “make designing and managing environment a bilateral task”; an individual employing this strategy shares control over situations with relevant others so that participants are able to make free and informed choices and to generate internal commitment; in addition, the individual also creates conditions where participants are able to confirm or disconfirm one another’s ideas (Argyris, 1982, p. 103; Argyris & Schön, 1974, p. 89; Schön, 2016). The second strategy is “make protection of self or other a joint operation”; generally, protection such as face saving is resisted; however, if protection must be adopted, the decision is made jointly with the people involved, and the reason underlying the decision is shared (Argyris, 1982, p. 103; Argyris & Schön, 1974, p. 90; Schön, 2016). The third strategy is “speak in directly observable categories”, which means providing the observable data on which one’s inference is based so as to facilitate independent interpretation of the data and to make the inference open to disconfirmation (Argyris & Schön, 1974, p. 90; Schön, 2016). The final strategy is “surface private dilemmas”, and this includes sharing dilemmas with others and allowing the assumptions underlying the dilemmas to be tested publicly (Schön, 2016).

If an individual employs the above action strategies, Argyris and Schön (1974) predicted that the individual will be considered minimally defensive, the defensiveness of interpersonal and group dynamics is minimized, and the people involved would experience free choice, internal commitment and be more willing to take risk (p. 91); besides, the individual’s theory-in-use is discomfirmable, as valid information is provided and public testing is conducted; therefore, double-loop learning can happen more readily, and the long-term effectiveness will be increased (p. 92).

Unlike Model I, there is no main assumption listed for Model II in Argyris and Schön (1974) or other publications by Argyris or Schön reviewed in this research.

2.5. Challenges in GMB sessions and the Facilitator’s Attitudes

A GMB facilitator could face challenges in GMB sessions due to the context where GMB is applied. To start with, GMB is usually applied in wicked problems, where people involved in the problems may have conflicting values (Roberts, 2000);

therefore, it might be threatening for the participants in GMB sessions to confront one another. In addition, new insights generated from the modeling process may reveal how the participants are collectively contributing to the problem and the incongruence between the participants' espoused theories and theories-in-use (Isaacs & Senge, 1992). Due to the prevalence of Model I theory-in-use (Argyris, 1982, p. 161), it is not surprising that the GMB process may trigger defensive routines from the participants. Defensive routines are based on Model I and are defined as actions or policies that prevent individuals from experiencing embarrassment or threat and simultaneously prevent the causes of the embarrassment or threat from being reduced (Argyris, 1990, p. 25; Argyris et al., 1985). For example, participants may perform "face-saving", which means the participants prevent others from feeling embarrassed by not pointing out their mistake or doing it in a mitigated way (Argyris, 1980; Argyris et al., 1985, p. 294). In addition, participants may "assert their position unilaterally", which means the participants state their views without making their reasoning explicit so as to impede others from testing the validity of their views (Argyris et al., 1985, p. 295).

Facing these situations, the GMB facilitators may make the situations even worse if they respond defensively (Isaacs & Senge, 1992). For example, the facilitators may "collude" with the participants and pretending the hidden conflicts don't exist. Another example is that the facilitators may unilaterally defend the "correctness" of the model when facing the resistance from the participants without trying to understand the participants reasoning (c.f. Isaacs & Senge (1992)).

A GMB session could be more challenging when a facilitator has to manage the group dynamics and the model at the same time. Although a GMB session can be supported by a team with multiple members, if having multiple team members is not feasible, the session would be more demanding of the facilitator. In this situation, the facilitator might feel a higher level of stress and it might be more challenging for the facilitator to behave effectively in response to the difficult situations emerging in the session.

To cope with the challenges emerging in GMB session effectively, it is understandable that the attitudes listed in Vennix (1996) are crucial for the GMB facilitator to behave in a productive way without exacerbating the situations. However, a GMB facilitator might face difficulty when trying to put those attitudes into action. Vennix (1996) followed Secord and Backman's (1974) definition of attitude: "...certain regularities of an individual's feelings, thoughts and predispositions to act toward some aspect of his

environment" (p. 97). The other source cited by Vennix (1996) was Ajzen (1988), who defined attitude as a predisposition of behavior (Ajzen, 1988, p. 4).

Defining an attitude as the regularity of feelings and thoughts and predisposition of behavior indicates that attitude is used from the perspective of an observer. That is, the concept of attitude is meant to provide an observer with a dispositional explanation and prediction for the behavior of those observed (Ajzen, 1988, p. 1). Therefore, attitude is intended to be used as a theory of explanation and prediction.

However, it might be problematic when an individual wants to implement his/her desired attitude if the attitude is not a theory of control. From the perspective of action science, if the individual is not clear about what value is to be satisfied, what assumption is to be held, and what action is to be taken, it might be difficult for the individual to behave in a way that is consistent with the desired attitude. Moreover, a lack of a clear theory of action for implementing a concept may cause the same concept to be implemented in different ways. Take social virtues for example. People with Model I and those with Model II might interpret and implement the same social virtue in different ways (Argyris, 2004, p. 4; Appendix 1); for instance, if people behave according to Model I and want to offer help and support to others, they may offer unilateral protection to other people such as covering up what might be embarrassing or threatening; another approach is to tell others what they might want to hear so as to make them feel good; in contrast, people who behaved according to Model II would offer help and support to others by assisting them in confronting their own ideas and surfacing their hidden assumptions.

As mentioned in Chapter 1 (see section 1.1), the description for attitudes in Vennix (1996) does mention some actions and assumptions; however, the description may not be explicit enough for people to get a grip of those attitudes. Therefore, this research is intended to develop a theory of action that specifies values, assumptions, and action strategies for GMB facilitation so as to help GMB facilitators to put those attitudes into action.

2.6. Conceptual Models Illustrating the Facilitator's Learning about GMB Facilitation

A series of conceptual models were developed to illustrate a facilitator's learning about GMB facilitation. The first conceptual model (Figure 1) was constructed based

on the conceptual model developed by Argyris (1990, p. 94). Figure 1 shows that the actual consequence of GMB sessions is influenced by the facilitator's theory-in-use, which includes the "in-use" version of "action strategies" and "values and assumptions". The "action strategies-in-use" is influenced by the "values and the assumptions-in-use." When there is a mismatch between the actual and desired consequences of GMB sessions, if the facilitator is able to perceive the mismatch, the facilitator might respond to the mismatch by changing the "action strategies-in-use", which is a single-loop learning process (L1). Besides, the facilitator might respond to the mismatch by changing the "values and assumptions-in-use"; in this case, the learning becomes a double-loop one (L2). Finally, the "level of awareness" denotes to what extent a facilitator is able to perceive the mismatch; given the same level of mismatch, if the level of awareness becomes higher, the facilitator is more able to perceive the mismatch, thereby responding to it.

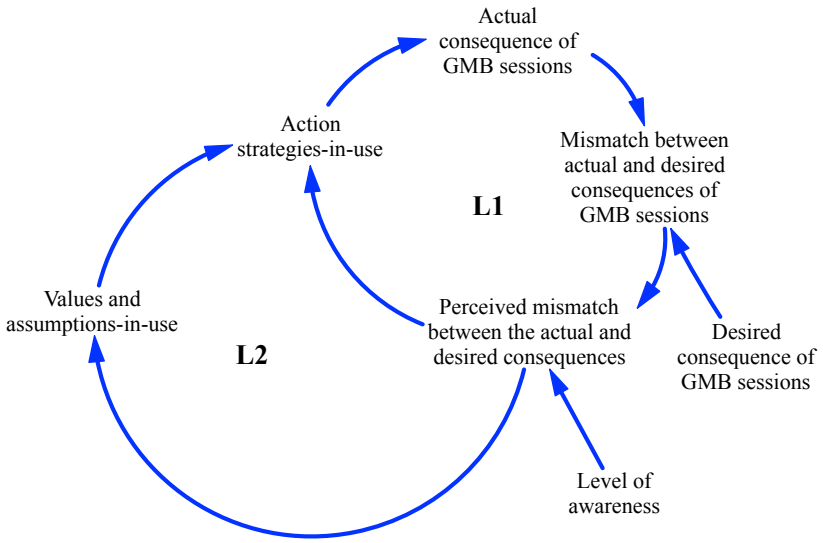

Figure 1. Change of a facilitator's theory-in-use due to the mismatch between the actual and desired consequences of GMB sessions. L1 and L2 denote the facilitator's response to the mismatch by undergoing single-loop and double-loop learning, respectively.

The second conceptual model (Figure 2) was constructed based on Argyris and Schön's (1974) statement that the incongruence between espoused theory and theory-in-use may induce modification of either theory so as to achieve congruence (p. 23); however, this model omits the modification of espoused theory caused by the incongruence for the sake of simplicity. In addition to the mismatch between the actual and desired consequences, Figure 2 shows that changes in the theory-in-use

could also happen by comparing the theory-in-use with the espoused theory of GMB facilitation, which could be influenced by the body of knowledge of GMB facilitation. When there is a mismatch between the two theories, if the facilitator is able to perceive the mismatch, the facilitator could adjust the theory-in-use to the espoused theory, forming a goal-seeking feedback loop (L3). In this model the perceived mismatch is also influenced by the level of awareness.

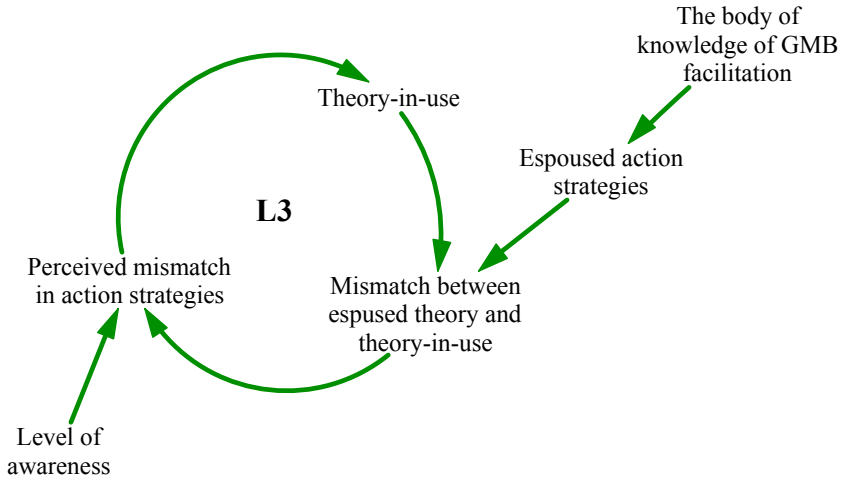

Figure 2. Change of a facilitator's theory-in-use due to the mismatch between the espoused theory and theory-in-use. L3 denotes the facilitator's response to the mismatch by moving the theory-in-use toward the espoused theory, which is a goal-seeking feedback loop.

By integrating the two conceptual models, a more comprehensive conceptual model was derived (Figure 3). In this more comprehensive version, the espoused theory for GMB facilitation in Figure 2 was divided into "espoused action strategies" and "espoused values and assumptions", both of which are influenced by the body of knowledge of GMB facilitation.

Four additional links (the red sector in Figure 3) were added to this integrated model. One is the link between the "espoused values and assumptions" and the "desired consequence of GMB sessions", which represents the influence of espoused theory on the definition of desired consequence of GMB sessions; the other three links were constructed based on the assumptions that perceiving the mismatch at one level could help the facilitator to be more able to perceive the mismatch at another level. To be more specific, perceiving the mismatch at the level of consequence of GMB sessions could help the facilitator to be more able to perceive the mismatch at the

level of action strategies and the level of values and assumptions, and the perceived mismatch at the level of action strategies could make the facilitator more able to perceive the mismatch at the level of values and assumptions.

The purpose of developing a theory of action for GMB facilitation is to contribute to the body of knowledge of GMB facilitation, thereby assisting GMB facilitators' learning about GMB facilitation and improving their effectiveness.

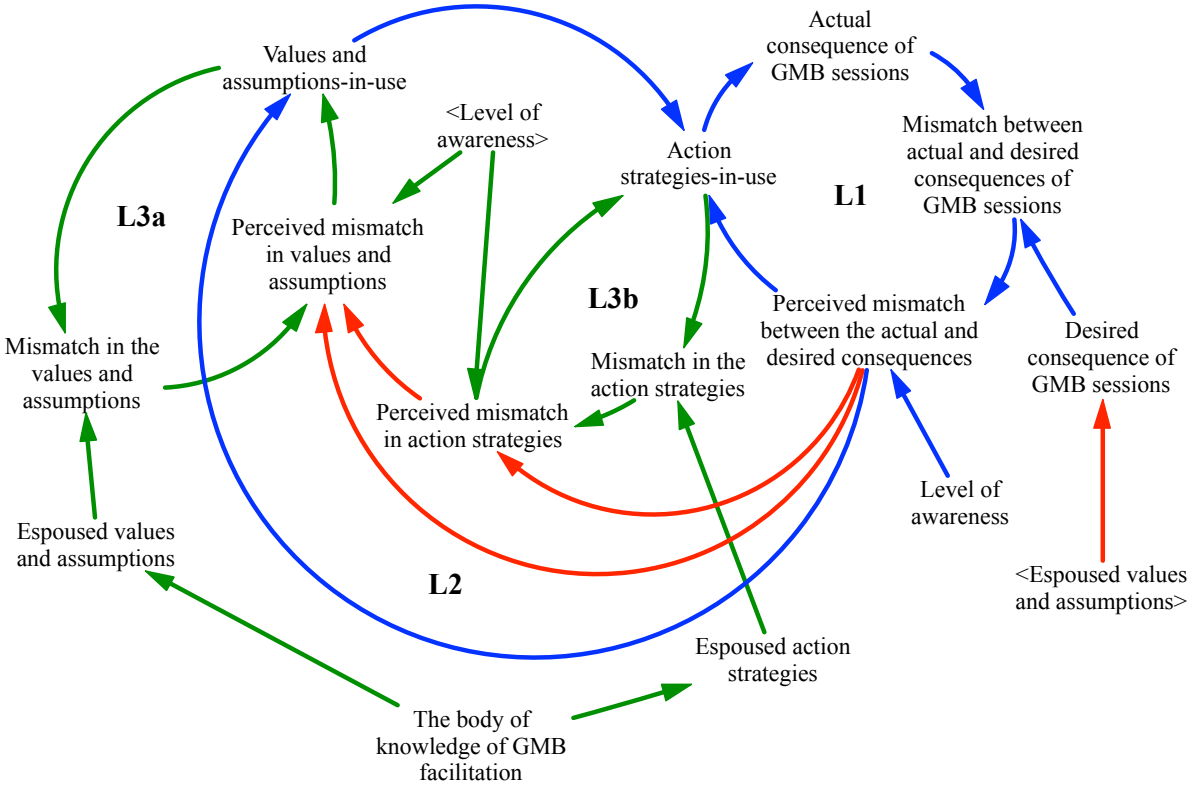

Figure 3. An integrated conceptual model illustrating the two ways in which the facilitator's theory-in-use could be changed. The blue sector is the facilitator's response to the mismatch between the actual and desired consequences of GMB session, while the green sector is the response to the mismatch between the espoused theory and theory-in-use. The goal-seeking feedback loop (L3) in Fig. 2 is divided into L3a and L3b; the former denotes the change in values and assumptions and the latter denotes the change in action strategies. The red sector includes four links; one represents the influence of espoused theory on the definition of desired consequence of GMB sessions, and the other three represent how perceived mismatch at one level could influence the perceived mismatch at different levels could influence one another.

2.7. A Preliminary Theory of Action for GMB Facilitation

This research is intended to contribute to the development of a theory of action for GMB facilitation, and the ingredients for developing the theory of action are derived

primarily from the fields of system dynamics (including GMB) and action science. The rationale of searching for ingredients from system dynamics to formulate the theory of action for GMB facilitation is similar to that of Visser (2007), who studied group facilitation in system dynamics intervention by applying the communication theory of Palo Alto School (Watzlawick, Bavelas, Jackson, & O'Hanlon, 2011). The communication theory was considered by Visser (2007) sharing important principles with system dynamics modeling. And the rationale of applying the communication theory was that "that the credibility and effectiveness of system dynamics interventions will improve in the eyes of client groups and organizations, if principles and methods of group facilitation can be brought in line with principles and methods of model building and simulation" (Visser, 2007, p. 454). Based on this rationale, this research proposes an assumption that the effectiveness of GMB could be further improved if more principles of system dynamics are applied in GMB facilitation, given Vennix's (1996) statement that the facilitator is crucial for the success of GMB (p. 133). As most of GMB facilitators may also be system dynamicists, principles of system dynamics may be more familiar to the GMB facilitators and hence may be easier for the facilitators to hold in GMB facilitation, thereby making the facilitators more able to "walk the talk" in front of the clients.

There are three bases for applying action science in GMB facilitation. The first basis is derived from the perspective of system dynamics on model validation. Forrester (1961) stated that "the validity of a model should not be separated from the validity and the feasibility of the goals themselves." (p. 122), and Barlas (1990) considered this statement reflecting a "conversationalist and functional philosophy of model validation" (p. 161), stating that "validation becomes very much a matter of social discussion" (p. 160); as a discipline that seeks to create a community of inquiry in the community of practice, action science is promising in facilitating the social discussion for model validation. The second basis is from Sterman (2002), who stated that "becoming an effective systems thinker requires the rigorous and disciplined use of scientific inquiry skills" for the purpose of surfacing hidden assumptions and biases (p. 501). The third basis is from Isaacs and Senge (1992), who suggested that the designers of computer-based learning environments could apply tools in action science and Model II in order to make the environments more conducive to learning for the participants (p. 191). Therefore, as one of the purposes of action science is to promote reflective and rigorous inquiry for learning, it is expected that GMB facilitators would not only be

more competent as system dynamicists and systems thinkers but also be more able to facilitate participants' learning about their problems in GMB sessions by adopting the principles and skills of action science.

2.7.1. Values

As the Model II theory-in-use is conducive to double-loop learning, its values (valid information, free and informed choice, and internal commitment) have the potential of becoming the values of theory of action for GMB facilitation. However, before adopting those values, it is important to examine their compatibility with the goals of GMB (learning, consensus, and commitment). From the perspective of action science, the three values are crucial for the three important activities of a social system, problem solving, decision-making, and decision implementation (Argyris, 1970, p. 36). To begin with, effective problem solving requires valid information; in addition, decision making needs choice made by actors of the system, and the decision would not have sound basis if the choice made by the actors is not free and informed; finally, effective implementation of decision needs the actors' commitment (p. 37). In fact, the three activities identified by action science are also the purposes of GMB. To be more specific, GMB is meant to address complex problems (problem solving); second, GMB requires stakeholders to make decision on the solutions to the problems (decision making); third, the problems will never be addressed if the decision is not implemented (decision implementation). Accordingly, it would not be surprising to discover that the values of Model II are quite compatible with the goals of GMB. To start with, without valid information the stakeholders would not be able to learn about their system of interest; in addition, without free and informed choice the consensus would not be genuine; finally, commitment is exactly one of the goals of GMB. Accordingly, "valid information", "free and informed choice", and "internal commitment" are adopted as the values of the theory of action for GMB facilitation.

2.7.2. Assumptions

The main assumptions for the theory of action for GMB facilitation were developed in two phases. In the first phase, several assumption elements were derived from the system dynamics worldview, the description for facilitator's attitudes in Vennix (1996), and action science. After all the assumption elements were derived, in the second phase those elements were integrated into a set of main assumptions for the theory of action for GMB facilitation.

To derive the assumption elements from the system dynamics worldview, the three elements of the worldview (i.e., the complexity of systems, the limited mental capacity of human beings, and the endogenous point of view) were used as premises, and the following two premises were used to derive the first assumption element:

- Premise 1: Human beings have limited mental capacity.
- Premise 2: Systems are complex.

Compared with the complexity of systems, the mental models of human beings are incomplete (Forrester, 1971, p. 3), and it is worth noting that not only non-system dynamicists but also system dynamicists as well as GMB facilitators have incomplete mental models. Therefore, Sterman (2002) stated that it requires people to understand that "all models are wrong" and the limitation of their knowledge to become systems thinkers (p. 501). Accordingly, with those two premises the first assumption element was derived:

- Assumption element 1: Different people might see different parts of a system.

If different people may see different parts of a system, it is not surprising that there may be differences in views among different individuals. Seeing the differences, if the goal is to learn, which is one of the goals of system dynamics, then difference in views indicates the opportunity to learn, which leads to the second assumption element:

- Assumption element 2: Difference in views indicates the opportunity to learn.

Because of the limited mental capacity of human beings and the complexity of systems, it is known in the field of system dynamics that people with good intention may move the system in the direction that makes the system worse (Meadows, 2008, p. 57). One example is the beer game, where players with good intention in the same supply chain may screw up the game (Senge, 1994, p. 41). Another example is the system archetype called “accidental adversaries”, where the solutions employed by individual actors to solve their own problems in a partnership may cause unintended negative consequences to others and to the whole system (Senge, Kleiner, Roberts, Ross, & Smith, 2010, p. 145). Seeing things that go wrong in a system, people tend to attribute what goes wrong to other people rather than the system (Senge, 1994, p. 41; Sterman, 2000, p. 28). In addition, when having negative attribution, people tend to

behave in a defensive way such as blaming the "scapegoats" without inquiring their perspectives, thereby poisoning the interactions with one another and making themselves less able to find the high leverage solutions in the system (Sterman, 2000, p. 28). Therefore, to be more able to find the high leverage point to solving the problem, it would be better to assume that people may have good intentions even if they seem to behave in a negative way, which is the third assumption element:

- Assumption element 3: Other people may have good intention even if they seem to do harm to the system.

The above assumption element is aligned with Sterman's (2002) statement that becoming a systems thinker requires respect and empathy for others and their viewpoints (p. 501). To derive the fourth assumption element, the third element of the system dynamics worldview is needed:

- Premise 3: System dynamicists make sense of the system with an endogenous worldview.

Although people might tend to think they are the creatures of the circumstance, the endogenous worldview suggests that the circumstance is the creature we help to create (Richardson, 2011, p. 230). In addition to how people make sense of the situation, Richardson (2011) even argued that whether people adopt the endogenous worldview would influence the policies generated to address their problems. Without the endogenous worldview, it would be less possible for people to find high leverage solutions (Richardson, 2011, p. 213). This statement is aligned with the saying that goes, "If you're not part of the problem, you can't be part of the solution" (Kahane, 2004, p. 83). Therefore, the fourth assumption element was derived as follows:

- Assumption element 4: I may be part of the problem and may contribute to its emergence and persistence.

In addition to the assumption elements derived from the system dynamics worldview, two assumptions elements were derived from Vennix's (1996) description for attitudes (Appendix 2):

- Assumption element 5: The information I hold may not be valid.
- Assumption element 6: All the participants and their opinions are very important.

As Argyris and Schön (1974) didn't list the main assumptions for Model II theory-in-use, the assumption elements from action science were derived from how the more reflection-oriented participants frame the problem of learning when they are trying to learn Model II (Argyris et al., 1985, p. 283):

- Assumption element 7: Others and I are responsible for working through the problematic situations.
- Assumption element 8: Errors are the raw material for learning.

By integrating the eight assumption elements derived from system dynamics worldview, Vennix (1996) and action science, the main assumptions for the theory of action for GMB facilitation were derived as follows:

1) **Each of us may have partial or invalid understanding of a system, but we could approach the whole picture by working together**. This assumption was derived from element 1 and element 5. In the context of GMB, this assumption indicates the importance of supporting the participants to work together; in addition, it also indicates that the facilitator's understanding of the session and system dynamics modeling might be partial or invalid.

2) **Difference in views and occurrence of errors indicate the opportunities for learning.** This assumption was derived from element 2 and element 8. In a GMB session, the "difference in views" includes the difference among all the people in the session, such as the participants and the facilitator. Besides, the errors might be made by participants or the facilitation team.

3) **Other people may have good intentions or important reasons even if what they say or do seems to harm the system.** This assumption was derived from element 3 and element 6. The "system" could be a GMB session, and the "people" could be anyone in the session, including the participants and the members of the facilitation team.

4) **Others and I may contribute to the problem, but we can also contribute to its solution.** This assumption was derived from element 4 and element 7. In the context of GMB facilitation, this assumption indicates that not only the participants but also the facilitator could contribute to the emergence and the persistence of difficult situations. If the facilitator wants to tackle the difficult

situation, s/he might need to address him/herself in addition to the participants.

2.7.3. Action Strategies

To derive the action strategies for group model building facilitation, part of the ingredients were derived from the description for attitudes in Vennix (1996; Appendix 3). Another part of the ingredients of action strategies were derived from the action strategies of Model II theory-in-use. In addition, the rules of hypothesis testing in action science intervention (Argyris et al, 1985; Appendix 4) were also adopted, as these rules follow Model II and are more specific. By integrating the ingredients from Vennix (1996) and action science, the action strategies for GMB facilitation were derived as follows (see Appendix 5 for how the strategies were derived):

1) **Explain intention and reasoning and share relevant information.** Explain to the group your intention underlying your facilitation. When voicing your view, explain the reasoning and the relevant information on which the reasoning is based; also, support the participants to do the same when they have views to share.

2) **Publicly test for agreement at each inferential step and ask for different views.** When sharing your reasoning, explain how you come to your conclusion from your data. When participants share their reasoning, support them to do the same. After the inference is made explicit, invite public testing for agreement, and ask for disconfirming data or alternative explanation of the data.

3) **Engage participants in designing the next step to address critical issues**. When there are competing views or other critical issues, engage the participants in designing the next step to address them. When you have dilemma in your mind during your facilitation, surface the dilemma and engage the participants in addressing it.

4) **Combine advocacy with inquiry.** Whenever you have views to share, make it explicit and invite others to inquire into them.

5) **Treat the participants equally.** Be impartial to the group members and treat what they say equally according to the same criteria.

6) **Minimize influence on the content of discussion.** Be aware of your verbal and non-verbal behavior and minimize their influences on the content of discussion. If

you really have important ideas, ask the group for permission before sharing, make them aware that you leave your facilitator role temporarily when you are sharing your ideas, and let the group to decide whether to keep the ideas or not.

7) **Affirm the making of mistakes and encourage exploration.** When you make a mistake during your facilitation, admit the mistake and try to understand how it influence the participants. When the participants make a mistake, encourage them to explore it so as to derive new understanding.

2.7.4. Consequences

According to the description for facilitator's attitudes in Vennix (1996) and the consequences of applying Model II (Argyris & Schön, 1974), it is expected that the facilitator would be considered minimally defensive, authentic, and having integrity, as the facilitator tends to make his/her intention and reasoning explicit, invites the participants' inquiry when having view to share, and is willing to admit mistake and surface dilemma. In addition, the facilitator is expected to be considered having neutrality, attitude of inquiry, and helping attitude, as the facilitator tends to pose question to support the participants to explore the views of one another and to make their thinking explicit, while refraining from imposing his/her view on the group.

At the group level, it is expected that misunderstanding would be minimized as valid information is shared. The atmosphere in the session would be more open, and the defensive dynamics at interpersonal and group level would be minimized. In addition, participants would experience free and informed choice and would be committed to the decision they made. Furthermore, double-loop learning can happen more readily if public testing is conducted (Argyris & Schön, 1974, p 92); with the support of the facilitator, participants would be more able to confront their mental models publicly, so double-loop learning would be more likely to happen.

The preliminary version of theory of action for GMB facilitation was derived above, and it was further revised based on the insights derived from the empirical study of this research. The following two chapters will present the methodology and the results of the empirical study, and the revised theory of action for GMB facilitation will be presented in the final chapter.

3. Methodology

This chapter illustrates the methodology employed in this research. According to Denscombe (2012), a qualitative approach can be adopted if the subject of the research is not directly observable, such as experience and attitude (p. 75). As the primary focus of this research is theory-in-use, which can only be inferred from observable behavior, a qualitative approach is adopted. The following sections introduce the design of the research, including the research strategy and procedures for data collection and analysis. In addition, the issues of reliability and validity, and research ethics are also addressed.

3.1. Research Strategy

The research strategy adopted in this study is narrative inquiry, which takes research participants' experience as the focus of research (Saunders, Lewis, & Thornhill, 2016, p. 197). A narrative is a story about the narrator's experience which includes things that happened and were connected to one another according to the chronological sequence (p. 198). Instead of fragmenting the narrator's experience into unconnected pieces, a narrative preserves the chronological connection among the moments and hence keeps the narrator's experience "as a whole", thereby enriching understanding and assisting in analysis (p. 198). In addition, a narrative not only presents the action and the intention of the narrator but also the narrator's interpretation of the circumstance and other actors in the narrative (Ospina & Dodge, 2005).

Dodge, Ospina, and Foldy (2005) elaborated on the three assumptions in the field of narrative inquiry. To start with, a narrative is assumed to be the vector of meaning and hence can be used to study how the narrator makes sense of the external reality and to investigate the narrator's internal world such as values, assumptions, and emotion. Second, a narrative is assumed to represents the narrator's experience where the tacit knowledge (Polanyi & Sen, 2009) is located; hence, a narrative can be used to surface the narrator's tacit knowledge and thereby to integrate theoretical understanding and practical application. Finally, the third assumption considers a narrative a symbol that reflects the deeper social structure in which the narrator is embedded, since how the narrator sees the world may be shaped by the social environment; therefore, a narrative can be used to uncover the deeper structure of the social environment. Accordingly, Dodge et al. (2005) organized the practice of

narrative inquiry into three approaches based on the relative weight of each assumption in an approach: Researchers who follow the “Narrative as Language” approach take a narrative as a vector that conveys meaning; those who adopt the “Narrative as Knowledge” approach take a narrative as a source of practical knowledge; the adopters of the “Narrative as Metaphor” approach consider a narrative a symbol of the social environment.

Narrative inquiry can be applied to investigate the theories-in-use of GMB facilitators because a difficult situation in GMB sessions includes a series of moments from the beginning to the end of the situation. In addition, the chronological sequence of the moments is important as things that happen at one moment may have a causal relationship with those that happen at another moment. Furthermore, this study seeks to study the reasoning of GMB facilitators by linking what happened in the external world with the thoughts and feelings emerging in the facilitators’ mind. Based on the above reasoning, narrative inquiry is employed as a research strategy in this study. To be more specific, as this research not only focuses on the reasoning of GMB facilitators in difficult situations but also tries to derive insights from their ways of responding to the difficult situations so as to improve the effectiveness of GMB facilitation, this research follows primarily the “Narrative as Language” and “Narrative as Knowledge” approaches.

3.2. Data Collection Procedures

3.2.1. Research Participants

The participants in this research were people in the field of system dynamics and had experience in facilitating GMB sessions. The participants were at first selected among the GMB facilitators with whom the researcher had acquaintance. The GMB facilitators who had experienced difficult situations in their GMB sessions were invited to participate in the research, and the facilitators who participated in the research were requested to suggest other GMB facilitators as research participants until the total number of research participants reached 10. Although it would be ideal that the research participants are added until data reaches saturation, which means that additional data adds little new information regarding the research topic (Saunders et al., 2016, p. 297), the desired sample size was determined according to the time constraint for a master thesis. Nevertheless, as the data collection method employed in this research is interview, the target of 10 research participants meets the

requirement of minimum sample size of 5 to 25 for interview suggested in Saunders et al. (2016, p. 297).

3.2.2. Interview

Since investigating the research participants' theories-in-use in their difficult situations requires not only collecting the information about the difficult situations but also probing into the participants' reasoning, it would be more convenient if the researcher could have direct conversation with the research participants; therefore, interview was employed as the data collection method in this research.

The process of interview was designed based on "case method" developed by Argyris and Schön (1974, p. 41), and the interview process for each research participant was divided into two sessions. The first session was intended to collect the information about the difficult situation of the research participant, and the second session was a semi-structured interview for exploring the research participant's theory-in-use in the difficult situation.

In the first session (Appendix 6), a research participant was asked to recollect the cases of difficult situations. The duration of the first session was about an hour. If the participant had more than one case and if time allowed, all the cases were recorded by the researcher. However, if time didn't allow, the participant was asked to select the most impressive case.

Two types of information were collected for a selected case so as to reconstruct the case. The first type of information is the actual conversation that was verbally said in the case; in addition to what was verbally said, other observable behavior that is relevant to the difficult situation was also recorded. The second type of information is the research participant's (case owner) thoughts and feelings in the case. Both types of information were organized into a two-column table (Appendix 7), where the left-hand column was used to record the case owner's thoughts and feelings and the right-hand column was for the actual conversation and other relevant observable behavior (Argyris & Schön, 1974, p. 41). In the right-hand column, the actual conversation was mapped out in a chronological order, and the case owner's thoughts and feelings which accompanied a specific moment of actual conversation were put in the corresponding position in the left-hand column. In this way, people who read the table will know what was in the case owner's mind at the moment when a certain

conversation or behavior took place in the difficult situation.

To facilitate the process, the researcher used post-it notes to record both types of information so that the sequence of the information was easy to be adjusted by the case owner if necessary, and an audio-recorder was used to record conversation to support the revision of the table after the session. In addition to the information used to construct the two-column table, information about the context of the case was also recorded if mentioned by the case owner during the session. After the first session, the two-column table was further revised based on the conversation between the case owner and the researcher and was sent to the case owner for confirmation and revision. In addition, a preliminary analysis was conducted so as to design the questions for discussion with the case owner in the second session.

To make sense of the two-column table during the preliminary analysis, the researcher followed “the ladder of reflection”, which is a reflection process composed of five steps: 1) selecting data to be analyzed; 2) describing the individual’s observable behavior; 3) explaining the individual’s behavior by connecting the behavior with the individual’s thoughts and feeling; 4) predicting what the individual’s behavior may cause; and 5) evaluating the individual’s behavior (Smith, 2011, p. 244). In the preliminary analysis only step 2 and step 3 were taken, since step 1 was already covered when the two-column table was constructed, and predicting and evaluating the individual’s behavior were considered relatively irrelevant for designing questions for discussion in the second session. Accordingly, the researcher first described what happened in the observable part of the world in the case by writing down the description for the right-hand column (actual conversation); second, the researcher wrote down the explanation for the case owner’s behavior by connecting the actual conversation in the right-hand column with the case owner’s thoughts and feelings in the left-hand column. Afterward, the researcher designed the questions for the second session. To facilitate the question design, a list of sample questions (Appendix 8) was prepared so that the researcher could use it as a reference.

In the second session (Appendix 9), the researcher had a discussion with the case owner so as to derive the theory-in-use. As the questions were designed before the session, this session could be considered a semi-structured interview. However, it is not a typical interview where the interviewer unilaterally questions the interviewee. Since the focus of this session is to derive the case owner’s theory-in-use in his/her

difficult situation, it is possible that the case owner might not feel comfortable and give distorted information; besides, it is possible that the researcher or case owner's may not perform rigorous reasoning. For example, there might be some flaws in the researcher's reasoning process; in addition, when there are multiple ways of explaining the same objective data (the two-column table), the researcher may be biased toward a specific way and hence be ignorant of the other possible ways of explanation. To address those issues, it is important to create an environment in the second session that is oriented toward Model II (Argyris & Schön, 1974, p. 93), where the interaction between the researcher and the case owner will be oriented more toward collaborative investigation rather than unilateral questioning. Therefore, in the second session, whenever a hypothesis about the case owner's theory-in-use emerged in the researcher's mind, the researcher shared with the case owner the reasoning and the relevant objective data on which his reasoning was based (p. 93); in this way, the case owner was offered opportunities to falsify the researcher's hypothesis by pointing out any flaws in the researcher's reasoning or to offer an alternative hypothesis. In addition, two audio recorders were used in the second session. The first recorder was used to support the discussion; for example, during discussion the case owner might suspect there was an inconsistency between what the researcher had said at a certain moment and a previous moment, and vice versa; if this happens, they could refer to the recording so as to check what was verbally said at the previous moment; in this way, both parties would be more able to base their discussion on the objective information ("what is verbally said" in this example). The second recorder was intended to record the whole discussion and hence was left untouched during the second session. After the session, the recording was transcribed for analysis.

3.3. Data Analysis Procedures

The data analysis procedures in this research was adapted from Dodge et al. (2005) and Koerner (2014), where the analysis was conducted at two levels, within each individual case and across multiple cases.

3.3.1. Within-Case Analysis

When each case was analyzed separately, a thematic narrative analysis (Saunders et al., 2016, p. 601) was conducted to derive the case owner's theory-in-use.

In the two-column table and the transcript from the second session, the data that reflected the case owner's action strategies, assumptions or values were coded. Action strategies were derived from the actions taken by the case owner to respond to the difficult situation, and they could be reflected in the data about the case owner's action (what the case owner's said and did) in the case in response to the difficult situation; in addition, action strategies could also be reflected in the data about the case owner's explanation for his/her action. Assumptions are how the case owner saw him/herself, the situation, and other people in the difficult situation and may have different levels of certainty; they could be reflected in the case owner's thoughts in the case and by the case owner's statement made in the second session about the difficult situation. The data that reflected the case owner's assumptions could be in several forms; for example, some were statements relatively stated for certain by the case owner, such as "he is trying his best", "I'm the one who know the most", and "this is a competition between us"; another form included the statements that represented inferred guess, such as "I might do something wrong", "she might have something important to say", and "making mistake might not be acceptable"; the third form included statements that represented the case owner's uncertain suppositions, such as "if I don't come up with a nice idea, they might consider me incompetent". Values are what the case owner wanted to satisfy, achieve or avoid in the difficult situation, and they could be reflected in the data about the case owner's concern (e.g., I am worried about losing credibility), statements showing evaluation (e.g., this is really awful), statements indicating necessity (e.g. I have to…), and statements about desire (e.g., I want to...). All the coded data were categorized to identify the case owner's theory-in-use in the difficult situation. The case owner might hold multiple assumptions or values during the difficult situation; however, only the assumptions and values that were relevant to the case owner's action strategies in response to the difficult situation were incorporated into the case owner's theory-in-use.

The results of the analysis for the case as well as the explanation for how the theory-in-use was derived was sent to the case owner for member checking so that the case owner had opportunities to provide feedback to the researcher's interpretation of their case (Symon & Cassell, 2012), thereby preventing the researcher from unilateral interpretation. In addition, the two-column table was also sent to the case owner to ensure that the information presented in the tables met the case owner's requirement for confidentiality.

3.3.2. Cross-Case Analysis

After the individual case analysis was completed, different cases were compared based on the case owners response to the difficult situations in order to derive categories of cases with the same “response types”. In addition, several similar ideas or phenomena related to the case owners’ response emerged in some cases which were categorized into different response types; therefore, the data that reflected those ideas or phenomena were coded and categorized by employing thematic analysis (Saunders et al., 2016, p. 579) in order to identify the common patterns.

3.4. Reliability and Validity

Reliability and validity are used to assess the quality of quantitative research. According to Saunders et al. (2016), reliability is the extent to which the design of a research can be replicated and the same finding can be achieved, while validity is the extent to which the measures are appropriately used, the research results are accurate, and the research findings are generalizable (p. 202). As the concepts of reliability and validity used in quantitative research are defined based on positivist perspective, they are considered inappropriate for qualitative research, which is based on interpretive perspective (Golafshani, 2003; Saunders et al., 2016, p. 204); however, alternatives have been proposed for assessing the quality of qualitative research (Guba, 1981; Maxwell, 1992; Saunders, 2016, p. 204). This section introduces the reliability and validity criteria used by the researcher to be aware of the quality of the empirical study in this research.

3.4.1. Reliability

In qualitative research, reliability is about “whether alternative researchers would reveal the same information” (Saunders, 2016, p. 397). Saunders et al. (2016) introduced three types of potential threats to the reliability of interviews: 1) interviewer bias, 2) interviewee bias, and 3) participant bias (p. 397).

Interviewer bias refers to the situation where the verbal or non-verbal behavior of the interviewer causes biased response from the interviewee; and interviewee bias refers to the situation where the interviewee’s perception for the interviewer causes it to give biased response (p. 397). In this research, the two biases induced concern especially in the second session, where the research participant’s reasoning in his/her difficult situation was the focus of the discussion. To minimize the influence of the two biases,

the researcher tried to make the environment of the second session oriented toward Model II, which was already explained in the section for data collection procedures, and the effect the researcher's efforts could be inferred from the research participants' feedback to the session. Before the end of the second sessions, the research participants were asked for feedback when time allowed, and most of the participants replied that the questions raised by the researcher were clear and that they felt they were treated in a fair way during the second session. The participants' feedback indicates the influence of the biases was effectively controlled during the second session.

Participation bias denotes the type of bias caused by the nature of the individuals who agree to participate in the interview, making the research participants not representative of the whole community (Saunders et al., 2016, p. 397). A GMB facilitator might refuse to participate in the research due to the time requirement of the interview. As there is no apparent relationship between a facilitator's concern about time and the difficult situation the facilitator might share if participating in the research, the researcher had less concern about the participation bias caused by the time requirement of participation.

In addition to taking the three types of bias into consideration, Saunders et al. (2016) also suggested that sufficient detail about the research design should be explained for the research employing semi-structured interview (p. 399). In response to this suggestion, the detail of the design of this research was presented in this chapter.

3.4.2. Validity

This research followed the validity criteria developed by Maxwell (1992) for qualitative research, which include: 1) descriptive validity, 2) interpretive validity, 3) theoretical validity, 4) generalizability, and 5) evaluative validity. Descriptive validity refers to the factual accuracy of the data collected in the research; in this research, audio-recorders were used in all interview sessions to ensure the accuracy of the data collected. Interpretive validity refers to the extent to which the interpretation made by the researcher is grounded in the data collected from the research participants; to ensure this type of validity, the two-column table was employed to reconstruct the relatively "objective data" of the case so as to ensure the discussion in the second session was grounded in what happened in the case; in addition, the theory-in-use derived from the case was sent to the case owner for member checking to prevent the

researcher from unilateral interpretation. Theoretical validity refers to the appropriateness of the theory used by the researcher; in response to this type of validity, the theory used in this research to interpret the data is based on Argyris and Schön (1974) and Argyris et al. (1985). Generalizability denotes the extent to which the study can be transferred to other persons, times or settings; due to the time constraint, this research only had 10 GMB facilitators as participants in the empirical study, which might limit the generalizability of the findings; therefore, this is the major limitation of this research. Evaluative validity refers to the appropriateness of how the data are evaluated by the researcher; therefore, when the evaluation for the data was made, the researcher tried to make explicit the evaluation criteria in order to facilitate scrutiny by readers.

3.5. Ethical Concern

An informed consent form was provided to each interviewee before an interview session was conducted. In the consent form, the research purpose and the rights of the interviewees were introduced. During each interview session, if the interviewee felt uncomfortable in any way, the interviewee had the rights not to answer the questions posed by the researcher or to end the session. To secure the confidentiality of the interviewee, data such as the name of the interviewee, the involved organizations and people, and other sensitive information were anonymously processed.

4. Results

In this chapter the results of the empirical study of this research are presented. Due to the limited space, this chapter only presents the results of cross-case analysis, and the results of individual case analysis are presented in the Appendix 10. In the first section of this chapter, the cases collected in this research are briefly introduced. After the basic information of the cases is provided, the response types identified from the cases are presented, which illustrates the main themes of how the case owners responded to their difficult situations. Finally, the third section presents the common patterns in the ideas and phenomena related to the case owners' response that were identified in cases which belong to different response types.

4.1. Description of the Cases

In this research, 24 GMB facilitators were reached. Some of the facilitators replied that they had not faced difficult situations in the past; some facilitators replied that they had faced difficult situations while they had difficulty in recalling their thoughts and feelings and the actual conversation in their difficult situations; some facilitators refused to participate due to their lack of time or other reasons. Finally, 10 GMB facilitators participated in this research. The age of the research participants ranged from 25 to around 70 years old. Among the 10 research participants, four of them were female and six of them were male; as for the experience with GMB facilitation, four of them were junior facilitators and had practiced GMB facilitation for less than two years, while six of them were more senior facilitators that had practiced GMB for more than five years. As some of the participants shared more than one case, 14 cases were collected. Table 1 shows the variety of difficult situations that happened in the cases collected in this research.

Table 1. List of cases collected

Case	Difficult situations	Response Types
1	The facilitator was concerned that the process might be dominated by a participant, who was the global CEO with the highest power in the group.	Confrontation avoidance
2	A participant gave input related to model quantification, while the session was set to focus on the qualitative structure of the model.	Confrontation avoidance
3	A participant mentioned a model to be referred to, while the facilitator thought the model was not relevant and the	Confrontation avoidance

Case	Difficult situations	Response Types
	participant's comment stopped a discussion that might be important.	
4	The group was working on the model built for a specific issue, while a participant gave comments related another issue.	Confrontation avoidance
5	A participant criticized that a loop in the model was "too big" but didn't give a clear explanation.	Confrontation avoidance
6	A participant stated that a parameter in the model was made up by the facilitation team and claimed that the exercise for estimating the parameter value was illegitimate.	Information sharing and joint decision-making
7	The facilitator had difficulty in helping the participants to find out meaningful feedback loops from the causal-loop diagram.	Unilateral protection
8	a. A participant gave an explanation for the reference mode behavior with which the facilitator disagreed.	Self-refraining
	b. A mistake in figures in the facilitator's presentation was pointed out during the session, and a participant insisted that the mistake is important.	Unilateral protection
9	A participant proposed an alternative topic to the predetermined topic for GMB session.	Unilateral protection
10	Participants showed disagreement on whether to enter the GMB process with the predetermined topic.	Information sharing and joint decision-making
11	a. A participant said he could sketch the whole model on his own for the predetermined topic, and the facilitator was worried that the participant might not be willing to stay in the session because the participant might consider the topic too simple.	(Not applicable)
	b. The facilitator had difficulty getting a participant's confirmation when trying to summarize what the participant said.	Unilateral control
12	Participants showed opposition to the facilitator's request of tape-recording the session.	Information sharing and joint decision-making
13	A participant gave an offensive comment on another participant's input.	Unilateral protection/ Unilateral control
14	A participant gave a statement regarding the cause of the problem, while the statement sounded discriminating to another participant, who considered the statement unacceptable and wanted to withdraw from the session.	Information sharing and joint decision-making

Since the facilitator of Case 11 couldn't recollect what he verbally said to negotiate with the participants, the theory-in-use derived for this situation is less grounded and is not used to derive response types.

4.2. Response Types Identified from the Cases

Five response types were identified based on how the case owners respond to their difficult situations, which are 1) confrontation avoidance, 2) unilateral control, 3) unilateral protection, 4) information sharing and joint decision-making, and 5) self-refraining (Table 1). Each response type is illustrated as follows.

4.2.1. Confrontation Avoidance

Five out of 14 cases (Case 1 to Case 5) are with confrontation avoidance response type (Table 1). In these cases, avoiding confrontation with the difficult participants is the theme underlying the facilitators' theories-in-use. By "difficult participant" this research means the participant who is considered causing the difficult situation.

One of the similarities among the five cases is how the facilitators saw the difficult participants. Those participants were perceived by the facilitators to have relative dominant position in their relationships. In some cases the facilitators considered the participants having higher power over them. For example, in Case 1 the facilitator was worried that the global CEO, which had the highest position in the group, might block the participation of the rest of the group. When the facilitator was trying to address the CEO, he was worried that the CEO might not think of him as equal in the conversation. In other cases (Case 2 to Case 5), the facilitators considered the success of their projects dependent on the difficult participants.

In addition to the relationship with the participants, other similarities were identified in the facilitators' theories-in-use. The common themes in their values are to avoid confrontation (Case 1 & Case 2) or to prevent the participants from having negative feelings and defensive reactions (Case 2 to Case 5). Correspondingly, the facilitators assumed that having confrontation with the participants might cause the participants to generate negative feelings and defensive reactions (Case 1 to Case 5) and would be harmful for their relationships (Case 1 to Case 4). To put the idea of confrontation avoidance into action, in some cases (Case 2 to Case 4) the facilitators showed that they accepted what the participants did without surfacing their concerns. For example, in Case 2 a participant gave a suggestion, which was off-topic from the perspective of the facilitator; however, she replied to the participant that the suggestion would be considered. In some cases (Case 1, Case 4, & Case 5), the facilitators adopted more active action strategies, trying to address the difficult participants implicitly. For

example, in Case 4 there was a participant who gave off-topic comments multiple times. At first the facilitator addressed the situation by mentioning the participant's comment was less relevant to the task they were working on and asking the participant for agreement on leaving his comment on the "parking lot" (a flipchart paper used to record items that was relatively not the focus of the meeting); in this way, the facilitator hoped that the participant would not give off-topic input anymore. However, the participant still gave off-topic input multiple times. Therefore, at another moment when the participant gave off-topic input, the facilitator intentionally became silent for a while and waited for other participants' response. After seeing that other participants were silent, the facilitator said thanks to the participant who gave the off-topic comment without putting it on the parking lot and asked the group if they had other comments on the model, thereby leaving the off-topic comment "in the air".

4.2.2. Unilateral Control

Two cases (Case 11 & Case 13) have the response type of unilateral control (Table 1). In this response type, the facilitators exerted unilateral control over the situation; that is, the facilitators controlled the situation and prevented others' influence without explicit communication with the participants. In fact, in some cases (e.g., Case 4) of the previous category, the facilitators could be considered seeking to exert unilateral control in response to the difficult situation; nevertheless, the facilitators in this category were not concerned that they might offend the participants when trying to control the situation, so their control was more conspicuous. This is the major difference between this response type and the previous one.

In Case 11, when the facilitator asked for the participant's confirmation with his summary for the participant's input for model conceptualization, the participant didn't give a clear "yes" or "no" answer in response to the facilitator's request and gave more input. As the participant took more and more airtime, the facilitator noticed that other participants were waiting and impatient. Seeing the situation, the facilitator thought he had to attend to other participants; therefore, he summarized what the participant said, incorporated the summary into the model even though the facilitator still didn't get a clear confirmation from the participant, and turned to other participants to ask for their input. Hence, at this moment the facilitator unilaterally defined the participant's ambiguous response as a confirmation; that is, the facilitator "controlled" the definition unilaterally. In Case 13, when a participant gave an offensive comment, the facilitator

considered the comment an expression of emotion; in addition, the facilitator was worried that the comment might threaten the safety of the environment and that the unsafe environment may prevent people from expressing their opinions. Therefore, with an intention of preventing the offending participant from talking in that way, the facilitator warned the participant with her body language by giving a silent and focused look to the participant; in this case, the facilitator didn't ask the participant to clarify the offensive comment, and why the facilitator considered the comment unacceptable was not explicitly communicated to the participant.

4.2.3. Unilateral Protection

Four cases (Case 7, Case 8, Case 9, & Case 13) have the response type of unilateral protection (Table 1). In this response type, the facilitators sought to unilaterally protect themselves or the participants against threats.

The facilitators in Case 7 and Case 8 responded to the difficult situations by unilaterally protecting themselves. Both facilitators held the values of maintaining image, and their assumptions reflected their concerns about how the participants would see them. In Case 7, the facilitator explained to the participants that his reaction to his difficulty in finding out meaningful feedback loops from the causal-loop diagram was a deliberate action while it was not. In Case 8, the facilitator directed the responsibility for the mistake in figures to the participant who was the head of the department providing the figures.

As for Case 9 and Case 13, the facilitators in both cases unilaterally protected the participants. The values and assumptions of both facilitators reflect their concerns about the participants' feeling. In Case 9, the facilitator assumed that the participants would not feel comfortable if they chose the "risky" topic; therefore, the facilitator implicitly guided the participants to choose the safer topic by addressing the participants' concerns that might prevent them from choosing the safer option. As for Case 13, it has been mentioned that the facilitator exerted unilateral control over the situation in order to prevent the offending participant from talking in the offensive way; in fact, the facilitator's response can also be considered unilateral protection for the rest of the participants.

4.2.4. Information Sharing and Joint Decision-Making

Four cases (Case 6, Case 10, Case 12, & Case 14) are with the response type of information sharing and joint decision-making (Table 1). In this category, the facilitators supported the groups to share information and make decisions, or they were directly engaged in information sharing and decision-making to address the difficult situations.

In Case 10 and Case 12, both facilitators had values related to helping the group to make clear decisions. In Case 10, the facilitator sought to help the group to make an unequivocal decision on whether to work on the predetermined problem definition. In Case 12, although the facilitator was shocked that her request for tape-recording the session was opposed by some participants, she considered it important to allow the participants to make their deliberate choices. To address the difficult situations, the action strategy adopted by the facilitator in Case 10 was to pose questions to the group to help them think clearly and make a decision on whether to enter the process of GMB. In Case 12, the action strategies adopted by the facilitator included explaining the reason for tape-recording the session and making it clear that the session would not be tape-recorded if the group disagreed; in addition, the facilitator decided not to tape-record the session after several participants showed their concern and rejection.

Unlike the facilitators of Case 10 and Case 12, “decision made by the group” was not derived explicitly as part of the facilitators’ theories-in-use in Case 6 and Case 14; nevertheless, the values and assumptions in their theories-in-use indicate that both facilitators considered it important to help the participants make decision in order to address the issues they faced. In Case 6, when a participant criticized that a parameter in the model was made up by the facilitation team, the facilitator held an assumption that it was the group that knew whether the model was substantively correct; as for the values in his theory-in-use, the facilitator considered it important to keep the group’s ownership of the model. Therefore, the facilitator asked the participant who criticized the parameter to say more regarding the criticism and clarified that the parameter was originally from the group by referring to the model; afterward, he convened a discussion within the group and supported their discussion on deciding whether the parameter was important and how to get the data for the parameter. In Case 14, the facilitator held an value of ensuring the validity of the

information incorporated into the model, meaning that a piece of information is incorporated into the model only if it is clarified and everyone in the group agrees. Therefore, when a participant said the statement of another participant was offensive and unacceptable and wanted to leave the session, the facilitator requested the "leaving" participant to stay with the explanation that her expertise was needed; besides, the facilitator asked the "offending" participant to clarify what he meant by his statement and incorporated the clarified statement into the model after its validity was approved by other participants.

4.2.5. Self-Refraining

A response type of self-refraining was identified in Case 8, which is the second type of response identified in the case besides the response type of unilateral control (Table 1). In this category, the facilitator responded to the difficult situation by refraining herself in order to minimize her influence on the group. When a participant gave an explanation for the reference mode behavior of the problem variable in Case 8, the facilitator was irritated by the explanation as she thought the explanation was simplistic. However, the facilitator considered it important that all the participants were able to express their opinions; in addition, the facilitator thought she had to minimize her influence on the content of discussion. Therefore, the facilitator tried to "correct" herself and let the participant to express his opinion without commenting on it, even though she thought the explanation was invalid.

4.3. Common Ideas and Phenomena Related to the Case Owners' Response

Several common patterns were identified in the ideas and phenomena related to the case owners' response across different response types, which include: 1) concern about image or success, 2) framing of the participant's behavior as opposition, 3) emergence of ideas about how a facilitator should behave, and 4) reflection on the alternative response to the situation after the session. Each pattern is illustrated as follows.

4.3.1. Concern about Image or Success

In six cases, the facilitators had concern about their professional image or success. As briefly mentioned in the section presenting the response type of unilateral protection, the concern about professional image was identified in Case 7 and Case 8. In Case 7 where the facilitator got stuck, the facilitator was worried that the

participants might consider the method not useful and might think he was not competent; in addition, during the discussion with the researcher, the facilitator explained that the reason he didn't want the participants to sense his internal struggle was because he wanted to maintain a professional image. In Case 8, when a mistake in figures was pointed out in the facilitator's presentation, the facilitator thought she should prevent the mistake from undermining the facilitation team's credibility. And during the discussion with the researcher, the facilitator explained that her response to the situation was because of the threat to the facilitation team's reputation.

The concern about image or success was also identified in cases categorized into other response types. In case 5, when a participant commented that a loop in the model was too big, the facilitator was worried that the participant would not believe in the model anymore and lose ownership. During the second interview session, the facilitator explained that the facilitation team would lose everything they had built up in the project if the participant lost the ownership. In Case 10, when participants showed disagreement on whether to work on the predetermined problem, the facilitator considered it a kind of embarrassment if he could not come up with a good satisfying solution to the difficult situation. During the discussion with the researcher, the facilitator explained that the embarrassment was originated from the concern that the participants might think he was not competent. In Case 11, when a participant, who was one of the gatekeepers of the project, mentioned that there was already a study on the predetermined topic while the report had not been sent out before the session, the facilitator thought it was a loss of face, as it indicated a bad connection with the gatekeepers. In Case 14, when a participant was going to withdraw from the session, the facilitator requested the participant to stay. The facilitator explained to the researcher that he thought participant's withdraw would diminish the standing of the project and would become a failure on the part of the facilitator.

4.3.2. Framing of the Participant's Behavior as Opposition

In four cases (Case 5, Case 8, Case 11, & Case 12), it was noticed that the facilitators framed the participants' behavior as opposition.

In Case 8 and Case 11, the facilitators thought that some participants were trying to oppose the process. In Case 8, when a participant insisted that the mistake in the facilitator's presentation was important, the facilitator felt that the participant was trying to oppose the process. In Case 11, after the facilitator couldn't get the

participants confirmation for several times, the facilitator assumed that the participant didn't want to say whether the summary was correct or not so that the participant could leave what he said less explicit; in this way, the participant could come back to what he said and change it.

In Case 5 and Case 12, the facilitators thought they were "targeted" by the participants' opposition. In Case 5, after the facilitator tried several ways but still couldn't get the participant to explain her comment on a loop in the model, she thought that the participant wanted to make some issues; in addition, she also thought the participant wanted to teach her something. In Case 12, when a participant replied "what if I say no" to the facilitator's request for permission of tape-recording the session, this response made the facilitator assume that the participant might be looking for conflict. In addition, when the facilitator asked the participants to keep the discussion confidential, the same participant said he didn't want to be taped if the discussion was that sensitive, and the facilitator thought that the participant made his unwillingness to be taped her responsibility. In addition, when another participant said he would like to have known the session might be tape-recorded beforehand, the facilitator thought what the participant said was an accusation that the facilitation team didn't communicate well.

4.3.3. Emergence of Ideas about How a Facilitator Should Behave

In four cases (Case 8, Case 11, Case 12, & Case 14), the facilitators had ideas about how a facilitator should behave when facing difficult situations.

In three of the four cases (Case 8, Case 11, & Case 14), the idea of being neutral emerged in the facilitators mind. In Case 8, when the invalid explanation for the reference mode behavior of the problem given by a participant was corrected by another participant, the facilitator felt happy and thought she couldn't do that as a facilitator; during the discussion with the researcher, she explained that she had to be neutral and let the participants understand the issue by themselves. In Case 11, when a participant gave an unclear response to the facilitator's request for confirmation, the facilitator felt annoyed but he reminded himself: "You should be neutral and entirely get rid of the feeling." During the discussion with the researcher, the facilitator explained that "being neutral" in this situation meant treating the participants and their contribution equally. In Case 14, when a participant said something that sounded discriminating, the facilitator thought: "But my job is to remain neutral and to ask what

the guy means.” By being neutral the facilitator meant valuing and treating people and their statements in the same way.

In Case 12, the idea of being reliable, fair, open, and the group’s role model emerged in the facilitator’s mind when a participant’s gave an opposing response to the facilitator’s request for tape-recording the session. During the discussion with the researcher, the facilitator said “being reliable” meant the participants were allowed to say “no” if she asked for permission; “being fair” meant being consistent in saying and doing and treating everyone in the same way; “being open” meant expressing explicitly how the process would unfold and sharing with the participants the dilemma and what was observed in the social dimension of the group. As for “role model”, the facilitator explained: “If you want the group to be fair and open you should behave like that yourself. Otherwise they won't see it as the best option for their own behavior.”

4.3.4. Reflection on the Alternative Response to the Situation after the Session

In Case 8, Case 11, and Case 13, the facilitators had reflection upon their sessions and thought about how they might have responded to the situations differently. In Case 8, the facilitator responded to the mistake in figures by pointing to a participant who was the head of the department providing the figures. After the session, the facilitator thought that it should have been better if she had taken the responsibility together with the participant. In Case 11, when a participant said he could sketch the whole model on the spot, the facilitator was concerned that the participant might leave in the session because he thought the original question was “too simple”; therefore, the facilitator negotiated with the group to slightly modify the question in order to engage the participant. After the session, the facilitator had a reflection upon whether he should have let the participant sketch the model, because the facilitator didn't think it was possible that other participants would totally agree with what the participant draw without anything to add. In this way, the participant could have known his knowledge about the topic was limited. However, later the facilitator dropped this idea because he thought the motivation behind this alternative response was not legitimate for a facilitator. In Case 13, the facilitator warned the participant giving offensive comment with her body language, after the session the facilitator came up with the idea that she should have addressed the offending participant explicitly, such as expressing that she was shocked and asking the participant to explain his reasoning.

5. Conclusions and Discussion

This chapter is divided in to six sections. In the first section, the findings from the empirical part of this research are summarized and discussed. Based on the findings from the facilitators' theories-in-use, insights were derived to revise the preliminary theory of action for GMB facilitation in the second section. In the third section, the contribution of this research to knowledge is discussed. Afterward, the practical implications of this research are discussed in the fourth section. The fifth section is about the researcher's reflection on the limitations of this research, and the directions for future research are provided in the final section.

5.1. **The Responses of GMB Facilitators to Their Difficult Situations**

Five response types were identified from the GMB facilitators' responses to their difficult situations in this research, including: 1) confrontation avoidance, 2) unilateral control, 3) unilateral protection, 4) information sharing and joint decision-making, and 5) self-refraining. Among the five response types, confrontation avoidance, unilateral control, and unilateral protection could be considered more oriented toward Model I, as the facilitators' responses include several features of Model I, such as exerting unilateral control over other people or the task and unilaterally protecting self or others (Argyris & Schön, 1974); in short, the facilitators decided to address the situations in a relatively unilateral way in these response types. Compared with those response types, the response type of information sharing and joint decision-making could be considered more oriented toward Model II, which has the features of "shared information" and "shared control" (Argyris & Schön, 1974). To be more specific, in this storyline the information relevant to the situation was relatively shared, and the participants were offered opportunity to influence how the situations were addressed. As for the storyline of self-refraining, this storyline might be considered oriented toward Model I, as in the case the facilitator withheld her disagreement and addressed the situation by "correcting herself" privately, and this response might be considered a kind of "self-censoring", which is a Model I behavior, at first glance. In action science, self-censoring means a person keeps thoughts and feelings hidden so as not to threaten self or others (Argyris, 2010, p. 58); however, in the response type of self-refraining, the facilitator's intention of withholding disagreement was not to prevent threat but to minimize influence on the discussion content in order to allow the participants to explore the topic by themselves. Therefore, the response type of

self-refraining could be considered having some features of Model I, but the intention of the facilitator is not typical of Model I.

Several common patterns were identified across different response types. In four cases (Case 5, Case 8, Case 11, & Case 12), the facilitators framed the behavior of the difficult participants as opposition, which might imply that the facilitator attributed the difficult situations to the difficult participants. According to Sterman (2000), if people attribute problematic behavior of the system to individuals, they may not able to see the problem from a systemic perspective (p. 28). Similarly, if a GMB facilitator attributes what goes wrong in a session to a participant, the facilitator might not be able to see the difficult situation in a systemic way. In fact, there is one case where the facilitator made positive attribution about the participant's behavior. In Case 6, when a participant criticized the model, the facilitator held an assumption that the participant had a legitimate and important point to make and was trying hard to do so. Therefore, the phenomenon that a facilitator may frame a participant's behavior as opposition indicates that it might be important for a facilitator to actively frame the participants' behavior in a positive way, and this consideration is reflected in the third main assumption in the theory of action for GMB facilitation developed in Chapter 2: "Other people may have good intention or important reasons even if what they say or do seems to harm the system." Furthermore, making attribution of the difficult situation to the participant might also make facilitators unable to see their contribution to the situation, and this concern indicates the desirability of having the fourth main assumption as an antidote: "Others and I may contribute to the problem, but we can also contribute to its solution."

In six cases (Case 5, Case 7, Case 8, Case 10, Case 11, & Case 14), it was noticed that the facilitators had concerns about their images or success. The concerns may imply the fear of being seen as incompetent. Having studied people's learning behavior in organizational work team, Edmonson (1999) stated that the fear of being seen as incompetent might cause an individual unwilling to admit mistake or ask for help, even if doing so would benefit the team or organization. According to Vennix's (1996) description for the attitude of neutrality, if GMB facilitators are not able to admit mistakes, they may not able to hold this attitude (p. 150). Moreover, if they react defensively to the difficult situation in the modeling session such as protecting their image as "experts", the behavior might make the situation even worse (Isaacs & Senge, 1992, p. 191). The facilitators' concerns about images or success indicate the

requirement for the facilitators to reframe their concept of error in order to respond effectively when their images or success are threatened, and this requirement supports the desirability of the second main assumptions in the theory of action for GMB facilitation developed in Chapter 2: “Difference in views and occurrence of errors indicate the opportunities for learning.”

In four cases (Case 8, Case 11, Case 12, & Case 14), the ideas about how a facilitator should behave emerged in the facilitators’ mind, indicating that the facilitators were trying to put these concepts into action in their difficult situations. In addition, the results show that the facilitators tried to used these ideas to set expectations for themselves in the face of their difficult situations:

> *“I have to correct myself, remain neutral and let them discover themselves about this issue...” (Appendix 10.8, C, 37)*

> “*You should be neutral and entirely get rid of the feeling.” (Appendix 10.11, B, 17)*

This phenomenon partially substantiates the conceptual model developed in Chapter 2, which illustrates how a facilitator’s theory-in-use for GMB facilitation could be changed (Figure 3). To be more specific, a difficult situation could be considered a mismatch between the actual and desired consequences of GMB sessions, and perceiving this mismatch could enhance the facilitator’s awareness of the difference between the “theory-in-use” and the “espoused theory”, which are acquired from the body of knowledge of GMB facilitation, and the facilitator might try to bring the “theory-in-use” closer to the “espoused theory” (Figure 4).

In three cases (Case 8, Case 11, & Case 13), the facilitators had reflections on how they could respond differently to the difficult situations after their GMB sessions. Besides, the accounts of the facilitators showed that their reflections focused on the alternative actions that could be taken to address the difficult situations, indicating that their reflections might be “first-order”. “First-order reflection” is the “reflection as usual” that people use when they try to figure out what to do with an unfamiliar situation (Wackerhausen, 2006, p. 464). Another kind of reflection is “second-order reflection”, which means people direct the attention to themselves, and the topics upon which they reflect may include the quality of the information about the situation, how the information is used to frame the situation, and how the framing is translated to the action designed to address the situation; in short, it can be regarded as “thinking

about one's own thinking" and "reflection on one's own reflection" (Bright, 1996; Clark, 2009, p. 216; Schön, 2016). According to the nature of the two types of reflection, first-order reflection would lead to single-loop learning, and double-loop learning would happen only if second-order reflection is employed (Rennison, 2015). Therefore, it could be inferred that the facilitators' learning through their reflection might be single-loop.

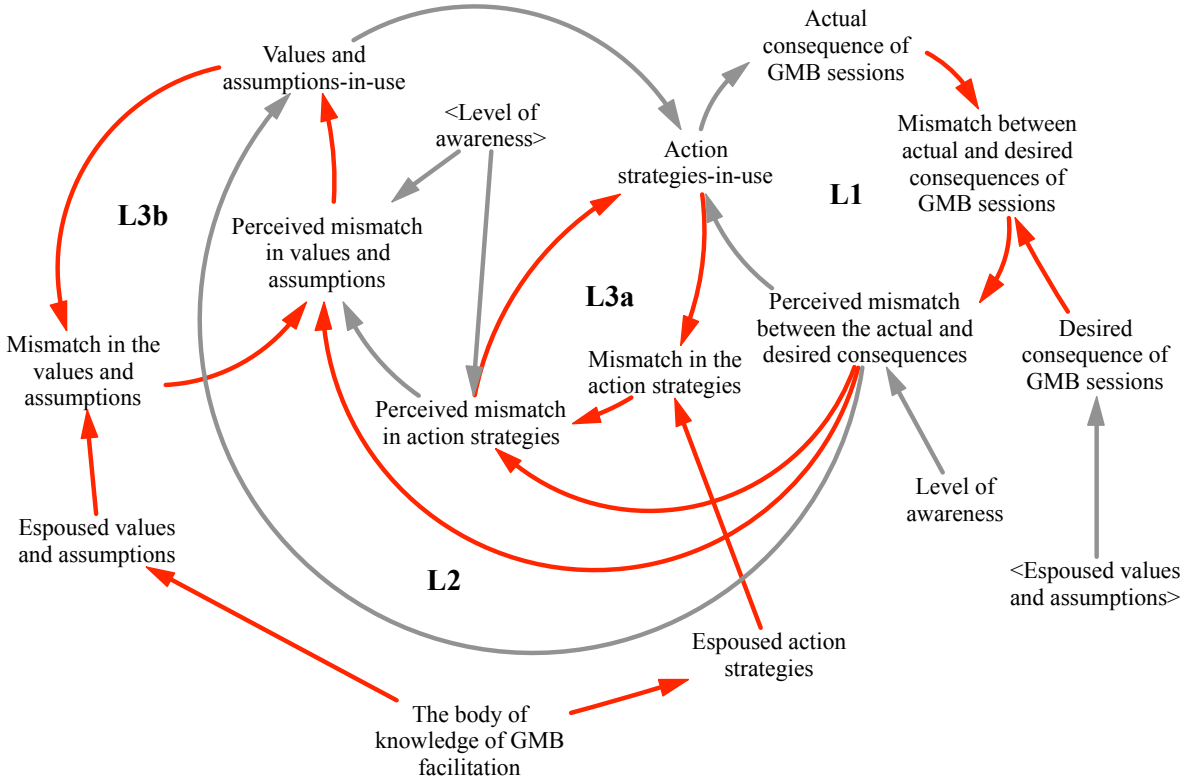

Figure 4. The pathway (red) by which the facilitator's theory-in-use could be adjusted closer to its espoused theory when a difficult situation is perceived.

5.2. **Revision of the Theory of Action for GMB Facilitation**

This section presents the insights derived from the empirical study for revising the theory of action for GMB facilitation developed in Chapter 2, and the insights were derived primarily based on the cases with the response type of information sharing and joint decision-making, as the facilitators' responses to the difficult situations in those cases are more oriented toward Model II; therefore, it is expected that the insights would be compatible with the preliminary theory of action for GMB facilitation, which has its origin from the Model II theory-in-use.

Three insights were derived, and the first insight was primarily derived from the facilitators' theories-in-use in Case 6 and Case 10. In Case 6, the facilitator assumed that it was the group but not the facilitator that knew whether the model was substantively correct; in Case 10, the facilitator assumed that he was responsible for the process but not the content; these two assumptions point to the issue about to what extent GMB facilitators should engage themself in the content of discussion in a GMB session.

Generally speaking, a facilitator is expected to minimize his/her influence on the content of discussion (Vennix, 1996, p. 150). However, rigidly sticking to this principle might be problematic. To be more specific, if an issue emerging in a session is about the problem explored in the session (e.g., in Case 10, the participants had disagreement on whether the predetermined topic needed to be explored), it is important that the facilitator refrains from voicing opinions, since the participants are assumed to be problem experts. However, when the issue is about the process, it would be problematic if the facilitator keeps refraining him/herself, since the facilitator is responsible for managing the process in the session.

An additional consideration is required when it comes to GMB facilitation because of the nature of the system dynamics model. A model can be regarded as consisting of two parts, syntax and semantics; the former is the model language and the latter is the domain knowledge that the model is intended to represent (den Hengst, 2005). When an issue emerging in the session is about the semantics of the model (e.g., in Case 6, a participant criticized whether a parameter made sense in reality), it is important that the facilitator refrains from influencing the content of discussion. However, when the issue is about the syntax of the model (e.g., in Case 5, the facilitator was concerned that how the participant wanted to deal with the model might violate the principle of system dynamics modeling), it would be important that the facilitator's concern is voiced, since the GMB facilitator is responsible for ensuring that the model follows the principles of system dynamics modeling, especially when there is no other member acting as a modeler in the facilitation team. Therefore, the first insight was derived as follows:

> *When an issue emerging in the session is about the problem explored in the session or the model semantics, the facilitator should support the group in information sharing and decision-making to address the issues, while minimizing*

his/her influence on the discussion content. However, when the issue involves the process of the session or the model syntax, the facilitator should play a more active role, sharing views regarding the process or the model syntax while trying to understand the group's concern in order to address the issue.

The second insight is about how to regard a difficult situation, which was derived from Case 12. During the discussion with the researcher, the facilitator of Case 12 stated that if a facilitator expects the participants to behave in a specific way, the facilitator has to behave in the same way, or the participants won't see the way of behaving as the best option. This statement is consistent with the one made by Isaacs and Senge (1992); Isaacs and Senge stated that the behavior of facilitators is important, because they not only set the ground rules for the session but also are role models for the participants (p. 194). Accordingly, the statement suggests a new way to regard a difficult situation; that is, by communicating in a constructive way during a difficult situation, it is possible that the facilitator could help the participants to behave in the same way and thereby improve the group dynamics, as the facilitator demonstrates to the participants how constructive communication could be "actionable". Therefore, the second insight was derived as follows:

The emergence of difficult situations is the opportunity to improve the group dynamics in the session.

The third insight is about how to regard a difficult participant in a difficult situation, which was derived from Case 14. In the case, although the facilitator considered a participant's discriminatory statement terrible, he also thought that he didn't really know what the participant meant by that statement, which was one of the reasons why the facilitator asked the participant for clarification. Therefore, the third insight was derived as follows:

I would not know the difficult participants' intention or reasons before asking them.

Based on the three insights, the theory of action for GMB facilitation was revised and is shown in Table 2.

Table 2. The revised theory of action for GMB facilitation.

Theory of Action for GMB Facilitation

Values

1. **Valid information**: Maximizing relatively observable data and correct report of thoughts
2. **Free and informed choice**: Choosing options that are feasible and truly desired
3. **Commitment**: A sense of responsibility for the decision and the resulting implications and willingness to monitor how the decision is implemented in order to make corrections if needed

Assumptions

1. Each of us may have partial or invalid understanding of a system, but we could approach the whole picture by working together.
2. Difference in views and occurrence of errors indicate the opportunities for learning, and the emergence of difficult situations is the opportunity to improve the group dynamics in the session.
3. Other people may have good intention or important reasons even if what they say or do seems to harm the system, and I would not know before asking them.
4. Others and I may contribute to the problem, but we can also contribute to its solution.

Action Strategies

1. **Explain intention and reasoning and share relevant information.** Explain to the group your intention underlying your facilitation. When voicing your opinion, explain the reasoning and the relevant information on which your reasoning is based. Also, support the participants to do the same; that is, invite participants to share their opinions, reasoning, and the relevant information.
2. **Publicly test for agreement at each inferential step and ask for different views.** When sharing your reasoning, explain how you come to your conclusion from your data. When participants share their reasoning, support them to do the same. After the inference is made explicit, invite public testing for agreement, and ask for disconfirming data or alternative explanation of the data.
3. **Engage participants in making decision to address the critical issue and surface your dilemma.** When the issue is about the problem explored in the session or the model semantics, support the group's conversation to address the issues. When the issue involves the process or the model syntax, share your views and inquire into the

group's concern in order to address the issue with the group. When you have dilemma in your mind during your facilitation, surface the dilemma and engage the participants in addressing it.

4. **Combine advocacy with inquiry.** Whenever you have views to share, make it explicit and invite others to inquire into them.
5. **Treat the participants equally.** Be impartial to the group members and treat what they say equally according to the same criteria.
6. **Minimize your influence on the content of discussion.** Be aware your verbal and non-verbal behavior and minimize their influences on the content of discussion. If you really have important ideas about the content of the discussion, ask the group for permission before sharing, make them aware that you leave your facilitator role temporarily when you are sharing your ideas, and let the group to decide whether to keep the ideas or not.
7. **Affirm the making of mistakes and encourage exploration.** When you make a mistake during your facilitation, admit the mistake and try to understand how it influence the participants. When the participants make a mistake, encourage them to explore it so as to derive new understanding.

Consequences

1. The facilitator would be considered minimally defensive, authentic, and of integrity.
2. The facilitator would be considered having integrity, neutrality, attitude of inquiry, and helping attitude.
3. Misunderstanding would be minimized.
4. The atmosphere in the session would be more open, and the defensive dynamics at interpersonal and group level would be minimized.
5. Participants would experience free and informed choice and would be committed to the decision they made.
6. Double-loop learning would be more likely to happen.

5.3. Contributions to Knowledge

Three major contributions to knowledge were identified in this research. To begin with, the empirical study of this research helps cast light on how GMB facilitators respond to difficult situations in GMB sessions. By applying the framework of theory of action (Argyris & Schön, 1974), this study not only focused on the actions taken by the

facilitators to respond to the situations but also uncovered the underlying assumptions and values, and five response types were identified.

Besides, based on Argyris's (1990) conceptual model for single-loop and double-loop learning (p. 94), this research proposed a conceptual model (Figure 3) illustrating how a GMB facilitator's theory-in-use could be changed in response to the mismatch between the actual and desired consequence of GMB sessions and the mismatch between the theory-in-use and the espoused theory for GMB facilitation, and part of the model was substantiated by the empirical findings in this research (Figure 4).

Finally, a theory of action for GMB facilitation (Table 2) was developed based on the empirical findings and the literature from the fields of system dynamics, GMB, action science. To be more specific, the theory of action is an attempt to operationalize the facilitator's attitudes described in Vennix (1996), incorporate the Model II theory-in-use from action science (Argyris & Schön, 1974; Argyris et al., 1985), and ground GMB facilitation in the worldview of system dynamics (Richardson, 2011; Sterman, 2000).

5.4. **Practical Implications**

The empirical findings of this research show how a GMB facilitator responds to a difficult situation has its basis in the facilitator's values and assumptions. Based on the empirical findings and the literature reviewed in this research, several suggestions were provided for GMB facilitators and GMB training.

5.4.1. **Suggestions for GMB Facilitators**

To respond to the difficult situation in a desired way, the facilitator would need to have a correspondent espoused theory for GMB facilitation whose values, assumptions and action strategies are clearly specified. For example, if GMB facilitators seek to put the facilitator's attitudes described in Vennix (1996) into action and to be able to respond to the difficult situation in a Model II-oriented way, GMB facilitators could consider adopting the theory of action for GMB facilitation developed in this research. However, it doesn't mean that the GMB facilitators who adopt the theory of action for GMB facilitation developed in this research should "always" follow the theory, and the reason is similar to why Argyris didn't claim that Model II should always be followed (Crossan, 2003). Argyris had stated that "it doesn't make any sense to die in the name of Model II", as there might be conditions where Model II is less feasible or less

productive than Model I; however, if Model I is used, then it is important to find time to have reflection (Crossan, 2003). Similarly, there might be situations where behaving strictly according to the theory of action developed in this research is not feasible due to some reasons such as time constraint; however, if this happens, the researcher suggests that the facilitator could reflect on the situations so as to think and act more effectively in the future.

Even if a GMB facilitator is not going to adopt the theory of action for GMB facilitation developed in this research, it would still be beneficial if the facilitator could acquire Model II, as it is more conducive to double-loop learning, which is needed for the facilitator to align the theory-in-use with the espoused theory for GMB facilitation. When conducting reflection, the facilitator may need support from others, as some information that is important for reflection might be hidden from the facilitator while visible to others (Bright, 1996); for example, the facilitator may not be aware of how his/her behavior contributes to the difficult situation, while the contribution is perceived by other members in the facilitation team. If people who reflect together are able to use Model II, they would be more capable of publicly testing the assumptions that may cause threat or embarrassment and confronting one another in a productive way, both of which are helpful for double-loop learning. In contrast, if people use Model I when reflecting together, they would not uncover threatening information and the learning would tend to be single-loop if any. Therefore, no matter what theory of action for GMB facilitation a facilitator is going to espouse, Model II would still be necessary.

Hovmand et al. (2011) suggested that scripts could be used to identify a GMB practitioner's espoused theory and facilitate the comparison between the espoused theory and theory-in-use for double-loop learning; that is, by comparing what is planned and what is done in a GMB session, the practitioner would be able to identify the incongruence between the espoused theory and the theory-in-use for GMB facilitation. However, to ensure that a script represents a practitioner's espoused theory, it is important for the practitioner to examine the assumptions and values underlying the script when the practitioner is designing the procedure of the session, especially if the procedure is adapted from the script of others. For example, in the script "Hopes and Fears" of the Scriptapedia, it is instructed in Step 4 that the facilitator "tries to identify some of the themes" of the hopes and fears submitted by the participants (Scriptapedia & Contributors, n. d.). If a facilitator identifies the themes of the hopes and fears of the participants, what is the assumption underlying

this step? Does the step imply that the facilitator knows more than the participants about their hopes and fears? If the facilitator doesn't know more than the participants about their hopes and fears, how can the facilitator identify the themes for the participants? If the facilitator doesn't consider the step consistent with his/her idea of how a facilitator should behave, then it might be better to modify the step; otherwise, the script may not be fully consistent with the facilitator's espoused theory for GMB facilitation.

As this research shows how the two-column table (Argyris & Schön, 1974, p. 41) can be used to facilitate reflection on difficult situations in GMB sessions, it is suggested that GMB facilitators could use the table to conduct reflection after facilitating GMB sessions; in addition, the table could be used in combination with scripts. For example, a GMB facilitator could use a script to identify the part of a session where there is the most significant discrepancy between what was planned with what was done in the session; afterward, the two-column table could be used to reconstruct the actual conversation and the facilitator's thoughts and feelings in that part of the session in order to reveal the values and assumptions of the facilitator's theory-in-use. Besides, if audio or video recording are available be done, they would be helpful for reconstructing the actual conversation in the session.

5.4.2. **Suggestions for GMB Training**

The purpose of providing suggestions for GMB training is to help the trainees to acquire Model II and to be reflective, thereby helping them to become "reflective GMB facilitators". To illustrate how training on GMB facilitation could be modified, the GMB training in 2016 autumn semester at Radboud University is taken as an example, and the training consists of two courses, Group Model Building I (GMB1) and Group Model Building II (GMB2). GMB1 is composed of lectures and a series of skill training sessions; the lectures include the theory of GMB and the skill training sessions are designed for the students to practice GMB facilitation in a simulation-based setting (MAN-MBAM002 - Group Model Building I, n. d.). GMB2 includes lectures and a group project in the real world organization; the lectures focus on the social context where GMB is applied and how GMB could be used in combination with other methods (MAN-MBAM003 - Group Model Building II, n. d.).

In the lectures of GMB1, the concepts of Model I and Model II theories-in-use can be incorporated so as to help students to be aware of the functioning of their

theories-in-use, and the way of helping the students to incorporate the concepts of Model I and Model II could be based on the approach developed by Friedman and Lipshitz (1992), who modified Argyris and Schön's (1982) approach in order to provide trainees with psychological safety and readiness, as people may feel threatened when confronting their theories-in-use and trying to shift from Model I to Model II. In addition, Taylor, Rudolph, & Foldy (2008) illustrated how a series of tools could be used to help students to be more reflective. Furthermore, the cases collected in this research could be used as materials for discussion.

Skill training sessions could provide safe environment for students to uncover the theories-in-use underlying their facilitation behavior. After getting familiar with the concepts of Model I and Model II, students could be encouraged to reflect on their reasoning underlying their facilitation behavior so as to be more aware of their assumptions and values. In addition, audio or video recorders could be used to record the actual conversation, and the two-column table (Argyris & Schön, 1974, p. 41) could be employed to facilitate students' reflection.

In the lectures of GMB2, the content could include how Model I and Model II theories-in-use could contribute to group and organizational dynamics in the social context where GMB could applied (Argyris & Schön, 1974; Argyris & Schön, 1982). As for the group project of GMB2, Argyris and Schön (1974) stated that field experience should be designed not only to let student gain experience but also "to learn to become more reflective under real-time conditions" (p. 188); however, under the pressure of the real world, the experience might make students tend to learn more Model I-based skills (p. 188). Accordingly, measures would be needed to support students' reflection on the group project, and the topic of reflection could include the general interaction with clients and the GMB sessions conducted in the client organizations.

Finally, when any critical moments, such as conflict or heated discussion, happen in the lectures of GMB1 or GMB2, the moments could be used as opportunities for students and faculty to practice Model II skills and reflection.

5.5. **Limitations**

Several limitations were identified in this research. First of all, most of the two-column tables in this research were constructed based on the GMB facilitators' memory; this

design led to the concern that the “theories-in-use” derived in this research might be “contaminated” by the facilitators’ espoused theories, and the concern caused the researcher to come up with the idea of employing the audio, video, or other forms of record of the cases. However, none of the 14 cases collected in this research is with audio or video record; only three cases are with written record.

The second limitation was about the number of research participants. As mentioned in the section of reliability and validity in Chapter 3, only 10 GMB facilitators participated as case owners in this research; therefore, it is uncertain to what extent the research participants in this study is representative of the community of GMB facilitators, and it is uncertain to what extent the empirical findings from this research could be generalized to other situations.

The third limitation was about the researcher’s language capability and experience. The requirement for the researcher’s proficiency in English to have discussion on the case owner’s theory-in-use (the second interview session) was beyond the researcher’s original expectation, as the interview session required the researcher to keep thinking about the case owner’s reasoning in its difficult situation and posing questions at the same time; besides, although the researcher had studied action science before conducting this research, this research was the researcher’s first time of applying action science in the research context; therefore, the depth of exploration in the case owner’s theory-in-use might be limited by the researcher’s proficiency in English and lack of experience.

Therefore, if a similar research is to be conducted in the future, it is recommended that more than one person could be engaged to construct the two-column table for one session when record of the session is not available; in addition, the research could be conducted with a larger number of research participants; finally, the interview session could be conducted by an interviewer who is experienced in action science and is proficient in the language used by the research participants.

5.6. **Directions for future research**

Several directions for future research were suggested as follows. As mentioned in the previous section, future research could study GMB facilitators’ theories-in-use in difficult situations with a larger sample size so as to further explore the variety of difficult situations and to investigate to what extent the findings of this research could

be generalized to other situations, thereby revising the theory of action for GMB facilitation developed in this research.

Besides, there might be multiple factors influencing a GMB facilitator's would respond to its difficult situation; accordingly, future research could investigate the impact of factors such as training or experience on the facilitator's theory-in-use in the face of difficult situations.

In addition, this research only focuses on the experience of the GMB facilitator; however, the participants in the same difficult situation might have different perspectives; therefore, future research could engage the participants in the difficult situation so as to understand the effectiveness of the GMB facilitator from the participants' perspectives.

This research focuses on the GMB facilitators' theories-in-use in difficult situations, while future research could focus on other types of situations; for example, by studying facilitators' reasoning and behavior in the GMB sessions that help the participants to derive lots of insights from the sessions, it is possible to make explicit the facilitators' tacit knowledge for facilitating insightful GMB sessions.

Finally, although the how the training in GMB facilitation could be modified was suggested in the section of practical implications, an action research could be conducted to investigate how to effectively integrate the training on Model II and reflection with the training on GMB facilitation skills, thereby helping the trainees to become reflective GMB facilitators.

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Appendix

Appendix 1. Model I and Model II Social Virtues

Social virtue	Model I	Model II
Caring, help, and support	Give approval and praise to other people. Tell others what you believe will make them feel good about themselves. Reduce their feelings of hurt by telling them how much you care and, if possible, agree with them that others acted improperly.	Increase the others' capacity to confront their own ideas, to create a window into their own mind, and to face their unsurfaced assumptions, biases, and fears by acting in these ways toward other people.
Respect for others	Defer to other people and do not confront their reasoning or actions.	Attribute to other people a high capacity for self-reflection and self-examination without becoming so upset that they lose their effectiveness and their sense of self-responsibility and choice. Keep testing this attribution (openly).
Strength	Advocate your position in order to win. Hold your own position in the face of advocacy. Feeling vulnerable is a sign of weakness.	Advocate your position and combine it with inquiry and self-reflection. Feeling vulnerable while encouraging inquiry is a sign of strength.
Honesty	Tell other people no lies or tell others all you think and feel.	Encourage yourself and other people to say what they know yet fear to say. Minimize what would otherwise be subject to distortion and cover-up of the distortion.
Integrity	Stick to your principles, values, and beliefs.	Advocate your principles, values, and beliefs in a way that invites inquiry into them and encourages other people to do the same.

Source: Argyris (2004, p. 14)

Appendix 2: Assumption Elements Derived from Facilitator's Attitudes in Vennix (1996)

Assumption elements	Excerpts from in Vennix (1996)
The information I hold may not be valid.	● …what you now consider to be true and thus real, could turn out not to be true or real tomorrow (1) ● …consider what you know to be preliminary and subject of scrutiny and discussion (1)
All the participants and their opinions are very important.	● …taking the client and his problem seriously (2) ● Always take all participants seriously (3)

The excerpts were derived by reviewing the description for facilitator's attitudes in Vennix (1996) and extracting the parts about how a facilitator should see itself, the situation, and others in the situation. The numbers in the table denote the source of the excerpts, which includes: 1) attitude of inquiry; 2) helping attitude; and 3) neutrality. There is no excerpt from the description for authenticity and integrity, as the description for this attitude doesn't meet the aforementioned criterion.

Appendix 3: Elements of Action Strategies Derived from Facilitator Attitudes in Vennix (1996)

Elements of Action strategies	Excerpts from in Vennix (1996)
1. Ask questions to understand the clients' opinions and reasoning.	• …understand what a person is really saying to you by asking questions (1) • …I tell people that I don't understand what they mean or why they hold a particular opinion (2) • (Ask) questions without an implied answer (2)
2. Engaging the client.	• …the best way to help patients is by making them help you. (1) • …start a joint thinking process with your client. (1)
3. Explain the purpose and reasoning underlying your approach and admit mistakes if any.	• …not rely on trick (3) • Be the first to admit your mistakes. (4)
4. Treat the participants equally.	• …be neutral with regard to group members. (4) • Don't show the preferences you might have for some people or ideas. (4) • Avoid getting involved in politicking. (4)
5. Be aware of your verbal or non-verbal behavior and minimize their influence on the content of the discussion.	• The facilitator must be neutral with respect to the content of the discussion (4) • The facilitator should refrain from airing his or her personal opinions, nor should the facilitator place evaluations on what is said both verbally and non verbally. (4) • (If you want to contribute to the content), be sure that you make it clear to the group that you abandon your facilitator role for the moment and would like to make a comment or present an idea. The best way to do this would be to present your idea to the group and let them decide whether to discuss or ignore it. (4)

The excerpts were derived by reviewing the description for facilitator's attitudes in Vennix (1996) and extracting the parts about how a facilitator should behave. The numbers in the table denote the source of the excerpts, which includes: 1) helping attitude; 2) attitude of inquiry; 3) authenticity and integrity; and 4) neutrality.

Appendix 4: Rules of Hypothesis Testing for Action Science Interventionists

Rules	Explanation
1. Combine advocacy with inquiry.	Make views public and invite others to inquire into them
2. Illustrate your inferences with relatively directly observable data.	When making a claim, provide the data upon which the claim is based.
3. Make your reasoning explicit and publicly test for agreement at each inferential step.	Make explicit the inferential steps that led from the data to their conclusions, publicly seeking agreement at each step. Return to the data in the face of conflicting meanings and retrace the steps taken to see where the meanings diverge.
4. Actively seek disconfirming data and alternative explanations.	Actively inquire into the new data or explanations and design ways of understanding the discrepancies by either designing tests of the competing views or reexamining the different inferences being made from the data.
5. Affirm the making of mistakes in the service of learning.	Regard mistakes as the raw material of learning, worthy of consideration and exploration.
6. Actively inquire into your impact on the learning context.	Inquire into the possibilities of making mistake by yourself and understand the nature of the impact that they do have in order to inquire into whether the impact is intended and whether it is the right impact to exert.
7. Design ongoing experiments to test competing views	When there are different views, design ways to test them rather than impose your own view or regard the differences as nonnegotiable.

Adapted and revised from Argyris et al. (1985, p.257).

Appendix 5: The derivation of the action strategies for the preliminary theory of GMB facilitation

Action Strategies	Ingredients
1. **Explain intention and reasoning and share relevant information.** Explain to the group your intention underlying your facilitation. When voicing your view, explain the reasoning and the relevant information on which the reasoning is based; also, support the participants to do the same when they have views to share.	● Ask questions to understand the clients' opinions and reasoning. (1) ● Explain the purpose and reasoning underlying your approach and admit mistakes if any. (1) ● Illustrate your inferences with relatively directly observable data. (2)
2. **Publicly test for agreement at each inferential step and ask for different views.** When sharing your reasoning, explain how you come to your conclusion from your data. When participants share their reasoning, support them to do the same. After the inference is made explicit, invite public testing for agreement, and ask for disconfirming data or alternative explanation of the data.	● Ask questions to understand the clients' opinions and reasoning. (1) ● Make your reasoning explicit and publicly test for agreement at each inferential step. (2) ● Actively seek disconfirming data and alternative explanations. (2)
3. **Engage participants in designing the next step to address critical issues**. When there are competing views or other critical issues, engage the participants in designing the next step to address them. When you have dilemma in your mind during your facilitation, surface the dilemma and engage the participants in addressing it.	● Engaging the client. (1) ● Design ongoing experiments to test competing views (2) ● Surface private dilemmas (3)
4. **Combine advocacy with inquiry.** Whenever you have views to share, make it explicit and invite others to inquire into them.	● Combine advocacy with inquiry. (2)
5. **Treat the participants equally.** Be impartial to the group members and treat what they say equally according to the same criteria.	● Treat the participants equally. (1)

Action Strategies	Ingredients
6. **Minimize influence on the content of discussion.** Be aware of your verbal and non-verbal behavior and minimize their influences on the content of discussion. If you really have important ideas, ask the group for permission before sharing, make them aware that you leave your facilitator role temporarily when you are sharing your ideas, and let the group to decide whether to keep the ideas or not.	● Be aware of your verbal or non-verbal behavior and minimize their influence on the content of the discussion. (1)
7. **Affirm the making of mistakes and encourage exploration.** When you make a mistake during your facilitation, admit the mistake and try to understand how it influence the participants. When the participants make a mistake, encourage them to explore it so as to derive new understanding.	● Explain the purpose and reasoning underlying your approach and admit mistakes if any. (1) ● Affirm the making of mistakes in the service of learning. (2) ● Actively inquire into your impact on the learning context. (2)

The numbers in the right column denote the sources from which the ingredients of action strategies were derived, which include: 1) the description for attitudes in Vennix (1996; see Appendix 2); 2) the rule of hypothesis testing for action science interventionists (Argyris et al., 1985; see Appendix 3); and 3) action strategies of Model II theory-in-use (see section 2.4).

Appendix 6: Guide for the First Session

1. Greet the research participant
2. Introduce the purpose of the session and go through the consent form
    - “The purpose of this research is to study the reasoning and action of GMB facilitators when facing difficult situations in GMB sessions.”
    - [Go through the consent form.]
    - “Before we start, do you have any question for me?”
3. Elicit the difficult situations the participant has met when facilitating group model building sessions in the past.
    - “In this session, I would like to help you to recollect your previous difficult situation when you were facilitating GMB sessions.”
    - “There are two types of information I would like to collect. One is the actual conversation or other relevant observable behavior happened in the difficult situations, the other is your thoughts and feeling at that moment.”
    - “If it is possible, it would be ideal if you could share two cases with me, but one is also fine for me.”
    - “Do you already think of any case to share with me? If not, I suggest that you could start recollecting several cases and I can put down the note for you. Afterward, you could choose which case you want to go deeper.”
4. Select at least one case to reconstruct the what happened and the interviewee’s feeling and thoughts

Appendix 7: Example of Two-column Table

The two-column table was part of the case method developed by Argyris and Schön (1974, p.41). The right-hand column, record the relatively objective information of case, such as the actual conversation and other observable and relevant information. The left-hand column records the thoughts and feelings of the case owner in the case. The following table presents a case in which the facilitator (F) has a discussion with a participant (P) on the model.

Thoughts and feelings	Actual conversation
[Feel shocked] What does he mean by saying that? I have to ask him to say more in order to know what he wants to say.	P: [Point to the model] I don't think this model make sense at all.
	F: [To P] Could you please say more about what you mean by “not making sense at all”?
It seems that he is saying the scope of the model is too narrow.	P: This model only focus on the performance of our department; however, our performance is also strongly influenced by another department, so I don't think it make sense that we ignore that department.
	F: So do you mean the scope of this model is too narrow to be useful?
[Feel happy] It’s nice that his concern is clarified.	P: Yes, exactly.
	F: What would you suggest to revise the model in order to make the model useful?
	[The participant makes several suggestions about how the model should be revised.]

Appendix 8: Sample Questions to Ask in the Second Session

1. Questions used to elicit information from the case owner for deriving its theories-in-use

    - What were your intended consequences by behaving in that way?
    - What makes you think you have to act in that way at that moment?
    - Did you have alternative options in response to that situation?
    - If you think you should have done something else, what prevented you from doing that?
    - From your perspective, what caused this difficult situation happen?
    - What caused the participants to behave in that way?
    - What do you think was the participants' intention?
    - What might the participants think about the situation?
    - What would happen if you didn't behave in that way?

2. Supporting questions

    - What do you mean by saying that?
    - How did you know that?
    - Do you have any questions for me?
    - Could you give me an example?
    - How would you define that?

Appendix 9: Guide for the Second Session

1. Greet the research participant.

2. Introduce the session:

   - “In this session we will go deeper into the two columns we have built and try to explore your reasoning in that situation. Based on the two columns I have come up with several questions to discuss with you in this session.”

   - “The elements of reasoning I plan to focus include: 1) value, which is what you see important and what to satisfy; 2) assumption, which means how you see yourself, the participants, and the situation; and 3) action strategy, which is the strategy you used to address the situation.”

   - “Whenever I sense these elements from our conversation, I will ask for your confirmation. If any hypothesis about your reasoning emerges in my mind, I will raise it and also explaining my inference and the data on which my inference is based. And if you see the data differently or if you find any flaws in my inference, please let me know. Also, if you have alternative hypothesis about your reasoning, please let me know, so that we can have investigation together.”

   - “If you don't’ feel comfortable about any questions I ask, please let me know. And you may decide not continuing the session if necessary. The session will be recorded and all the data will be treated anonymously. After this session I will come up with a report for you to have your confirmation. Do you have any questions for me?”

3. Go over the two columns to make sure if there is anything to add.

4. Raise questions to derive the case owner’s theory-in-use.

5. Ask the case owner if there is anything else about the case to provide and for the feedback about the session.

Appendix 10: Results of Within-Case Analysis

The results of within-case analysis are presented from **Appendix 10.1** to **Appendix 10.14**. The results of each case are divided into four sections. **Section A** provides the context of the case, and **Section B** presents the two-column table constructed in the first interview session. In the two-column table, the square brackets in the left-hand column denote the case owner's feelings or emotion; in the right-hand column, the brackets denote people's non-verbal behavior or the part of the case where the case owner had difficulty in recollecting the actual conversation.

In **Section C**, the account of the case is presented, which is constructed by connecting the actual conservation with the case owner's thoughts and feelings in the two-column table. The purpose of producing the account is to provide explanation for the case. In addition, excerpts from the transcript of the second interview session, where the case owner had discussion on the case with the researcher, are also provided in this section.

Finally, the theory-in-use of the facilitator derived from the case is presented in **Section D**.

Appendix 10.1: Analysis of the Case 1

A. Context

A workshop was designed for an international company to facilitate a conversation among its global leaders. In the introduction phase of the workshop, the global CEO (P) gave a ten-minute talk about what the problem and solution were from his point of view and suggested that the group discuss how to implement his solution.
The facilitator (F) was worried that if P kept behaving like that, he would destroy the purpose of the workshop, which was to have the group have lots of conversation in order to really understand the problem and possible solutions from a systemic point of view. Therefore, during the break F decided to talk to P.

B. The two-column

Thoughts and feelings		Actual conversation	
1	[Feels uncertain] The global CEO might be very used to being right and might not be very open.	2	F: [Gets up from the chair and walk to the P.]
3	[Feels uncertain]	4	F: [To P] I have a question for you to think about.
5	[Feels uncertain]	6	P: Yes.
7	[Feels uncertain] He may not know what I am asking, and he may not think of me as equal in this conversation. I am worried that I might have to make the question too explicit.	8	F: Do you think there are people in the room willing to disagree with you publicly?
9	He is pondering upon my question. He is mentally going around the room and thinking who is in the room.	10	[P becomes silent for a bit]
11	[Feels much better] He heard me and knew why I asked this question. He has found people who would be	12	P: Yes, I think so.

Thoughts and feelings		Actual conversation	
	willing to disagree with him. I can trust his answer [gets confidence].		
13		14	[After this short discussion F explains the agenda for the rest of the workshop.]

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session)

- A workshop was designed for an international company to facilitate a conversation among its global leaders. In the introduction phase of the workshop, the global CEO (P) gave a ten-minute talk about what the problem and solution were from his point of view and suggested that the group discuss how to implement his solution.

- The facilitator (F) was worried that if P kept behaving like that, he would destroy the purpose of the workshop, which was to have the group have lots of conversation in order to really understand the problem and possible solutions from a systemic point of view. Therefore, during the break F decided to talk to P.

- On his way of approaching the P, F was uncertain, as he thought P might be very used to being right and might not be very open (1, 2).

  He would be a very confident man, and sometimes very confident people assume they don't have to listen to other people very much. So I was worried about that.

  I'm generally uncomfortable in antagonistic situations so I simply didn't want him to come out looking like that. I want him to perceive us as his friends, so it was worrisome to me whether I could find the right words to speak to the CEO.

  I really didn't know how he might respond to the implication that he was derailing the meeting, he was going to prevent other people talking and that was a bad thing. And he might have been upset by that.

- After reaching P, F asked P whether there were people in the room willing to disagree with him publicly (3, 4, 5, 6, 8). At this moment F was uncertain, as he

thought P might not know what he was asking and might not think of him as equal in the conversation; in addition, F was worried that he might have to make the question too explicit if P didn't know what he was asking (7).

I wanted him to think about the question… I wanted him to say to himself, "Whoops, I might have made a mistake there. I should be quiet for a while and listen to what these other guys say."

I wanted to avoid any perception on his part that I was arguing with him or contradicting him.

…My way of dealing with it was to phrase my statement as a question.

If I asked my question much more explicitly, "don't you think you should be quiet and listen to the people in the rest of the room," I think that form would have been much more likely to bring up the defensive reaction.

…I want to be part of the facilitation team so I want to be seen as being helpful… We are here to help them think... We are helping them reveal their understandings of their complex system. We are helping them to build their model.

- Hearing F's question, P became silent for a bit. At this moment F thought P was seriously pondering upon his question (9, 10).

- After a short time, P replied, "I think so" (12). Hearing P's positive confirmation, F thought P heard him and knew why he asked the question; in addition, F thought P had found people who would be willing to disagree publicly; therefore, F thought he can trust P's answer and got more confident (11). Afterwards, F explained to P the agenda for the rest of the workshop (14).

It was the fact that he took some time think before he answered and that he gave his answer in the way that sounded thoughtful. And those two things make me think that he's not being defensive, he's actually thinking about the question, and that should be enough for what I was driving at.

- During the second session, the facilitator thought that the assumption that the CEO might not be very open might be unfounded. Although the facilitator

probably would ask the same question, he would have been less nervous.

Probably my concerns were unfounded, because he had agreed to come to such a meeting and he knew that people would be talking, that they were brought together to talk, so I suspect… I should have known that he was comfortable listening to other people in the room.

So I think if I had a little more time think about it, I probably still would ask the question, but I would not have been nervous about it, because I had to ask such a question in such a way that got him to realize that he had to be quiet for a while.

D. Theory-in-use of the facilitator

- Values
  - To prevent the CEO (P) from having defensive reaction
  - To avoid antagonistic situation
  - To be perceived as friend and being helpful
  - To have the group have lots of conversation
- Assumptions
  - P might not be very open to other people's opinions.
  - If I make my point too explicit, I might bring up P's defensive reaction, and P might think I am contradicting him.
  - If P thinks I am contradicting him, I would not be perceived as being helpful.
- Action Strategies
  - Frame my statement in the form of question in the hope that P will understand the real information I want to convey (that he should be quiet for a while and listen to what the other guys say).

Appendix 10.2: Analysis of the Case 2

A. Context

A model was constructed with the participants in the previous group model building sessions. In this session the facilitator (F) presented the model and asked for feedback from the participants for the qualitative structure of the model. One of the participants, P2, had some background knowledge in system dynamics modeling and gave comments about model quantification several times in the session.

B. The two-column

Thoughts and feelings		Actual conversation	
1		2	F: [Present the model] This variable influences this flow, which is X (name of the flow).
3		4	P1: That flow should not be called in that way. The name should be Y (alternative name for the flow).
5	Because he is an expert, it is great that he corrects it.	6	F: Thank you. We will change the term [continue explaining the model].
7	[Felt anxious] The time is limited, and I have to move on because next part of the model is very important. I need to know if I capture their mental model well.	8	P2: According to my model, it should be a random variable instead of average.
9	I feel I am lying. Because it is out of the scope of the project, we won't add any equation. But if I don't respond in this way, he might continue arguing why it is important and take more time.	10	F: Thank you. We will consider it.
11	If he wants to explain, then I let him go ahead.	12	P2: [Explain why the variable should be random and mention the equation to be put into the

Thoughts and feelings		Actual conversation	
			model]
13	I feel grateful. He said what I was too struggling to say.	14	P3: Ok, this is too technical.
15	I have to laugh so as to be polite. I wasn't sure if it was funny or they should have been more serious.	16	[All the Participants but P2 laugh, and the Facilitator also laughs. P2 looks at his handout.]
17		18	P4: Let's move on. [Smile]
19		20	F: [continue explaining the model]
21	This change is unnecessary for this session. Why don't you tell me when I show you the model before the session?	22	P2: That variable should not be called that way. It should be called Z (a name with system dynamics terms).
23		24	F: OK, we will take this suggestion when we refine the model. [Continue explaining the model]
25	The suggestion of adding a new stock makes sense, but why did he mention aging chain? Only I and P2 know that term.	26	P2: When you model this stock, I would say that another new stock should be added to this stock. [Explain why a new stock should be added] You know like an "aging chain."
27		28	P5: Yes, this should be considered.
29		30	[A discussion on the new stock and the related process ensues among the participants]
31	[Felt curious] I want to know if I understand it correctly.	32	F: [To all the participants] If I understood you correctly, this process will be like this?
33		34	P5: Yes.
35	[Felt relieved] I finally finish the explanation.	36	F: Thank you. I will model it that way. [Summarize the model] Do you have any question?

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session)

- A model was constructed with the participants in the previous group model building sessions. In this session the facilitator (F) presented the model and asked for feedback about the qualitative structure of the model from the participants (2).

- At one moment, a participant (P1) suggested a change in the name of a flow (4). F took the suggestion and thought it was great that P1 corrected it; afterward, F resumed presenting the model (5, 6).

- Another participant (P2) suggested a variable should be random variable (8). At this moment F felt anxious, because the she had time constraint while there was another part of the model to be presented. As that part of the model was very important, F was eager to know if that part was modeled well (7).

  When I felt anxious and… when he was constantly bringing the quantification phase, I felt anxious and powerless… I didn't know what to do, to be honest.

- Although F thought P2's suggestion was out of the scope of the project and hence the suggestion would not be implemented, she said thanks to P2 and that the suggestion would be considered. F was worried that if she told P2 what was in her mind, P2 might argue why the variable should be random and took more time (9, 10).

  If I started an argument about that "this is out of the scope…" I would take more time and he would continue arguing about why this was important. So I said "we will consider it."

- After F's response, P2 started explaining why the variable should be random and mention the equation to be put into the model (12), and F thought that If P2 wanted to explain, she let him go ahead (11).

  Maybe because he was the gatekeeper… (who) would be important for us in the future… so being like constraining him in the session too much, like stopping him

from explaining his idea might be hurtful for our relationship.

I want to minimize confrontation (with P2). It was also because I actually didn't know if his input was going to be good.

It was important to have as many improvement for the model as possible… So I feel good if everybody would make correction so we could refine the model.

- Another participant (P3) said that what P2 said was too technical (14), and F felt grateful, as P3 said what she was too struggling to say (13).

Because I didn't know if people knew statistics... so if I said "this is too technical," maybe it wasn't true.

- After P3's comment, all the participants but P2 laughed; at this moment P2 was looking at his handout (16). Although F wasn't sure if what P3 said was funny, she thought that she had to laugh so as to be polite; therefore, she also laughed (15).

(Being polite means) to have manners and being proper.

If I were serious, it would have been awkward… so I would rather repeat what everybody was doing.

(The intended outcome of laughing when the participants laughed is) not to look awkward, or not to break the room atmosphere.

- After a while, another participant (P4) suggested that they move on (18), and F continued explaining the model (20).

- P2 suggested that the name of a variable should be changed into another name with a system dynamics term (22). F felt the change was unnecessary for the session and wondered why P2 didn't tell her when she showed him the model before the session (21). Nevertheless, F took the suggestion and resumed explanation (24).

(The reason why I considered the change unnecessary is because) it wouldn't make any difference... so why to bother changing what everybody already understood to something that might be not known….

I tried to assume that P2 wanted to get everybody to be familiar with system dynamics methodology. That's why I continued and I didn't say "no, no, no, this is not necessary…" I didn't confront him.

We (P2 and I) had time discussing the model before the session. Maybe he missed it. Maybe he forgot… I don't know actually. But (if he told me before the session)… we would have skipped that and saved (time).

- P2 suggested a stock should be added to the model and further mentioned that the structure would become an aging chain, which is a system dynamics term (26). F thought that P2's suggestion made sense but she wondered why he mentioned aging chain (25).
- Another participant (P5) agreed with P2's suggestion (28). Afterwards, a discussion on the new stock and the related process ensued among the participants (30).
- After the discussion last for a while, F summarized the discussion and asked for confirmation, as she wanted to know if she understood it correctly (31, 32).
- P5 confirmed F's summary (34). Afterward, F summarized the model and asked if the group had any questions (36); at that moment F felt relieved, as she thought she finally finish the explanation (35).

D. Theory-in-use of the facilitator

- Values
  - To avoid confrontation with P2
  - To finish the session in time
  - To ensure participants' understanding of the model
  - To get useful suggestions for model refinement from the participants
- Assumptions
  - If I start an argument with P2 about what he said is out of the scope, he would continue arguing about why what he said is important.
  - P2 would be important for us in the future, as he is the gatekeeper.
  - Constraining P2 in the session too much, like stopping him from explaining his idea, might be hurtful for our relationship.
  - The more the group understand the model, the more they are able to give

useful suggestion.

- I am not sure if P2's input would be really unnecessary for the session.

- Action Strategies
  - Accept P2's suggestion and not surface my concern about the focus of the session.
  - Let P2 explain his idea even if I think it might be unnecessary for the session.

Appendix 10.3: Analysis of the Case 3

A. Context

The facilitator (F) had facilitated the participants to construct a qualitative model in the previous sessions. In this session, the purpose was to collect the participants' feedback on the structure of the model. One of the participants, P2, has some background knowledge in system dynamics modeling and gave comments related to model quantification several times in the session.

B. The two-column

Thoughts and feelings		Actual conversation	
1		2	F: [Presents the model]
3		4	P1: Could you clarify the meaning of this variable?
5		6	[A discussion ensues between F and P1]
7	This comment is valuable. He helped me with this difficult situation.	8	P2: This discussion is more relevant to the quantification. During the quantification, this will be addressed.
9		10	F: [To P2] Thank you for your explanation. [Explains another part of the model]
11	You already said it. Why did you repeat it (issue of quantification) again?	12	P2: For quantification this part will be like this.
13		14	F: Thank you for the comment. In quantification this will be handled. [Continues explaining the model]
15		16	P1: This is a soft variable. I agree this is correct, but I'm wondering how it functions in our organization.
17	This comment is stupid. That model	18	P2: [To P1] I know your concern.

Thoughts and feelings		Actual conversation	
	is not relevant to this model. And the rest of the participants are confused.		During the quantification this will be solved. [To F] You should consider modeling this variable by following **X's Model** (a model by someone else). [The rest of the participants are silent after P2's comment.]
19	If that were someone else I would say I know that model and that model is not relevant. But I don't want to have discussion on this. It would be better to get back to our task.	20	F: Thank you for the comment I will take a look at it later.

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session)

- A model was constructed with the participants in the previous group model building sessions. In this model validation session the facilitator (F) presented the model and asked for feedback from the participants (2).

- At one moment a participant (P1) questioned the meaning of a variable (4), resulting in a discussion between the F and P1 (6). After the discussion lasted for a while, another participant (P2), the gatekeeper, settled the discussion by mentioning that P1's question would be addressed when the model was quantified (8). F thought P2's comment was valuable and said thanks to P2. At this moment the F's concern was mainly about time (6).

  It is related to time. When you have to explain something and it takes you a lot of time for you to explain to someone, your reputation (as a facilitator) go down.

  …And also effective. Because we had a little bit time pressure. If we lost time in this part of the model, that was not nice for the rest.

- After F resumed explaining the model for a while, P2 gave a comment on how the

model should be quantified, making F wonder why P2 gave the comment on quantification, as P2 already mentioned quantification several times while the purpose of the session was validating the qualitative structure of the model (11, 12). In response, F said thanks to P2 and continued explaining the model (14).

- Afterward, P1 raised another question about how a variable functioned in their organization (16). In response to P1, P2 commented that the issue would be handled when the model was quantified and suggested that F refer to a specific model (18).

I wasn't so happy, because I had the feeling that there could have been a nice discussion about this variable, but the comment of P2 cut off the possible discussion.

They (other participants) didn't say anything (more about the variable). I had a feeling that there was no room any more for conversation. They were not thinking about it anymore…

- F thought the comment was stupid, as he thought the model mentioned by P2 was not relevant to the model he was presenting (17). During the discussion with the researcher, the researcher raised an idea that F's thoughts revealed that he assumed he knew the model mentioned by P2 and he knew P2's reasoning of mentioning that model.

Researcher: …My concern is… if I want to judge P2's comment is valid or not… I have to know his reasoning. If I know his reasoning and that model, I can compare and know if P2's comment is valid or not.

Facilitator: You are right. I remember the basic structure of that model. It seems there is no relation between that model and our model. There is no relation. But actually yes, maybe I could have asked him to be clearer to specify why.

- In response to P2, F said thanks and that he would take a look at the model later, while in his mind F thought that if it were not P2 but someone else who mentioned the model, he would have said the model was not relevant. However, he didn't want to have that discussion and thought it would be better to get back to the

current task (19, 20).

…He was stuck in his idea of quantification... so raising a difficult discussion during the meeting could have taken so much time.

…Having discussion with me would make him lose face and generate problems for the project since he is the gatekeeper.

In the case like... his comment would have appeared to be not so important or wrong or whatever, it could have made him lose face in front of his peers… If other participants would say the same… there was more room for discussion with them, since they didn't know what system dynamics is. They might be fine to make a mistake about it.

D. Theory-in-use of the facilitator

- Values
  - To get feedback from participants to improve the model
  - To finish the session in time
  - To keep harmony in the environment and not to make P2 feel losing face
- Assumptions
  - I know the model mentioned by P2 and know why P2 mentioned the model.
  - If I surface my concern about P2's comment about the model of someone else, it might result in a discussion and take more time, as he has some knowledge in system dynamics.
  - If I have discussion with him, P2 will find his comment not valid.
  - If he finds his comment is not valid, P2 would feel losing face in front of his peers.
  - If P2 feels losing face, it might be harmful for the project, since he is the gatekeeper.
- Action Strategies
  - Not surface my concern about P2's comments and show that I accept his comment.

Appendix 10.4: Analysis of the Case 4

A. Context

A model was constructed with the participants for **Issue A** in the previous group model building sessions. In this session the facilitator (F) presented the model and asked for feedback from the participants, while a participant (P1) gave comments related to another issue (**Issue B)** several times in the session.

B. The two-column

Thoughts and feelings		Actual conversation	
1	[Feel happy, excited, and nervous] This is the final session and I have something to present.	2	F: [Explains the model] Does anyone have feedback?
3	Although it is a bit meaningless, as the purpose of this project is working on Issue A, but it is interesting to know.	4	P1: For **Issue B** this variable will be something like this, and this variable will be like this.
5		6	F: Thank you. Yes, in the next phase for **Issue B** this is something to be taken into account. However, we are now working on **Issue A**. Is it okay for you if we just leave this comment?
7		8	[P1 agrees and F puts the comment onto the parking lot]
9		10	F: Does anyone else have comments related to **Issue A** about the model? I don't know if the structure is correct. You are the experts
11	Why does he keep mentioning this? Should I react to that? Is it really necessary?	12	[All the participants, including P1, give feedback on the model. During the period P1 gives comments

Thoughts and feelings		Actual conversation	
			related to **Issue A**, while some of the comments are related to **Issue B**.]
13		14	[After collecting the feedback, F facilitates an exercise. After the exercise, F starts asking for feedback from the participants on the model.]
15		16	F: Does anyone have feedback?
17	Here he comes again. Other participants are silent. It seems that they are not interested.	18	P1: In my model about **Issue B**, this should be this and this and this. [Other participants become silent.]
19		20	F: [Remains silent for a while] Thank you P1. Let's move on. Does anyone have comments related to Issue A toward the model? [This time the comment is not put on the parking lot]

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session)

- A model was constructed with the participants for Issue A in the previous group model building sessions. In this session the facilitator (F) presented the model and asked for feedback from the participants.

- At the beginning of the session, F explained the model and asked for feedback on the model (2). She felt happy and excited, as it was the final session and she had something to present (1).

- A participant (P1) gave a comment related to Issue B, which would be the focus of the next phase of modeling work (4). Although F felt it was interesting to know, she also felt the feedback was a bit meaningless, as the feedback was not directly related to the focus (Issue A) of the current project (3). Therefore, F

explained the purpose was building the model on Issue A and asked for P1's agreement to leave his comment on the parking lot (6). P1 agreed and F moved on asking for feedback about the model on Issue A (8, 10).

We did the similar exercise a week before this one… In that session we explicitly explained what we were looking for in terms of feedback (Issue A), so we didn't explain again in this session… we assumed at least the participants understood and knew that

That (asking P1 for agreement to put his feedback on the parking lot) was more of "okay, so we don't discuss Issue B for now anymore." It wasn't explicitly said like that but… I interpreted that it was also clear in the way… that Issue B was off the table for now.

Especially since he (P1) was the one that told us to address Issue A in the first place, I thought he would get that (Issue B was off the table for now).

I think it was more indeed addressing the specific comment (rather than clarifying the overall process). I tried to emphasize the process a little bit: "We are now addressing Issue A."

- The group, including P1, gave feedback about the model. Although P1 did give feedback related to Issue A, he also gave some feedback about Issue B, making F wonder why P1 kept mentioning Issue B and whether it was necessary to react to P1's feedback (11, 12).

We can also replace that thought by "Should I facilitate this comment?" or "Should I just leave it in the air?" …Like I did it in the later for instance.

I didn't want to drift the issue to Issue B, and I didn't want to give any floor to Issue B, although I did want to give floor to all participants, so… it was a bit of a tricky situation.

(Giving floor to all participants means) All participants' input should be equally valued as we were taught in the facilitation, and not giving any value to the input of P1 would be a bit contradicting to that.

I was trying to find a way to make clear that this session was not about Issue B without harming the relationship. So this was a bit the moment where I felt inner

conflict…

I think there was more of a continuum of options of "full facilitation" and "not-at-all facilitation." And at this point I was more on the full facilitation side (e.g. paraphrasing and asking for explanation).

- After the first round of feedback collection, F facilitated an exercise (14). Afterwards, the second round of feedback collection started (16). P1 gave another feedback related to Issue B, and the other participants became silent (18). At this moment, the first thought of F was "here he comes again." Seeing that the other participants were silent, F thought it seemed they were not interested in the feedback given by P1; therefore, F intentionally became silent for a while; afterward, she said thanks to P1, and asked if the group had other feedback for the model (19, 20).

I didn't want to go completely toward the "we are not addressing this today, sorry" side (not-at-all facilitation), cause that was also for me at least putting too much of myself or of my own opinion up there, cause other participants might want to discuss this issue as well a little bit.

My biggest concern was that I would harm the atmosphere and… I would harm the relationship (if I took "not-at-all facilitation" approach).

(The intermediate stage between "taking not-at-all facilitation approach" and "that the relationship and atmosphere get harmed" include) that they might feel insulted and also they might feel that their input was not valued… that P1 might get the feeling that his input was not valued and therefore would not give any input at all because his input was shut down, and that that might in turn give the other participants the idea that they were not equally valued at that point in time…

D. Theory-in-use of the facilitator

- Values
  - To minimize discussion on Issue B
  - To prevent the participants from having negative feeling
  - To give equal treatment to participants' inputs
- Assumptions
  - P1 would know that Issue B is off the table for now if I say "we are not

addressing Issue A" and put his Issue B-related feedback on the parking lot.

- If I shut down P1's Issue B-related feedback, he might feel insulted and that his input is not valued, and he might not give any feedback at all; other participants might feel insulted and that their inputs are not equally valued. Consequently, our relationship would be harmed.

- Action Strategies
  - Address P1's Issue B-related feedback (including "put on the parking lot" and "leave in the air") without explicitly mentioning my concern about the process.

Appendix 10.5: Analysis of the Case 5

A. Context

A project employing group model building was initiated in an organization to investigate an issue related to several companies. The difficult situation happened in the session where the facilitator (F) presented the model and asked the participants to name the loop, and a participant (P1), who had some knowledge in system dynamics, expressed her concern about a specific loop.

B. The two-column

Thoughts and feelings		Actual conversation	
1		2	F: [Explains all the loops in the model] Now the exercise is to name the loop. How would you name this loop?
3	There is no loop that is too big. This is just relationship between the variables. [Feels scared] She would not believe in the model anymore and lose ownership. Maybe I model something wrong. [Goes over the model] It was correct how I did it. [Feels more secured]	4	P1: This loop is too big
5	I want to try to explain her that you cannot just cut off the loop because you have the feeling that the loop is too big.	6	F: Let's have a look at it again. Imagine you are the company and you choose this strategy…. [Explains the loop again with a practical example and explains the relationships between the variables]. [Asks for confirmation] If it is increasing, this variable is also increasing, right?
7		8	[All the participant agree. And the

Thoughts and feelings		Actual conversation	
			facilitator continues explaining the relationships of other pairs of variables and asks for confirmation.]
9	I had a feeling that she wanted to make some issues.	10	P1: I agree with your explanation, but I still have a feeling that the loop is too big.
11		12	F: What do you mean exactly by “the loop is too big”?
13	She just wants to be right. She is trying to teach me something. She cannot really give me a reason” so maybe she is trying to be more expert than we are in system dynamics	14	P1: I just have a feeling that it is too big
15		16	F: Where would you cut it?
17		18	P1: I don’t know.
19		20	F: [Turn to other participants] Do you think the loop is too big?
21	Maybe it is because P1 has a leading position in the group.	22	Other Participants: [Move their heads without giving a definite answer] hmm… yah…
23		24	F: [Toward P1] What would you like to have differently?
25		26	P1: I would like to make it more explicit. This variable (satisfaction) is composed of several other variables. Maybe it is too much detail. Never mind. Move on.
27		28	F: [Continues asking for confirmation for relationships of other pairs of variables] Okay. If this variable increases, will this

Thoughts and feelings		Actual conversation	
			variable also increase?
29		30	P1: You cannot link that variable directly to this variable.
31		32	F: If you don't want to link it like this, how would you link this variable?
33		34	P1: I would not link it like this.
35	Maybe she judge too fast or she skip the variables by just looking at it.	36	F: How would you link it?
37		38	P1: It would be more complex than how it is, because it depends on the situation.
39		40	F: But the general relationship is correct, right?
41	It doesn't make sense to make it explicit. At the beginning of the project you already mentioned that you were worried that the model would be too detailed, but now you said it should be more explicit.	42	P1: Yes. But in the second moment we should make it more explicit.
43		44	F: Yes, there is always a boundary around the model. There is always thing that might be missing but we can discuss if there is something more you want to add.
45		46	P1: Okay. We move on.
47	I want to give her the feeling that she got heard from us.	48	F: Let's put this (P1's comment) on the parking lot.
49		50	P1: Okay.

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session)

- A group model building project was initiated in an organization to investigate an issue related to several companies. The model had been built in the previous sessions. In this session, the facilitator (F) explained the loops in the model and asked the group to name the loops (2).

- At one moment a participant (P1) gave a comment that the loop was too big (4). F thought the comment didn't make sense, since she thought that there was just relationship between variables; besides, F was worried that P1 might not believe in the model and lose ownership. Moreover, F also thought that maybe she didn't do the modeling correctly and went over the model in her mind on her own; after checking the model, F thought that the model was correct and felt secured (3).

  (If she lost ownership) I thought well then every thing we did so far was… we lost kind of every thing we built up because in the end that was the end product...

  (When P1 gave her comment) the first emotion was feeling insecure (having naked feeling in front of the group) and that's why I went over the model again and the second emotion was "No, I'm actually right, but how should I translate to the group?" "How should I not falling this expert role but still defending what I did?"

  If I went over it again (in my mind) and I knew that I did every thing correct… I could go into this protective mode because I was kind of right or I could defend it… It was possible there were mistake in it… I would have corrected my mistake, but I would have used it as an example: "Oh. Yah. Do you mean this one?" …Instead of saying: "Oh. Yah. I made a mistake and sorry for that…"

  (The reason why I judged the model was correct was that) I just knew it was not correlation but was causality… (Another point was the relationship between variables) could happen in reality.

- In response to P1's comment, F went over the loop with the group and examined the relationships between the variables (6), and her intention was to explain to P1 that the loop couldn't be cut just because of the feeling that the loop was too big (5).

  (The purpose of going over the model with the group was) maybe I went over it slower and they would understand, and they would agree… Maybe it was just

because it looks weird so I thought I tried to connect it with real example… and they would say, "Yah, of course, you make this correct. We agree on what you said."

(That P1 wanted to cut the loop) was an assumption, because she just constantly said, "It's too big."

It was challenging not get into this expert mode… (Getting into the expert mode means) I will go deeper in SD… I will start explaining SD methodology and then I will say, "Yah, I capture this principle" and… "Actually it is difficult to explain..."

(Not getting into the expert mode) is more to get into a mode like "I support your reflection. I support your reasoning. I support your thinking. But everything you reflect, you think, or you have in your mind, it is yours… and it has nothing to do with what I have in my mind."

- The group agreed with the facilitator's explanation for the relationships of several pairs of the variables (8), while P1 said she still felt the loop was too big (10). At this moment F felt that P1 might want to make issues (9).

- F asked P1 what she meant exactly by the loop was too big (12), and P1 responded that it was a feeling (14). Then F thought that P1 was trying to teach her something and to show she was more expert in system dynamics (13).

She had this little bit of knowledge and she thought, "Yah, I can go against them because I also know something..."

(The intended consequence of asking P1 what she meant exactly was) that she reflected on what she said and if she could explain why she made this comment then I could actually also go deeper into her thinking or I could better understand why she felt like that but since she didn't have any reason… It was also difficult for me.

- In response to P1's answer, F asked P1 where she would cut the loop (16), while P1 said she didn't know (18). F then turned to other participants to ask for their opinion, but the participants didn't give a definite answer (20). F thought maybe it was because P1 had a leading position in the group (22).

(The reason why I turned to the group was) because I thought there were possibly two things happening if they gave me a response. The first one was that if everybody agreed then I have to go deeper to understand why the group was thinking it and the second one was the opposite: the group agreed on mine, like the group was on what I think not what she think. Then maybe on her own she reflected and said, "Actually it is weird what I am thinking…"

If she had the feeling, "Okay, it's weird that the whole group has other opinion than I have", then maybe… she moved away from that position and it was kind of solved because she couldn't explain it. Or she had the opposite feeling and then if she defended her position even more, I thought she would try to find reasoning... and if she came up with something... I could try to understand why she was feeling like that. But since that I didn't get any clear answer from the group… It didn't really help.

- F asked P1 what change she would suggest (24). At this moment the focus of discussion changed, since P1 suggested that a variable should be disaggregated into several variables; however, P1 retrieved her suggestion and suggested that they move on (26).

…I thought it was a pity because it (P1's comment that the loop is too big) was unsolved and it would stay unsolved. I mean we change topic more because the group didn't agree or the group didn't have a real opinion, and she couldn't really explain why she has this opinion.

It was more like "I know the next step" but I don't know anymore how to proceed with this loop… but I knew it was not good to move on. But it was just more comfortable to move on… (The reason why it was not good to move on is) because I knew if we didn't (address P1's comment that the loop is too big) she would have this feeling always and it wouldn't go away alone.

- F resumed explaining loop (28), and at one moment P1 gave another comment that a certain variable couldn't be directly linked to another variable (30). Then F asked P1 how she would link the variables (32, 34, 36). At this moment F thought that maybe P1 made some mistakes when making judgment (35).

- P1 responded to F's question that the structure should be more complex so as to include different situations (38). F then asked if the relationship was correct in general (40), and P1 agreed and stated that it should be made more explicit at the later phase (42). F thought P1's statement didn't make sense; in addition, F also thought what P1 said was contradictory to the group's goal for the model set at the beginning of the project (41).

  (The intended consequence of asking P1 if she agreed that the general relationship was correct was to know if) they developed an understanding that there was a relationship between this… that this was about the relationship and not the situation that there were 11 companies. There were so many individuals (in the system) that there would always be different cases, but was the relationship generally correct?

  (Or let P1 get) the understanding that to build such a generic model or to build a model, it is not about that you try to model a situation… (It is about that) you try to model the relationship that applies to most situations.

  I'm sure actually during session I said "Let's come back to our goal" and then I repeated "The purpose of this three session is to develop a generic model for 11 small-medium size companies…" to make them aware again that this was about 11 companies and not about one single company or one situation or… so I definitely repeated the goal but I didn't know exactly when.

- In response to P1's statement, F said there was always boundary for a model, but they could have discussion if P1 wanted to add something (44). P1 agreed and suggested that they move on (46). With the intention of making P1 feel that she got heard from the facilitation team (47), F suggested that they put P1's comment onto the parking lot (48), and P1 agreed (50).

- In the discussion session F further explained the difficulty she experienced with P1. One of F's challenges was to let P1 understand the principles of system dynamics modeling.

  Because it let me feel insecure… And I think because this participant (P1) was older and I also experienced her authority… I know that I knew more about this subject (system dynamics) … but I have this feeling of… I am more like the

person that does the internship and she is the boss. Yah, it makes me like struggle between "okay I'm right" but I can't…" I have to find a way to show her but not to insult her…

… I should not feel like that but I still feel like… Yah, I'm not in the position to kind of teach them something.

…We should not act as experts but sometimes when you know (what participants says is wrong in terms of methodology)… Since she has this little knowledge and… she was pretty sure about she was saying. That was what makes it difficult.

…I don't know what kind of position she (P1) had in the organization, but she was very present always… and in the center of the tension… and yes she was very engaged… but sometimes it was too much engagement… It gave me a feeling of "Okay, I want to do it this way and we do it this way now."

- In addition, F elaborated upon the feeling she had in this difficult situation. She thought she didn't make up anything that was not from the group, and she was fine if the group wanted her to revise the model, but she was irritated that P1 couldn't give the reasons underlying her comments on the model.

(This situation) is more this feeling of "how can you not believe in it (the model)," because it is totally based on what you told me… It is just the appearance is a bit different… we didn't make up anything that they didn't tell us, but it was definitely a protective mode, I think.

Because for me it was… Yah, then where is the point of this criticism? Is it just it looks big or because there are too many variables? That was more the thing than why made me angry… I'm completely fine with someone telling me (to revise the model).

D. Theory-in-use of the facilitator

- Values
  - To prevent P1 from generating negative feeling
  - To minimize directly telling the group what I think
  - To maximize the group's understanding of the model

- To strive for the success of the project

- Assumptions
  - If I tell the group directly what I think about the model and modeling, I would get into the expert mode.
  - P1 wants to teach me something because she thought she knows my methodology
  - If I tell P1 directly that what she thinks is not correct, she might feel insulted.
  - If I don't address P1's comment, she might not have ownership of the model.
  - If P1 loses ownership of the model, it would be a failure for me.
  - Although I thought the model is correct, it might still need to be revised.
- Action Strategies
  - Ask questions to understand the group's ideas about the model.
  - Convey what I think about the model and modeling in an indirect way.

Appendix 10.6: Analysis of the Case 6

A. Context

A project was initiated in the government sector to investigate a public issue. The facilitator (F) conducted an exercise called parameter exercise, where the parameters used in the model were listed in a sheet and the participants were asked to fill out the sheet. And the participants raised questions about the exercise, inducing a discussion in the session.

B. The two-column

Thoughts and feelings		Actual conversation	
1	This is a common response. People always say that. It is good for people to realize that there are some things as simple as numerical values that they don't know and that their knowledge is interdependent.	2	P1: We can't do this exercise. We don't know the number for this parameter. We don't have the expertise. P2 has the expertise and knows the number.
3		4	F: We recognize that this is a difficult exercise. People understand different parts of the system, so it's important that you give your best try to give us what you know and to tell each other what you know about the whole system. Please do your best and try not to leave anything unfilled.
5	This is an important comment, and we need to draw it out more fully. We need to make it public and we need to understand what he's saying.	6	P2: You can't write down that number. You can't ask us write down that number.
7		8	F: Why do you say that?
9	This person is trying hard to raise something which is important to	10	P2: Because that number does not exist. It is an invalid exercise.

Thoughts and feelings		Actual conversation	
	them and my job is to help him say what he's trying to say as completely as possible and honor what he's trying to say.		
11		12	F: Could you please say more about why you say that?
13		14	[The Facilitator draws other participants into the conversation.]
15	He is trying to say that we are telling them what numbers are important. It is an ownership issue. I have to keep the ownership with the group and not to get caught in defending the exercise.	16	P2: I am in charge of the database that gathers all the information relevant to this, and the number doesn't exist, so you are dealing with fiction. You're making this up. This whole exercise is based upon non-existent fiction and I know that because I am the number guy. I have the expertise. This exercise can't go on. This exercise is illegitimate. We are not talking about thing that is unreal.
17		18	F: Wait a second. We didn't make up these numbers. They are from the board. [Turn to the model on the board] This, someone in the room generated this variable, and this variable is an important driver of total cost. From all these feedback loops going to this variable, you told us this is important. We didn't tell you this is important. Someone in the room made up this variable. It wasn't us. Where did this (variable) come from?

Thoughts and feelings		Actual conversation	
19	This problem is being resolved. This is a good conversation. This is one of the best conversations of the day. They're coming up with a solution that respects the power structure of the group. It's legitimate. It's civil. P2 is being heard. Other people are making important points. They're changing their data information system. Things are going in the right direction.	20	[A discussion ensues among the participants. During the discussion the Facilitator facilitates the conversation and makes a record of what is being said. As the discussion unfolds, it turns out that P2 doesn't mean that the variable is not real but that the data for the variable is currently not calculated. At the end of the discussion, the meeting owner (the governor secretary) asks P2 if he can calculate the number and bring it to the meeting next time, and P2 agrees.]

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session, and the numbers indicate the places in the two-column table from which the account was derived.)

- The facilitator (F) conducted an exercise called parameter exercise, where the parameters used in the model were listed in a sheet and the participants were asked to fill out the sheet.

- A participant (P1) said all the participants except another participant (P2) were not able to estimate the values due to lack of expertise (1). F thought that it was a common response and that it was good for people to realize the limit and the interdependence of their knowledge (2). Therefore, F said that he recognized the concern and encouraged the participants to do their best (4).

- P2 said F couldn't ask them to write down the number for one parameter (6). At this moment, F thought his comment was important and he needed to fully understand what P2 was saying and to make it public (5). Therefore, F asked P2 why he gave that comment (8).

We're just picking up on what he's saying… and actually encouraging him to say more. So, he was not attacking, and we were just drawing that out.

- P2 said the reason was that the parameter didn't exist (10). At this moment, F thought that P2 was trying hard to raise something important. Besides, F thought his job was to help P2 express what he was trying to say as completely as possible and honored his opinion (9). Therefore, F encouraged P2 to say more and drew other participants into the conversation (12, 14).

…I make the assumption that P2… has a legitimate point to make, and my role is to help him make that point, and to help him find support in the group, or if what he's saying is disputed in the group, have that dispute come out in a civil conversation.

Civil discourse has respect, so I always respect the participants and one of the things we always try to do is to have the participants respect each other. To not speak from anger or arrogance… You listen and you hear each other… active listening and all of those kinds of things.

- As the conversation unfolded, P2 said that it was the facilitation team who made up the exercise and questioned the legitimacy of the exercise (16). At this moment, F considered what P2 said an ownership issue, and he thought that he had to keep the ownership with the group and not to get caught in defending the exercise (15).

Most difficult situations revolve around one or more principles that we have about how the group should work. One principle is that we're in charge of the process, and the group is in charge of the substance and when that gets violated. When they think that we're adding substance, we get into trouble; or when someone in the group tries to seize process, we get into trouble. Another way that a group can get into a difficult situation is when (the group lose the) ownership of the artifacts.

So, I had to go through a critical diagnosis saying, "What's going wrong here?" And my diagnosis was it was ownership… that P2 was trying to say, "You guys are telling us what numbers are important." So I turned it into an ownership issue.

A defensive way says I'm arguing with the group that something is correct… We can explain what a stock is, or we can explain what a positive link is, but we can't defend it.

I have no right to say that anything is correct in the model as a facilitator, because the only people who know that is substantively correct is the member of the group.

- Accordingly, F directed the participants' attention to the model and clarified that the parameter was originally from the participants but the facilitation team; moreover, F asked the group where the parameter was from (18).

What I was trying to do was to convene a discussion with the board.

I wanted to draw attention to this artifact, this boundary artifact which was in front of them and say, "Okay, what about this boundary artifact? How are we going to deal with that?"

- A discussion ensued among the participants. F assisted in the group's conversation and recorded what was said, and it turned out that P2 didn't mean that the variable was not real but that the data for the variable was not calculated in their usual practice at that moment. At the end of the discussion, the governor secretary, who was the meeting owner, asked P2 if he could calculate the number and brought it to the next meeting, and P2 agreed (20). In addition to supporting the group's conversation, during the discussion the facilitator kept observing and assessing the quality of the conversation (19).

P2 was defending the integrity of his dataset, which is what he should be doing.

…It actually is that P2 and other people in the group haven't had a clear communication, so the issue is to… (have) a productive conversation, between P2 and the other people in the group to arrive at a resolution.

Use the power structure in the group, so there was a governor secretary… When it became clear what was going on, then the high status, high power person in the room solved the problem.

D. Theory-in-use of the facilitator

- Values
  - To keep the group's ownership of the model
  - To maximize the productivity of conversation
- Assumptions
  - The participant (P2) has a legitimate and important point to make and is trying hard to do so.
  - It is the group but not the facilitator that knows whether the model is substantively correct.
- Action Strategies
  - Ask P2 to say more and draw other participants into the conversation.
  - Explain that the parameter is not made up by the facilitation team by referring to the model and convene a conversation among the group members on the parameter.
  - Use the power structure in the group by letting the person with high power to solve the problem.

Appendix 10.7: Analysis of the Case 7

A. Context

A group model building exercise was conducted in an organization. The difficult situation happened in the model conceptualization phase, where the facilitator was facilitating the construction of causal-loop diagram.

B. The two-column

Thoughts and feelings		Actual conversation	
1	[Feels difficult] This is really messy. I'm not sure where we are going to go from here. I don't have time to step back and try to find the loops. It is tough to be a facilitator in the front of this room because all the eyes are on you.	2	[The facilitator starts facilitating the participants to build the causal-loop diagram. Since not all the variables are well defined, some are soft variables and some are ratio variables, making each variable linked to many other variables.]
3		4	[P1 stands up, moves to the wall and moves the variables around. Besides, P1 explains to other participants why she moves the variables. Other participants respond to P1 and have discussion. At this moment the facilitator quietly moves to the back of the room.]
5	I am glad they are working on it by themselves. This give me time to sit at the back so that I have the time to think about what the key loops are. I identify three loops. [Feels relaxed.] I can close the session, because we have some loops and they have some experience with the group model building process.	6	[The participants have discussion on how the variables should be linked to one another.]

Thoughts and feelings		Actual conversation	
	The energy is low because they have talked to each other quite some time. It is time for me step in again.		
7	I want to justify why I step back.	8	F: [Comes back to the front of the participants] Group model building is messy as I promised at the beginning. You have just experienced that. I deliberatively sit at the back so you can talk to each other and experience the complexity
9		10	P: [Laugh]
11		12	F: [Explains the loops he just identified] What do you guys think? Do you agree?
13	[Feels relieved] We are going somewhere. It will not be a failure. I have confidence to move on.	14	Most Participants: [Nod their heads] That is what is happening.

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session, and the numbers indicate the places in the two-column table from which the account was derived.)

- A group model building exercise was conducted in an organization. At the beginning of the model conceptualization phase, the facilitator (F) started facilitating the participants to build the causal-loop diagram. Since not all the variables were well defined, this made each variable linked to many other variables (2). At this moment, F got a sense of difficulty; he felt the map was messy and was not sure where they were going. F thought he didn't have time to step back to find the loops and thought it tough to be a facilitator in the front of the room because all the eyes were on him (1).

It was difficult because to make sense of the causal link in real-time with so many opinions when the variables are not well defined. It was under time pressure to come up with some meaningful loops.

- At one moment a participant (P1) approached the wall. She started a discussion with other participants while moving the variables around. After P1 started the discussion, F quietly moved to the back of the room, and the participants kept discussing how the variables should be linked (4, 6). F felt glad that the group had discussion on their own, as it allowed him to have time to identify loops (5).

Not really (thought about what to do if P1 didn't approach the wall) then, but now I think probably I will take a break.

I felt like I was playing two roles at the same time. I was facilitating the discussion, which was helping people to see linkage and drawing it on the map, and the other role was stepping back and seeing the pattern. I think normally you should have two people, right? One is at the back as modeler, and the other one is at the front, but I was playing two roles at the same time.

(The intended consequence of my stepping back is) to see the pattern. To see the loop. To give me some time. To think.

- After a while, F identified three loops, which made him more relaxed. And F thought he could close the session. In addition, F noticed that the energy of the group was low after having discussion for quite a while, so F thought it was time to return to the group (5).

- F came back to the front of the group. With the intention of justifying his stepping back, F said to the group that the reason why he sat at the back was to let them to have discussion and to experience the complexity (7, 8). The group laughed (10).

(What made me wanted to justify my stepping back was that) I didn't want to show I didn't know what to do… Like I want to maintain a professional image. Expert image. And I didn't want them to sense that my internal struggle of not knowing… not able to see the pattern, so I want to play the cool… I want them to think that I did that deliberately.

…I'm just reflecting on if I would have been more honest and more authentic, what will happen. And I think one effect it will have is I will create a more of a learning space that I shift from an expert to a co-learner… and then maybe they will as a result step up even more to share, solve the problem. That is the up side… Now the risk will be they lost confidence in me… So that's why I tried to play cool and not showing that. But I think in reflection this is interesting. I think I do aware I have an expert mindset. I see myself not just a facilitator but as an expert, meaning I should have come up with "I know better in terms of systems mapping," "I should be the one who can help make sense of the messy map." My assumption is: if I don't step in and play that role, they cannot do it… so I needed to play that role, and I needed to let them see that I was capable of playing that role so they had confidence in me and also in the method.

- Afterwards, F started explaining the loops he just identified and asked the group what they thought and if they agreed with his explanation (12). The group replied that the loop was functioning in the company (14). F felt relieved, since he thought they were going somewhere and the session would not be a failure (13).

Failure is we are going nowhere… it is just a bunch of variables but they are not in a coherent manner, like we are not able to close some feedback loops to have meaningful… to have interesting structure to explain the problem.

…If it ended up a messy map then they would say… not only the method is not useful but I am not good. So it became a personal failure. So I think there is a lot of at stake for me personally, and that is more of a deeper emotional part… whether I was… trying to hide or trying to move forward… to make sure that I wouldn't be seen as a failure.

- During the discussion session with the researcher, F had a reflection on setting the right expectation at the beginning of the session as an alternative. And he also deliberated upon the feasibility.

So it let me thought about setting the right expectation in terms of how they see me and how I see myself. If I say at the beginning… "I am a co-learner", "this is a messy process", "we may not get to the answer", "it takes time", "we will likely, most likely get stuck somewhere" and "if that happens I will share with you that I

also feel stuck so we can collectively think about how we can move forward." If I have said something like that at the beginning and they all agree that's the role that I can play and should play. It will give me a safer space to be more authentic and also… which could create a very different space, because people… maybe will step up more and also I may also feel more relaxed to be able to actually facilitate better.

Yes. I think it is possible when you have enough trust with the sponsor, so … the sponsor need to know that they should not see you as an expert consultant. They should see you as a process consultant. Your primary job there is to create spaces for learning and showing your weakness authentically is important method to create that space. If the sponsor knows this, it will be easier for you to actually do it… so instead of judging me, they know that that's part of the process, learning process. And if this can happen when you have those shared understanding with the sponsor at the beginning before the workshop... And in real time in the process other people may not know that but at least you know you have the backing and trust of the sponsor. It allows me to do that easier, and this will allow me to really be able to create a space to trust the group, right? "I'm not the expert. You guys are. Let's collectively think about how we can solve this." And something will still come up. I believe… this is a deeper assumption: if I truly trust the… I truly let go and let the group… tapping the group wisdom, something will come up from the session, and then people can then reflect "oh, what you did at the beginning by showing your vulnerability is actually very helpful." Even the suspective will reflect and say "thank you for doing that."

D. Theory-in-use of the facilitator

- Values
  - To maintain a professional image
  - To prevent the group from knowing my internal struggle
  - To increase the participants' confidence in the method
  - To come up with a map with meaningful structure
- Assumptions
  - If I don't step in and play the expert role, the group cannot do it.
  - If the group knows my struggle, I might lose my professional image.
  - If the session ends up a messy map, the group would not only consider the

method not useful but also think I am not competent.

- Action Strategies
  - Quietly move to the back of the room to make sense of the map when the participants start to have discussion on their own.
  - Explain to the group that my stepping back is a deliberate action while it is not.
  - Explain the loops I identify and ask the group what they think and if they agree with my explanation.

Appendix 10.8: Analysis of the Case 8

A. Context

A project was initiated in an organization to study the career development of two target groups. This difficult situation happened in the first session where the reference mode behavior was introduced by the facilitator (F).

B. The two-column

Thoughts and feelings		Actual conversation	
1	[Feels confident] I know what to do. I have prepared this. It feels okay.	2	F: [Presents reference mode on the screen] Let's have a look at the reference mode behavior. You can see that the inflow of the group, the flow-through, is not equal, and the outflow is like that.
3	[Feels irritated] It is a simplistic explanation. Just let him express his opinion.	4	P1: Yah, that is just because **Group A** individuals decide to follow more difficult track.
5	[Feels happy] The group process was already correcting P1's false assumption. As a facilitator I cannot do that.	6	P2: No, that is not the case. **Group B** individuals have better performance in any tracks than **Group A** individuals.
7		8	[The facilitator moves to the number of a specific group of employees]
9	[Feels a small shock] Too bad. He is probably right. I should prevent this from undermining our credibility.	10	P3: Hmm, these figures don't match. I see eight **Group B** individuals but in my department there are already nine. It doesn't matter to me. I just wanted to say.
11	[Feels irritated] He found another occasion to oppose this process.	12	P1: Yes, it does. It is really important
13	[Feels shame and vulnerable] I want to explain it was not my mistake.	14	F: We receive these figures from personnel department. [Looks at the representative of the

Thoughts and feelings		Actual conversation	
			department.]
15	[Feels grateful] It took away the tension. She took responsibility for solving this.	16	P4: Oh that's bad if they don't fit. I will check it again.
17	[Feels in control] I took control again.	18	F: Thank you P4 for checking them. We will come back to this issue in the next meeting with adapted figures. We can just continue this conversation with all the other figures that we agree about.

Note: After the session the facilitator had a reflection and thought about how she could respond differently when the mistake in figures was pointed out:

I feel shame that I immediately said "it is from P4's department", "we are not responsible." It is like we are not taking the responsibility. I should have said something like "okay we thought we have the latest figures. Of course it is not the case we will correct it," without pointing to P4's department.

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session, and the numbers indicate the places in the two-column table from which the account was derived.)

- A project was initiated in an organization to study the career development of two target groups.
- In the first session, the facilitator (F) presented the reference mode and pointed out the issue (2), and she felt confident because she felt prepared and knew what to do (2).
- After F pointed out the issue, P1 responded by saying the reference mode was caused solely by the individual choices of the target groups (4). At this moment, F felt irritated and thought the explanation was simplistic; nevertheless, F decided to let P1 express his opinion (3).

(The reason why I felt P1's explanation was simplistic is) because what happens with groups was explained by individual choice of lot of individual people, and I

have been in the systems thinking for a long time, so I cannot believe that what people do is only because of their own choices. It is always influenced by what was in the system around them.

About this issue, I have a lot of knowledge of course and that may be a disadvantage here as well, but even without having that I just don't believe in explaining things from individuals only, an individual perspective only.

(The reason why P1 said that might be) because people were shocked about the reference mode behavior… and I see it as a defensive routine… At that moment, I didn't think '"this is a defensive routine..." But when I reflect upon it I can understand it. Things go very fast.

I think that (the feeling of irritation) is a kind of impatience in me that people don't understand the systematic perspective… It is not good, but it is how I was at that moment.

I felt irritated (about this lack of understanding] but it is still important that all participants are able to express their understanding of the problem. When there is a serious effort, when the expression of their ideas is not like offensive, they are allowed to share it with the group.

- P2 disagreed with P1's response and explained the reasoning behind the disagreement (6). Hearing what P2 said, F was happy and thought the group process was correcting P1's false assumptions (5).

As a facilitator, I am responsible for the group process... If I would try to influence the content… we were trying to give meaning to the reference mode of the behavior. If I would do that, I would be lecturing rather than facilitating. So, I was aware of my knowledge about it, the same knowledge that makes me irritated, because I was impatient that they didn't understand it yet, but I have to correct myself, remain neutral and let them discover themselves how to understand this issue… how this issue can be explained, how you can model it or understand it.

Neutrality is that a facilitator should allow group to understand the complexity of the problem in its own pace... and with their own shared mental model of the group. So, with neutrality I mean as a facilitator, I cannot influence the content of the knowledge they are entering, they are developing.

- Afterward, F presented another slide, and P3 pointed out a mistake in the figures, but he said it didn't matter (8, 10). At this moment, F felt slightly shocked that there were mistakes in the figures; besides, she thought it was too bad and the mistake should have been prevented so as not to undermine the facilitation team's credibility (9).

What makes me think it was too bad? I had the feeling that P1… that he was trying to block the conversation about the issue… If someone like that is in your group you should not make any mistake because any small mistake will be a target of complaining and objecting or even boycotting, and then we are not talking about the content.

- P1 disagreed with P3 (who had said it did not matter) by saying the mistake was important (12). This statement made F feel irritated as she thought P1 found another occasion to oppose the process (11).

- Seeing the mistake, F felt ashamed and vulnerable and wanted to explain it was not her mistake (13). Therefore, the facilitator said the figures were from the personnel department (14), and the head of the department, P4, said they would check it again (16).

It was making us vulnerable as we (as facilitators) where defending ourselves about the fact that we showed figures with mistake. So, I tried to defend ourselves because of the threat of our reputation… I'm not proud (about my reaction) because that way the HR department had to take responsibility for the mistake, and it should have been better if we just took the responsibility together rather than that I 'blamed them' for delivering the wrong figures.

Of course, it is better for having a professional image if all the figures are right of course, but I have learned that mistakes like this happen very often, because not all the departments have provided all the information to the personnel department. Personally, I don't mind too much about my image, but if I have a hard time (with a group) then I more quickly try to defend myself than when I feel relaxed, and this was one of the most difficult group processes I ever entered.

- P4's response made F feel grateful, as it took away the tension, and she thought

77 P4 took responsibility for solving this (15). Hence, F said thanks to P4 and
78 suggested that they continue conversation on the part of the figures upon which
79 they had agreement, and she felt she took control again (17, 18).

D. Theory-in-use of the facilitator

1. When P1 gave his explanation about the reference mode behavior

- Values
  - To ensure people's opportunity to express their opinions
  - To minimize my influence on the content of discussion
- Assumptions
  - People's behavior is always influenced by the system around them.
  - Simply using individual choices to explain people's behavior is a simplistic explanation, which does not take the system of which they are part into account.
- Action Strategies
  - Correct myself and allow P1 the opportunity to express his opinion.

2. When a mistake in figures is pointed out

- Values
  - To keep my credibility and reputation
  - To minimize my mistake
- Assumptions
  - The mistake in figures would undermine my credibility and reputation.
  - Any small mistake will be a target of complaining and objecting for a person looking for opportunity to oppose the process.
  - P1 is looking for opportunity to oppose the process.
- Action Strategies
  - Direct the responsibility for mistakes in longitudinal figures to P4 by saying the figures are from P4's department.

Appendix 10.9: Analysis of the Case 9

A. Context

A group model building exercise was initiated with the human resource (HR) department of a company. The difficult situation happened when the facilitator (F) was facilitating the group to decide the problem they wanted to focus on.

B. The two-column

Thoughts and feelings		Actual conversation	
1		2	F: [Presents the small scale HR-centered question which is about the effectiveness of a HR program] How long has this (program) been in place?
3	The time might be too short to make the exercise meaningful.	4	P1: Six months
5	Maybe the original problem definition is not shared. It is a good learning moment. I want to let them to experience how to come to a shared problem definition.	6	P2: Maybe we have to focus on larger problem.
7		8	F: How would you name the problem?
9		10	[P2 names the problem and explains why it should be the focus. The problem turns out to be a company-level problem.]
11	I want to make sure they know the importance of problem definition and make sure that they choose the question they want to explore.	12	F: What do other people think? Is this the problem we want to focus on? Problem definition is the most important step, because it will determine the boundary of the system.
13		14	[The participants start to have

Thoughts and feelings		Actual conversation	
			discussion with one another]
15		16	P3: Is this the question (the larger problem) we want to focus on?
17	I agree. People may not feel comfortable to examine the effectiveness of the HR program. Because this will be actually examining how they have been performing. Looking at the larger issue may be a safer topic to focus on.	18	P4: Yes. If we only focus on small-scale level it would be too limiting.
19	Good question. I want to make sure they are not constrained by the concern about insufficient data or not enough right people when choosing the company-level problem.	20	P5: Do we have enough information to answer the company-level question?
21		22	F: Even if you don't have information, we can still do this exercise by sharing your perspective. We can see how HR team sees this problem. It will not be complete. You will need to engage other stakeholders to explore this problem, but we still can explore from HR perspective.
23		24	[Most participants nod their heads.]
25	It is time to move on. I need to help the group to move on.	26	F: Sounds like people are more interested in having company-level problem, is that okay to choose this as a problem for us to move on? [Looks around.]

Thoughts and feelings		Actual conversation	
27		28	[Most participants nod their heads.]
29	Let's make sure what we want to focus on, because the company-level problem was not clearly defined when it was proposed by P2. It was just a concept.	30	F: How would you name the core variable (for the company-level problem)?
31		32	[The participants identify the core variable and then move on for the rest of the exercise]

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session, and the numbers indicate the places in the two-column table from which the account was derived.)

- A group model building exercise was initiated with the human resource (HR) department of a company.

- At the beginning of the session, the facilitator (F) introduced the original problem, which was about the effectiveness of the HR program; F then asked how long the program had been in place (2). One participant (P1) said six months, and then F thought six months might be too short to make the exercise meaningful (3, 4).

  Ideally we should have defined the right problem definition beforehand, but now in real time we are adjusting the problem definition in real time. So the challenge is: Do we have enough time to define an appropriate question?

  My internal objective is to let them experience the value of group model building. So make sure the problem we choose… there is sufficient history and dynamic pattern, so they can see the power of systems thinking.

- Another participant (P2) made a suggestion, which was a company-level problem (6). Hearing the suggestion, F thought maybe the original problem definition was not shared; besides, he also considered it a good learning moment for the group to experience how to come to a shared problem definition (5).

Just leading through this process by asking them questions and having them talk to each other to come up with a problem definition that they all agree on.

- In addition to making sure the group knew the importance of problem definition, F also wanted them to choose the question that they wanted to explore (11). Therefore, after having P2 name and explain the problem (8, 10), F asked other participants for ideas and explained the importance of problem definition (12).

- Then a discussion ensued within the group (14). A participant (P3) asked for others' opinion (16), and another participant (P4) supported focusing on the company-level problem, as focusing on small-scale level (the HR program) might be too limiting (18). Hearing what P4 said, F thought the group might not feel comfortable to examine the effectiveness of the HR program, as that would be examining how they had been performing; therefore, F thought it might be safer to look at the larger issue (17).

(That the group might not feel comfortable) was just my internal interpretation… The reasoning could be people don't want to… examine the effectiveness of the HR program because they are the ones who are running it. If we go through the process and they find out it is not effective, essentially it's a sort of self-criticism.

I guess I didn't (ask what P4 meant by "limiting"). Maybe I didn't. I'm not sure.

"Safer" means that it is not personal… It's not HR-specific or to the people in the room.

You know, now I thought about it. It was actually a wrong decision. So at that time I didn't want to touch on too sensitive topic… and facilitate that on my own in such a short time. So I want to choose a topic that is safer to work on. It was more for my own sake. But, yah, I guess I may think about this.

I now think I should have chosen the more personal, sensitive topic… and the reasoning is: in reflection, at the end of the day, …people had a sense that it (the map) was a bit general and it was about the system, not so much about them. And that's probably because of the criteria I chose was safer, larger, impersonal problem… The awareness I have now is we should choose a topic that is personal, right? In the sense of the people who are doing the mapping should see themselves in it and their action in it in a way. Especially when there are those

"pain points"… those are opportunities for them to really have awareness and "aha" moment on how they could have done differently.

- In response to what P4 said, another participant (P5) raised the concern about the limited information of the company-level problem (20). F considered P5's concern a good point and wanted to make sure the group was not constrained by the concern about insufficient data or not enough right people when choosing the company-level problem (19). Therefore, F explained that they could still explore the company-level problem from HR perspective despite the limited information (22). Hearing what F said, most participants nodded their heads showing agreement (24).

- Because of the concern about time, F thought it was time to help the group to move on (25). Mentioning that he noticed the participants were more interested in the company-level problem, F suggested that the group focus on that problem, and the group agreed (26, 28). As F thought the company-level problem was not clear enough, he asked the group to identify the core variable for the problem (29, 30). Afterward, they moved on to the rest of the exercise (32).

D. Theory-in-use of the facilitator

- Values
  - To choose a topic that is safer to facilitate on my own
  - To ensure the group choose the problem they want to explore
  - To complete the exercise in time
  - To find an appropriate problem definition with long enough history
- Assumptions
  - The group might not feel comfortable to examine the effectiveness of the HR program.
  - Working on the company-level problem might be safer.
- Action Strategies
  - Ask the participants for their opinions and agreement
  - Unilaterally protect the group and myself by addressing the participants' concerns that may prevent them from choosing the safer topic (company-level problem).

Appendix 10.10: Analysis of the Case 10

A. Context

A group model building project was initiated in an organization. The problem was already defined before the session by the facilitator (F) and the gatekeeper who contacted the facilitator, and the facilitator intended to start model conceptualization in this session, while some of the participants (P) suggested that they drop the original problem definition and switch to other topics.

B. The two-column

Thoughts and feelings		Actual conversation	
1		2	F: I understand your problem is Area A.
3	(Surprised) Oh my god. What's going on here?	4	P: That is not our problem. That issue will not be important anymore. Just drop it. We need to focus on these two areas and save our time.
5	Okay, what am I going to do here? As a facilitator, I have to do something. It is a kind of embarrassment if I cannot come up with a good satisfying solution. Are they sure there is no connection?	6	[A discussion ensues among the participants. They talk about whether they are going to build the model.]
7	If they don't want to do, it is still fine.	8	F: Are you sure if you drop this strategic area (Area A) this will not affect the other two strategic areas?
9	They are not sure. They are kind of saying, "We are not sure about it. Maybe we should try this." They are moving toward a tipping point. There	10	P: Hmm, good questions. We don't know.

Thoughts and feelings		Actual conversation	
	might be a ground for GMB.		
11		12	F: Okay, if you don't know, why not build a causal-loop diagram and find out whether there is connection between the three?
13	(Relieved) Phew.	14	[The participants agree with the suggestion and the model building process starts.]

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session, and the numbers indicate the places in the two-column table from which the account was derived.)

- A group model building project was initiated in an organization to explore a **Strategic Area A**, which was defined by the facilitator (F) and the gatekeeper. In the first session, F intended to start model conceptualization.
- At the beginning of the session, F was asking the participants for confirmation about whether **Strategic Area A** was what they wanted to explore (2).
- Some participants said **Strategic Area A** was not important any more and suggested that they focus on other areas that were more important (4). At this moment, F was surprised and wondered what was going on (3).
- A discussion ensued among the participants, and they talked about whether the model should be built (6). During the discussion among the participants, F was thinking what he could do to address the situation, and he thought it would be an embarrassment if he could not come up with a good satisfying solution (5).

Well, not the solution to their problem in the sense of what to do with their fleet, but a good solution in terms of how the process should move forward.

As a facilitator, you're responsible for the process, not for the content.

They will think you're not competent. You're not a good facilitator because you don't know what to do. That's the embarrassment, I think.

- Afterward, he came up with a question about whether the participants were sure there was no connection between the original problem (**Strategic Area A**) and the other areas suggested by some of the participants (5).

  "How are they so sure that these are not interrelated?" You come up with the question partly because you're a systems thinker, so you think in whole, while most people don't do that. They think in parts, you know.

  You don't have the time to think of different plans. This happens in 2, 3, 4 minutes.

- Therefore, F asked the participants if they were sure that dropping **Strategic Area A** would not affect the other areas that were considered more important by some of the participants (8). At this moment, F thought it was still fine if they didn't want to have the group model building session (7).

  (By asking this question I wanted them to make a decision that was) unequivocal.

- The participants responded that they didn't know (10). Because of the response, F thought there might be a ground for group model building (9), so he suggested that the participants investigate whether there were connections between **Strategic Area A** and the other areas by building a causal-loop diagram (12). The participants agreed with F's suggestion and started the model building process. At this moment F felt relieved (14).

D. Theory-in-use of the facilitator

- Values
  - To make the process move forward
  - To help the group make unequivocal decisions
- Assumptions
  - As a facilitator, I am responsible for the process, not for the content.
  - If I cannot come up with a solution that moves process forward, the participants would consider me incompetent.
- Action Strategies
  - Pose questions to help the group think clearly and make decisions on whether to enter the process of group model building.

Appendix 10.11: Analysis of the Case 11

A. Context

A group model building project was initiated with the board members of an institute working on an area of social policies. The following situation happened in the first session intended for model conceptualized.

B. The two-column

Thoughts and feelings		Actual conversation	
1		2	F: How do we conceptualize appropriate **Social Policy Area** in the country?
3	Oh, we make a mistake. We failed, because we don't have a clear starting question.	4	P1: Well, how broad do you want it, internationally or in the rooms of the practitioners? What level of abstractness do you want to talk about this question?
5	It is sort of loss of face to the facilitator, as it indicates a bad connection to the gatekeeper apparently.	6	P2: We just had a study. We fail to give it out and send it to the facilitator.
7		8	[The session is then started on the basis of what is in the report.]
9	This is very arrogant.	10	P3: The purpose of this session is not to map the whole system in the country, is it? That's not really interesting, because I can sketch it for you on the spot.
11		12	[F discusses with the participants on the output of the project and they find a middle ground, answering the question in a slightly different way. Afterward F starts facilitating the modeling process.]

Thoughts and feelings		Actual conversation	
13		14	P3: [Talks about his understanding of the question]
15		16	F: [Summarizes what P3 said] Did I understand you correctly?
17	[Confusion] What does his answer mean? Does he agree or disagree? [Feel annoyed] You should be neutral and entirely get rid of the feeling.	18	P3: Sure. Of course. But that is not the whole picture.
19		20	F: What else is there?
21		22	P3: [Talks more about the question]
23	Okay he is never going to say “this is correct.” Some of what he said is a bit separated from model building.	24	[This kind of conversation (F summarizes and asks for confirmation; P3 doesn't give a explicit “yes” or “no” answer; F asks P3 what else is there; P3 talks more about the question) happens multiple times between F and P3.]
25	The other participants are waiting and impatient. I need to attend to them.	26	[Other participants lean forward, move their hands, and open their mouth.]
27		28	F: [Summarizes what P3 said] Can I summarize like this and this and this?
29		30	P3: Yah, sure, but that is not the whole thing.
31		32	F: [Notes the summary on the board and then turns to other participants] What do you think?

Note: After the session the facilitator had a reflection and thought about how he could address P3 in a different way:

I should have told him “Okay, you think you know everything about the issue? Well, tell me, and I will just map it.” Because if what he said is true, that would

mean all the other five participants in the room would agree to his idea of how the system was. And there will be no disagreement about any of the variables or relationship in the model. I think the chance that it will materialize is very small. You could have taken up the challenge, and went along his suggestions and then see that he doesn't have all the knowledge. But it is questionable. Did I do that because he is a difficult participants or it was in the best interest of the goal of the session.

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session, and the numbers indicate the places in the two-column table from which the account was derived.)

- A group model building project was initiated with the board members of an institute working on an area of social policies, and a session was facilitated by the facilitator (F) for model conceptualization.

- When F started the session with the starting question, a participant (P1) asked F about the level of abstractness of the question (2, 4). At this moment F thought the facilitation team made a mistake, as they didn't have a clear starting question (3).

- In response to P1's question, another participant (P2), who was one of the gatekeepers of the project, mentioned that there was already a study whereas it had not been sent out before the session (6); F thought it was a loss of face, as it indicated a bad connection with the gatekeepers apparently (5). Afterward, the session started with the new question based on the report of the study (8).

Well, the facilitator is there to design the session, to think of the design that helps the group to achieve the goal, and to steer the process in a way… so (P1's response) feels the facilitator hasn't done his job, right? And especially when P2 said "Oh, we forgot to mention. We did the whole study on this. And we could have been much more specific about the question we ask." Well, that's not good practice I think.

- Another participant (P3) questioned the purpose of the session and said that he could sketch the whole model on the spot if the facilitator wanted (10). Hearing

P3' statement, F thought it was arrogant (9).

Well, I'm not clear if his intention is to show that he knows so much, or his intention is to avoid wasting time so that they can spent the time of the group on the real issue, which would be a better help to the client organization. The first interpretation is a negative one, and the second interpretation is the positive one, and I don't really know.

- In response to P3's statement, F had a discussion with the group and found a middle ground that allowed the question to be answered in a slightly different way, and then F started facilitating the group to conceptualize the model (12).

Well, if he said "we don't want to map the current situation of the social policy", that was very close to the goal of the session… so if he then said "We really don't want to do that, do we? Because it is too simple, right? We all know this." Then I feel that this is so close to your original goal of the session that we need to find a way to actually do something which is in line… he refused to do something… I can read it like that… That is his comment I think, but I have to find a way to answer the question the client wants to answer while avoiding the guy said "I don't want to do that."

- After they started conceptualizing the model, P3 explained his understanding of the question (14), F summarized what P3 said and asked for his confirmation (16), while P3 didn't answer yes or no (18). At this moment, F felt confused, as he didn't know whether P3 agreed or disagreed what he summarized; in addition, F felt annoyed; however, F thought he had to be neutral and actively get rid of the feeling (17).

(Being neutral is) give people the same level of attention to everyone, and treat their contribution in the same way.

I think I could dislike someone in the room because he is arrogant, because I think he was arrogant, and then still try to keep the same level of attention…

Actively trying to avoid those negative feelings… would mean in the break or so, you go and speak to that person in particular. Because maybe it turns out that this is a very normal person or he has other concerns and maybe also because

that person can talk to you in the break they feel a little bit more recognized so they don't behave so arrogantly any more in the next phase after the break…

What that (speak to P3 in the break) would bring to me is that it eases the tension in the whole session, that I don't have to keep on worrying am I doing the right thing because I really dislike this guy… am I, you know, balancing that enough? Or am I not over doing it? Because I dislike this guy I spend even more time on him. If I would have no particular liking or disliking for everyone in the room it makes life a lot easier. But that's only for me. But also for the participants if this guy feels he is now more recognized because he had a talk with the facilitator in the break then maybe it doesn't have to be so on the foreground any more in the real session.

- In response to what P3 said, F asked P3 "what else is there" (20), and P3 talked more about the question (22). This kind of conversation happened multiple times, where the facilitator didn't get P3's yes or no as response to the facilitator's request for confirmation (24).

- After several rounds of conversation happened between F and P3, F thought P3 was never going to said whether the summary was correct or not; besides, F thought some of what P3 said was a bit separated from model building (23). Moreover, F noticed that some of the other participants leaned forward with their bodies, raised their hands, and opened their mouth, so he thought they were waiting and impatient and hence he needed to attend to them (25, 26).

… It seems at the moment that he wanted to have a degree of freedom so that he could deny what he just said in the next moment. That's a negative interpretation, but that's almost seemed like that. He just doesn't want to be… like I said he doesn't want to be pinned down to anything, because if it was left less explicit he can come back to it next time again.

I didn't (think of asking what P3 meant by his response). Otherwise I should have tried it on the spot, asking him, "Does it mean you agree with what I said and we should build on that or does it mean you don't agree what I said? Is it wrong or is it incomplete? These are two different things." Sometimes you find those better questions only after the fact I think.

Because also at the same time I was watching all those other stakeholders who didn't get any air time… So I was trying to give them enough attention to.

- Therefore, F asked P3 for confirmation for his summary, while P3 still didn't give a "yes" or "no" to the facilitator's request (28, 30). Seeing P3's response, the facilitator noted down the summary on the board and turned to other participants asking for their ideas (32).

At the same time I realize he hasn't explicitly said "that is right," so that leaves the question open that any time in the process he will say, "Yah, but those things you sketch up there anyway. I don't know if I agree to that." Cause he hasn't explicitly said, " Yes. It is correct. Maybe incomplete but correct." …Because he left it open and unclear, he gave himself freedom to deny it at the later stage, to say, "it's not so relevant."

Allowing other people to talk also means not only that you give them attention but also that you check what the first guy was saying. We don't want to model what he is saying. We want to have the group idea on what is happening, so you need to check.

I don't know if I made it (the airing time issue) explicit in the end. I really don't remember. I can imagine that I would have said "yes, but I would like to turn to other participants now" because that was fairly clear that the rest was waiting, and he would just keep on talking. So I can imagine that I did say that explicitly but I'm sure anymore. It's a long time ago.

- After the session, F had a reflection on the moment when P3 said he could sketch the model on his own. F was thinking whether he should ask P3 to sketch the model, but he also had concern about whether the idea was based on the reason that P3 was a difficult participant or that having P3 sketch the model was the best interest of the group.

I think I mentioned that when we first talked… that I would like to see him presenting that (model) and all the other people in the room, also very experienced stakeholders, very high level, working for a long time in this (area)… that all of them would say "Yah. Yah. This is right. I agree." Fine. I don't think that was possible. But that was more out of a (motivator that) "because he is a difficult

participant indeed and you want to put him in his place," so those are not the best motivators I think.

D. Theory-in-use of the facilitator

- Values
  - To avoid the participant's (P3) withdraw from the session
  - To give equal treatment to the participants and their contribution (being neutral)
  - To maintain the validity of the information going to the model
- Assumptions
  - "I can sketch the model on my own" is an arrogant statement.
  - P3 might not want to stay in the session because he thought the topic is too simple.
  - P3 doesn't want to say whether the summary is correct or not, because if what he says is left less explicit he can come back to it and change it.
- Action Strategies
  - Discuss with the group in order to find a middle ground that allows the question to be answered in a slightly different way. (This strategy is less grounded in the facilitator's action, as the two-column doesn't record what the facilitator verbally said during the negotiation.)
  - Ask P3 to say more when he doesn't confirm my summary.
  - Unilaterally define what P3 means by his response to my request for confirmation ("Sure. Of course. But that is not the whole picture.").
  - Make participants have balanced airing time.

Appendix 10.12: Analysis of the Case 12

A. Context

A research project employing group model building was initiated in an organization. This situation happened in the first session, where the facilitator (F), who was in the research team, asked for permission of tape-recording the session.

B. The two-column

Thoughts and feelings		Actual conversation	
1		2	F: [Introduces the project] I would like to kindly ask you if we are allowed to tape the session. We will use this for research purposes. And we will anonymize any references that we would use.
3		4	Most Participants: [Nod their head] Yes, it is okay.
5	[Feels shocked] I didn't expect it. It never happens. [Feels fear] He made objection and articulated it in such a way. He might be looking for conflict. It is fair not to tape. We should be reliable researchers so we should not force them to be audiotaped if they don't want to.	6	P1: What if I say no?
7	I should behave fair and open, and to be the role model for the group.	8	F: If you say “no,” we do not tape.
9	[Feels irritated] He was supporting his colleague in a negative way. It is not common.	10	P2: I would like to have known this before.
11		12	F: It is how we usually do this. In the interview we normally ask before the conversation starts if it can be

Thoughts and feelings		Actual conversation	
			taped.
13	[Feels relieved] He tried to solve this. I felt supported. [Feels concerned] “Taking care” means sensitive.	14	P3: I will just take care of what I say now.
15	I admire this participant because it is brave to be open, especially in a sensitive context. He is supporting.	16	P4: I am just planning to be as open as I can.
17		18	F: [Explains what is the purpose of taping the session] We will use every thing confidentially. [To all participants] Would you please treat every thing we discuss in the room confidentially?
19	He is making it my responsibility that he is not able to give agreement.	20	P1: If it is that sensitive, I don't want it to be taped at all.
21	This is supportive for the process, but it would give P1 lots of power to stop taping all the time and so boycott the conversation.	22	P5: We just put the tape recorder in such a place that we can stop it when it is necessary.
23		24	F: We have two tape recorders, so that’s complicated. If any one of the participants doesn't want it then we don’t tape.

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session, and the numbers indicate the places in the two-column table from which the account was derived.)

- A research project employing group model building was initiated in an organization, and the facilitator (F) was one of members of the research team.
- After introducing the project, the F asked the participants if they allowed taping (2). Most participants agreed (4), while one participant (P1) asked what if he said

no (6). The response made F shocked, as this situation had never happened in the past; besides, F feared that P1 might be looking for conflict (5).

It was of course also an interpretation of his body language and the way he pronounced this. It was also the fact that he was posing it as a "what if" question, which is like trying out how far he could go. So body language, way he expressed it, and the question may seem innocent, but it may be… it was implicitly threatening—"what if I say no? Let's see what she does now."

Where does this fear come from? It comes from a fear for losing the harmony in the group and this harmony is so important for having a learning process together for being open. We are all vulnerable when reasoning out loud. And we need harmony and a safe area to do so. And from beginning this harmony is threatened. Someone openly tries to oppose that then I'm afraid that the whole process is lost.

- However, F also thought that they should be reliable and not force the participants to be taped. With the intention of being fair, open and the role model for the group, F replied that the session would not be taped if the participants refused (7, 8).

What I mean by reliable is if I ask for permission people should be allowed to say no (to make their deliberate choice). And if they say no I should take it seriously. So reliable means doing what I tell them are the options.

Actually that (being fair, open, and role model) is what I learn is very important in group model building. And I would say any group process if you want the group to be fair and open you should behave like that yourself. Otherwise they won't see it as the best option for their own behavior.

Open is like expressing explicitly how the process will be going and what cognitive dilemma you are facing with the group. And sometimes also expressing what you are seeing in the social dimension of the group. That was open.

Fair? Wow…this fair… Fair is being consistent in doing what you are saying that you are going to do. So, practice what you preach… And what also connects to fair but not in this particular occasion is that everyone will be treated the same. So, it is not only me and you but also the different participants are treated the

same.

- After F replied to P1, another participant (P2) said he would have known the session might be taped beforehand (10). F felt irritated, as P2 seemed to support P1 in a negative way (9).

To be honest, he just expressed what he would like to have. But it felt like an accusation about us communicating not well. So the irritation was the implicit accusation that I felt.

- In addition, F also thought the situation was not common (9). In response to P2's comment, F explained that asking for taping was the research team's usual practice (12).

When I said it is normal, what was my intended consequence? Actually, I was just expressing that I didn't expect this reaction and I don't think we should have written in the e-mail that it would be taped. It is not the regular way of introducing an interview or focus group…

- Afterward, another participant (P3) said he would take care of his words (14). F felt relieved because she thought P3 was solving the situation. However, "taking care" induced some concern, as F thought it indicated the issue was sensitive (13).

- After P3 made his comment, another participant (P4) said he would try to be as open as possible (16). F thought P4 was supporting and admired his bravery to be open (15).

- Afterward, F explained the purpose of taping and asked the participants to treat the discussion in the session confidential (18), and P1 said he didn't want to be taped if the discussion was sensitive (20). At this moment, F thought P1 made his unwillingness to be taped her responsibility (19).

- Another participant (P5) suggested that taping can be allowed at first and be stopped if necessary afterward (22). Although F thought the suggestion was supportive, she was concerned about it would give P1 lots of power to stop taping and hence to boycott the conversation (21). Therefore, F said the suggestion

would be complicated given how the taping was done; in addition, she said they would not tape-record the session if any of the participants refused (24).

He (P5) really wanted to support the process but I had to say no because I thought it would still be bad if I would pursue my own interest rather than recognize the other person's right to object. So, then there is support but I still have to say "sorry, thank you for your suggestion but we don't do it because one person objects."

D. Theory-in-use of the facilitator

- Values
  - To keep harmony in the group
  - To allow the group to make their deliberate choice
  - To maximize the sharing of relevant information with the group
  - To keep consistency between my saying and doing
- Assumptions
  - P1 might be looking for conflict.
  - P1 makes his unwillingness to be taped my responsibility.
  - P1 might boycott the conversation if I accept P5's suggestion.
  - The participants would consider our way of practicing taping normal
  - P2's comment on taping is an accusation about us not communicating well ("I would like to have known this before.").
- Action Strategies
  - Explain the reason for taping and what I will do if the group agree or disagree with being taped.
  - Decide not to tape-record the session as P1 refuses to be taped.

Appendix 10.13: Analysis of the Case 13

A. Context

This is the difficult situation where the facilitator (F) was helping the participants to clarify their objectives for a group model building project. A participant (P1) suggested an additional dimension, while another participant (P2) disagreed.

B. The two-column

Thoughts and feelings		Actual conversation	
1	[Feels comfortable] This is prepared. I am not pursuing my own agenda. I am presenting their agenda and getting their confirmation. I am just a process facilitator	2	F: [Presents the objectives for the session collected from the participants] You as a group identify the objectives of the group model building as striving for more diversity. Most of you referred to **Dimension A**, **Dimension B**, and **Dimension C**. Is that indeed what you are trying to understand?
3	Yes, good idea. Interesting, relevant, and brave.	4	P1: In Germany they are discussing **Dimension C** and **Dimension D**. Let's also include this **Dimension D** because it is relevant as well.
5	[Feels anger, very angry, and feels so sorry that P1 had to receive this negative comment]	6	P2: This is bullshit! We have to look for **X** (an offensive term referring to a specific group of people) and we should get **that person** here. We are creating bullshit. It doesn't make sense.
7		8	[At the moment when P2 gives his comment, some of the participants laugh, some of them utter "oh" and some of them are silent.]
9	I want to try to warn him not to continue this with my body	10	[F remains silent and look and focus on P2 without laughing]

Thoughts and feelings		Actual conversation	
	language.		
11	They become silent because I am openly disapproving and showing that I think there is nothing to laugh about.	12	[All the participants become silent.]
13	[Feels relieved] He is willing to repeat his case. I feel I am supportive to and empathize with him.	14	[P1 explains the reason for including **Dimension D**]
15		16	F: [Nods] Okay, thank you P1. You clearly identify a relevant point. I can feel in the group that there is no consensus that we should include **Dimension D**. So I conclude we will continue on **the original dimensions**. Is that okay?
17		18	[All the participants agree.]

Note: After the session the facilitator had a reflection and thought about how she could respond differently when the P2 gave the offensive comment:

When P2 said "It is bullshit", I should have said "Sorry it is offensive. I don't think we should talk like that."

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session, and the numbers indicate the places in the two-column table from which the account was derived.)

- In the first session of a group model building project, the facilitator (F) intended to help the participants to clarify their objectives for the project.
- The facilitator (F) presented the participants' objectives collected before the session and asked for confirmation (2). At this moment, F felt comfortable as the presentation was prepared and she saw herself as merely a process facilitator (1).

- One participant (P1) suggested the project include **Dimension D** as another dimension, and F thought it was a good idea, as it was interesting, relevant, and brave (3, 4).

(The thought that P1's suggestion was a good idea was) from my previous understanding of this issue. Yes. And as a facilitator, I am supposed not to have that, but I have. Yep. It is also from the discussion with the gatekeeper of this faculty. They also said they want to include a lot of diversity dimensions.

- Hearing P1's suggestion, another participant (P2) called it "bullshit" and said it doesn't make sense. In addition, he said they should find and get a person from **X** (an offensive term referring to a specific group of people) in response to P1's suggestion (6). F was angry and felt so sorry that P1 had to receive P2's negative comment (5).

What was difficult is that I did not succeed in protecting the participant. I felt I didn't succeed in keeping the environment so safe and open that everyone could really express his or her opinions. And because one of the other participants was offensive, the group atmosphere was harmed and I felt responsible for keeping it safe.

What made me feel angry? The rough language which differed from a friendly, open exchange of ideas. That's for one. The second is the very negative framing of the idea of one of the other participants. So, he (P) could also have done that in a friendly way… so he didn't respect the other person. And finally, it was offensive for the whole group of people in one sentence... So he was… he was talking in a negative way about all the groups that were not represented at that moment in that meeting.

What was his intention? Actually, he wanted to show that talking about diversity in his opinion was not relevant. (He wanted to show) the problem was not relevant. There was no real problem. It was an issue that was not relevant to address.

Actually, to be honest it (asking P2 why he considered P1's suggestion as not making sense) didn't come to my mind. And in retrospect it should have been another way to bring the discussion back to the more cognitive level and away

from rough language. But at that moment I thought he was taking a lot of space so I wasn't thinking about giving him more space. That was the first consideration. And the second is I didn't consider it something clever or something about ideas. I considered it is an expression of emotion. At that moment, I didn't think the ideas were relevant but they could have been.

I was really, really thinking about how to get back the safe group atmosphere, so process was more important than content at that moment. I was really involved with what does this mean for the group process and what does it mean for understanding the problem.

- P2's suggestion made some participants burst out laughter, some participants remained silent, and the other participants utter "oh" (8). With the intention of warning P2 not to continue behaving in this way, F remained silent and gave a focused look to P2 (9, 10). At this moment, all the participants became silent (12), and F interpreted their silence as a response to her disapproval (11).

(The intended consequence of giving a focused look to P2 is) letting him know that we should not talk in such an offensive way. So, he was breaking the laws of respectful conversation.

(During the session, the recorder) wrote down that she observed me and that she could see I didn't like it. She could see my body language and that I tried to remain neutral.

After the session… I thought I could have said like… "Oh, I'm quite shock that you express it in such a way" and then "I think it is offensive." And I could even have asked: "Can you explain what is the reasoning behind this offense?"… However, I still have some kind of concern (about reacting in this way). If I continue the conversation with him, it also can give him more space to be offensive…

The (intended) consequence (of addressing the rough language in an alternative way) is that I then would perform meta-communication about the way we talk to each other. And by making explicit that I expected all participants to be respectful, I can get the harmony back… I think there is strength in putting it on the table explicitly, framing, explaining what is going on, and explaining that it doesn't fit

the criteria for a good conversation.

- Afterward, P1 explained the purpose of including **Dimension D** as a dimension (14). F felt relieved as she thought P1 was still willing to repeat his idea, and she also considered herself supportive to and empathizing with P1 (13).

- After P1's explanation, F said thanks to P1 and said he identified a relevant point; besides, F concluded that the project would continue with the original objectives collected from the participants before the session, as it seemed there was no consensus on including P1's suggestion (16). All the participants agreed (18).

My intention (of responding to P1's explanation) was to give him back the respect that he deserved in front of the whole group, even giving him some positive feedback, in order to compensate for the negative feedback he got.

D. Theory-in-use of the facilitator

- Values
  - To keep the safety in the environment
  - To minimize the participants' negative feelings (P1 in this case)
- Assumptions
  - If the environment is not safe enough, people cannot not really express their opinion.
  - I am responsible for keeping the environment safe.
  - P2's comments on P1's suggestion are an expression of emotion and threaten the safety in the environment.
- Action Strategies (course of actions used to address the difficult situation)
  - Unilaterally protect the environment by warning P2 not to talk in that way with my body language.
  - Unilaterally support P1 by giving positive feedback to him.

Appendix 10.14: Analysis of the Case 14

A. Context

A project on the safety issue in a district of a city was initiated, and stakeholders from various institutes and organizations were engaged. The difficult situation happened in the first session intended for model conceptualization.

B. The two-column

Thoughts and feelings		Actual conversation	
1		2	F: Why do you think it is unsafe in that district of the city?
3	This is an awful thing to say. Not a nice thing. But my job is to remain neutral and to ask what the guy means.	4	P1: Well, that is obvious. It is in their genes. It is in the gene of the people living in that area.
5	She is going to go away. I don't want that. I want her to remain in the room	6	P2: Well, this is evidence of discriminatory attitudes with some of the people in the institutes. If you guys would be just doing your work, then all problems would have already been solved. And by the way I'm not going to be part of this. [Stands up] I want to leave this room. It is unacceptable.
7		8	F: Please we would very much like you to stay, because we really do need your expertise.
9		10	P2: [Comes back and sits down]
11	I want to check what he means.	12	F: [To P1] Can you say more about why it is in their genes?
13		14	P1: If new people come into that area and if they don't fit then they move out again.
15		16	Other Participants: Yes, it is

Thoughts and feelings		Actual conversation	
			probably how it works. If you don't fit to the area you move out again.
17	Phew. It is settled. The group remained in the task. Everyone went through.	18	F: [Puts what P1 said into the model] It is social, not genetic. It is people in the area influence who is coming in.

C. Account of the difficult situation

(The *italic* parts are excerpts from the second interview session, and the numbers indicate the places in the two-column table from which the account was derived.)

- A project on the safety issue in a district of a city was initiated, and stakeholders from various institutes and organizations were engaged. And the session was intended for model conceptualization.

- At first the facilitator (F) asked the group what was the cause of the issue in one area of the city (2), and a participant (P1) said that the issue was caused by the genes of the people living in that area (4). F thought the statement was awful; however, he thought he had to remain neutral and ask for clarification (3).

  (It) is difficult because two values clashed. One is, on the one hand, you would want every body in the session to be able to speak up, say whatever they want; on the other hand, the facilitator… it is not only the facilitator but I personally would really think it's important that you value people in the same way, so you don't see one person as something better or higher than someone else.

  He (P1) should be able to voice that opinion in the session because those were the rules we agreed to when starting the session. But in his opinion, he discriminated certain people so it is a clash between two things. That's why you have to stop and think: "What do I need to do here?"

  Well, from the facilitator point of view you have to be neutral towards what he said, so the only thing you need to be worried about is whether other people might completely disagree… It might invoke a lot of conflict. That is the first worry as a facilitator.

The reason why I said that was awful was because I thought it was a totally wrong opinion to have, going against some of my own values.

- In response to P1's statement, another participant (P2) said the statement was discriminatory and wanted to leave the session (6). At this moment, F thought he didn't want that (5), so he told P2 that the session would need her expertise and requested her to stay (8). Therefore, P2 went back to her seat (10).

(Participant's withdraw is) not completely failure of the project but it diminishes the standing of the project. Because someone left and that means they also haven't checked the rest of the argumentation. They also don't now what exactly is in the end report, right? …And because of that it is also a little bit of failure on the part of the facilitator because he couldn't prevent the person from leaving.

My hope really was that she would stay. Maybe I did make her more conscious about the consequences but I really was trying to convince her that she was the value to the project and therefore she would stay.

(I didn't think about what to do if she refused to stay.) It went very fast, right? P2 was reacting like that. I said this. P2 stayed. And then we went to the P1. So this was all in a matter of few minutes.

- After P2 went back to her seat, F turned to P1 asking him to clarify his statement (12), since he wanted to check what P1 meant by his statement (11).

(Being neutral is to) ask him to clarify and if it is clarified, put into the model, check if every body agrees, and that's it. So you need to not because I think this is a terrible statement I shouldn't say "we will leave that out of the model and we move on to someone else."

Sometimes you really have to ask; otherwise you really don't know what variables and relationship to put up. So it's related to being neutral. Yah, checking if you understood correctly what the person means.

(I had no idea what P1's intention was.) And even then I had some small ideas, there are fifty different things he could mean with this... I don't know what he means, so it is such a broad set of things you might mean.

- P1 explained his reasoning by sharing his observation (14), and other participants agreed with his observation (16). F summarized P1's observation into the model and stated that the factor he mentioned was social instead of genetic (18). In addition, F felt relieved, as he thought the group went through the difficult situation (17).

D. Theory-in-use of the facilitator

- Values
  - To value people in the same way
  - To have every participant say what they want to say
  - To give equal treatment to what the participants say
  - To prevent participants from leaving
  - To ensure the validity of the information incorporated into the model
- Assumptions
  - What P1 said is a discrimination against certain people and might invoke disagreement and conflicts among the participants.
  - If P2 leaves the session, it would be a sort of failure of the project and myself as a facilitator.
  - Even I think P1's statement is terrible, I don't really know what he means by that.
- Action Strategies
  - Request P2 to stay and explain my reason.
  - Ask P1 to clarify what he said even if I think it is a terrible statement.
  - When P1's statement is clarified and agreed by other participants, incorporate it into the model.