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Building a shared understanding for carsharing concept using remote GMB workshops

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Abstract—

Urban carsharing is often posited as a solution to address urban transport issues, such as high CO₂ emission, private car dependency, and intensify fossil fuel consumption. However, its applications in cities within developing countries, where the number of private vehicles is expected to significantly increase in the next decades, is still limited. The unfamiliarity toward the concept among related stakeholders, such as policymakers and regulators, has been identified as a hindrance of its wider implementation.

In this study, we explore how a diagnostic participatory tool in remote group model building (rGMB) can build a shared understanding of the concept among the stakeholders, thus support the planning and implementation of the service.

We found the rGMB process helped the stakeholders to understand a novel mobility concept in carsharing from their different perspectives and building a coalition between them that will be beneficial to the policymaking process. The resulting CLD diagram also provides a basis for a qualitative policy analysis process and the development of a qualitative System Dynamics model to assess likely impacts of a given policy. Moreover, our rGMB process was innovatively designed to minimize in person-contact, thus reduced the risk of exposure to coronavirus for the participants and the research team.

I. BACKGROUND

Urban carsharing has become an integral part of sustainable transport solutions (GIZ, 2014; Lane et al., 2015). By distancing vehicle usage from ownership, this access-based mobility enables individuals to gain the benefits associated with access to a car without the financial burden and responsibilities related to the ownership (Shaheen, Cohen, & Farrar, 2019). The concept has been linked with merits associated with sustainable transport, such as the reduction and delay of private vehicle ownership and vehicle miles traveled, promoting public transport usage, enhancing accessibility, and reducing energy consumption and greenhouse gas emissions (Giesel & Nobis, 2016; Kent & Dowling, 2013; Schreier et al., 2018; Shaheen et al., 2019). Implementation and adoption of carsharing have been gaining momentum in recent years but primarily in developed countries within North America and Western Europe, such as the USA, Canada, Italy, and Germany (Shaheen & Cohen, 2013b). In contrast, the adoption and implementation in developing countries, such as China, India, and Thailand, are still limited (Movmi, 2019a, 2019b), despite the importance and urgency regarding sustainability of the transport system in these countries (Jackson et al., 2019; Lane et al., 2015).

Past efforts to promote carsharing in developing countries have been met with challenges. Besides generic challenges, such as lack of public awareness (Shaheen & Martin, 2010), some of these are context-specific to developing countries, for instance, aspiration to personal car ownership, severe congestions, inadequate transport infrastructure and supporting facilities, presence of incumbent and more affordable transport services (e.g., rickshaw, taxi, and ride-hailing services), and absence of supporting legislation (Lane et al., 2015; Movimi, 2019). Several of these challenges also stem from the unfamiliarity of the car-sharing concept to public authorities and regulators in these countries as it is still emerging and novel for many local authorities (Lane et al., 2015; Münzel et al., 2018). Additionally, a lack of shared understanding of the concept among stakeholders is also likely as the operation of carsharing is complex involving multiple entities and players, all of which are interconnected (Jorge & Correia, 2013; Spickermann, Grienitz, & Von Der Gracht, 2014). This study aims to address the unfamiliarity and lack of understanding among these stakeholders to ensure the successful implementation of carsharing in developing countries. These elements are important as the concept can be highly dependent on public policies and patronage to ensure a supportive environment for its continuing operation (Shaheen & Cohen, 2013). In contrast, delayed or inappropriate legislation can have detrimental effects, particularly in developing countries where most of these services are set up through self-funding or by local capital investment (Lane et al., 2015).

The remainder of this paper is organized as follows. In Section 2, we present the research aim and method. Next, we present the results and discuss the findings in Section 3. We then reflections on the process in Section 4 and conclude the paper in Section 5.

II. AIM AND METHODOLOGY

The objectives of this research were twofold. First, it aimed to establish a shared and comprehensive understanding of the carsharing concept among relevant stakeholders in developing countries using a holistic and a system approach in Group Model Building (GMB). Our study looked to complement previous works that examined carsharing from a single perspective by applying a process that brings together relevant stakeholders, such as policymakers, regulators, operators, researchers, user representatives, and insurance providers, to exchange their knowledge and expertise. Additionally, the application of this ‘bottom-up’ approach to support the implementation of shared mobility concepts is still limited and can be instrumental as discussed previously. Moreover, the facilitated process in GMB provides essential information (e.g., vision, Key Performance Indicators, and barriers to implementation) that can be used to support a future planning process.

Second, by using a participatory approach in the Group Model Building technique, we explored how GMB, which is typically implemented in a face-to-face workshop format, can be carried out remotely to minimize the risk of exposure to the coronavirus for the participants and the research team. The study also helped the participants to gain a new understanding and insights into the urban carsharing system, produced a qualitative system structure for policy evaluation, and identified planning elements for policy formulation.

Typically, GMB is carried out in a face-to-face setting by a facilitator(s) who may assume different roles at different points of the workshop (i.e., facilitator, modeler, reflector, wall-builder). Several researchers have sought to improve the technique by strengthening the objectiveness by formulating scripts (Andersen & Richardson, 1997; Andersen, Richardson, & Vennix, 1997), enhancing scripts to ensure effective sessions (Ackermann et al., 2010), and using interactive dialogue games (Hoppenbrouwers & Rouwette, 2012). In this study, we also explored how GMB could be carried out remotely to minimize in-person contact, thus reduced the risk of exposure to the coronavirus for the participants and the research team. Initially, the workshops were planned in person with the participants. However, the outbreak of the coronavirus pandemic at the end of 2019 affected traveling and the planned works, so we moved the activities to interactive online platforms. To our knowledge, only a recent study by Wilkerson et al. (2020) carried out GMB exercise in a similar setting.

The methodological approach of this study involved four steps: 1) knowledge elicitation, 2) conceptualization of system and interconnectedness among variables, 3) analysis impacts of possible interventions, and 4) evaluation of the process. These steps are typically carried out in a face-to-face workshop setting, but to move the GMB process online, we made the following adjustments. The knowledge elicitation was carried out through semi-structured interviews with stakeholders (Galletta & Cross, 2013), which took place between May and July 2020. Steps 2 and 3 took place during a two-session online workshop (August 5 and 26, 2020), and the final step took place through an online follow-up survey (between August 26 and September 2, 2020).

At the outset, we identified the stakeholders to invite with a group of experts who have experienced the carsharing service industry in a city. Care was taken to ensure the apparent influences and connections of these stakeholders to the system (Vennix, 1996). We also asked each interviewee for further recommendations (“snowballing”). The final respondent list comprised a total of 23 stakeholders from the public sector and governmental agencies (11 persons), service providers (4 persons), private sector (3 persons), smart mobility community (2 persons), academia (1 person), and users (2 persons). All of them agreed to participate, although one

of the public organizations later limited its involvement to only the interview session. The names and organisations of these participants are not included here for anonymity reason.

The schedule of the two-day workshop sessions is shown in Table 1. On the first day, after a brief welcome and an explanation of the goal of the exercise, the research team (one main facilitator and four group facilitators) and participants introduced themselves. The team explained the workshop process and the iconography of CLD (Richardson, 2013) and split the participants into four groups. Each group had 4-5 members from different sectors and a group facilitator to support them in examining the CLDs of their group members and to combine them into one CLD. A preliminary conceptual model, constructed from the results of the analysis of the interviews, was presented as a possible starting point. For each modification to the diagram, a consensus had to be reached by the group on the proposed adjustment. This activity yielded four CLDs. The process was then repeated with the same participants but we combined the four groups into two groups. Each of the new group then proceeded to combine their CLDs. This step combined the four CLDs into two, and with this, the first-day session was concluded. The research team then combined the two CLDs into one and presented it to the group in detail at the beginning of the second day of the workshop. The participants could critique and modify the diagram until they reached a consensus. At the end of the second day's session, the participants deliberated the impacts of possible interventions using the CLD and expressed their opinions on the overall process. The research team also followed up with an online evaluation survey the next day.

Table 1. Schedule of the two-day remote GMB workshop

Day 1: Activity/duration - (total duration: 3 hrs)	Duration
Welcome, scene-setting, outline of activities and expected outcomes for the day	10 min
Background on carsharing, explanation of the process and results from the interview, clarification of CLD and the GMB process	20 min
CLD formulation round 1 (4 groups, each with 4-5 participants and a facilitator)	50 min
Break	10 min
CLD formulation round 2 (2 groups, each with 8-10 participants and two facilitators)	60 min
Break	10 min
Group discussion and concluding remarks	20 min
Day 2: Activity/duration (total duration: 2 hrs 30 min)	
Welcome, scene-setting, outline of the activities and expected outcomes for the day	10 min
Presentation of the results from the previous session; explanation of the combined CLD	40 min
Discussion and alteration of the combined CLD	50 min
Break	15 min
Discussion on policy evaluation	20 min
Evaluation and concluding remarks	15 min

III. RESULTS

The variables extracted from the interview transcripts were ranked and presented to the workshop participants. A selection of this list is presented in Table 2. Participants could also suggest additional variables during the workshop. Most of these attributes had been mentioned by previous studies, but a few of them were identified here for the first time.

Table 2. The most frequently mentioned variables in each category extracted from the interview transcripts

Category	Variables
Vision	Services are convenient and easy to use Sufficient stations and coverage area High variety of vehicle types and models
Key Performance Index	People's awareness of carsharing service Number of users, number of reservations/days, the utilization rate Reduction of transport system externalities (pollution, accidents, and energy consumption) Number of private cars in the system
Factors that can accelerate or prevent visions to be reached	Stakeholder collaboration People's awareness of carsharing service Confidence in carsharing service (reliability) Competitions/alternative modes of transport Convenient and attractive services Value for money and customer satisfaction Quality of public transportation systems Government support and endorsement
Government policy	Road pricing, e.g., toll fees Tax incentive Vehicle ownership control policies

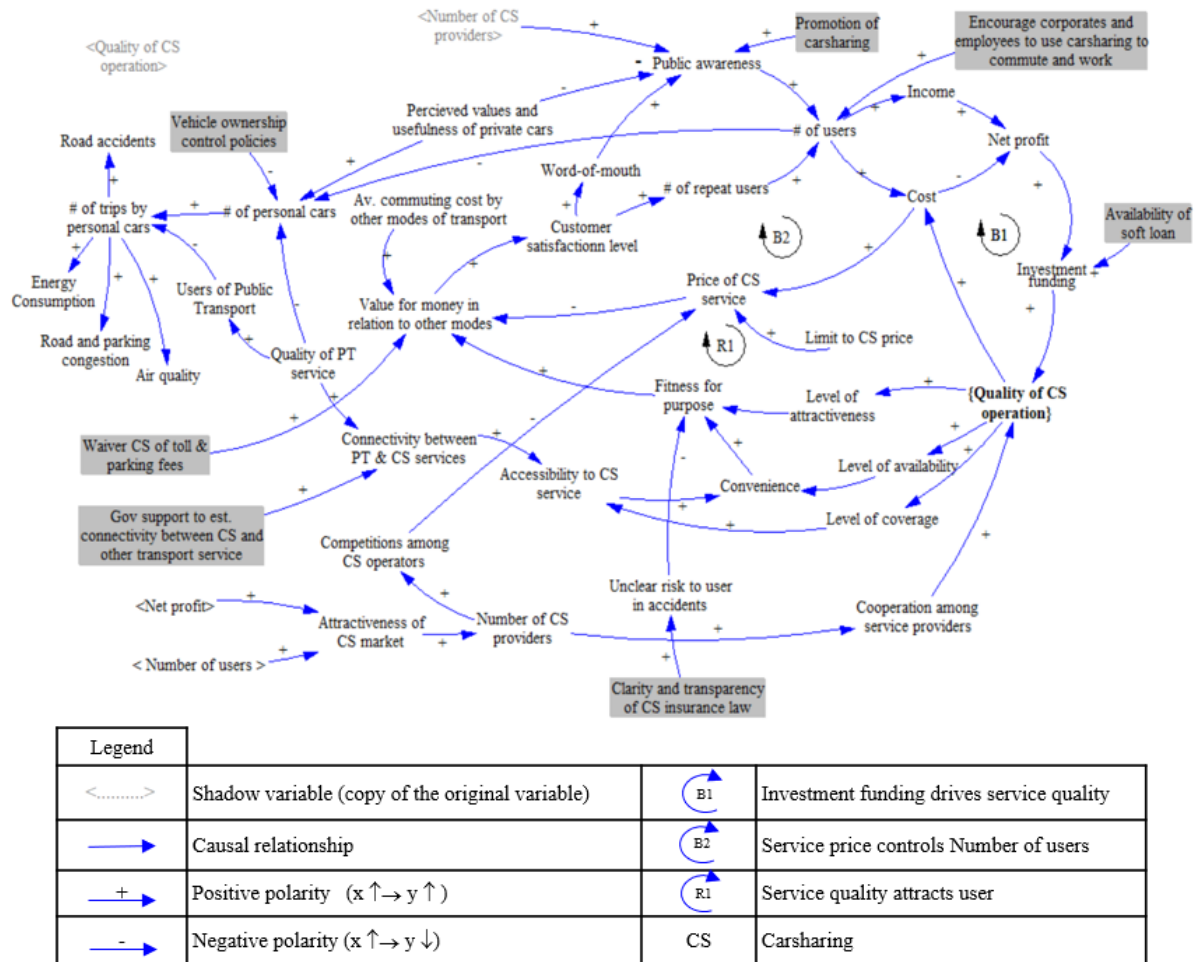


Fig. 1 System structure of Bangkok's carsharing dynamics

IV. REFLECTIONS AND DISCUSSION

In this subsection, the reflections on the remote GMB process are described in three different phases: preparation, workshops implementation, and post-event. We also present the results of the evaluation and highlight the limitations and benefits of remote GMB applications to the subject.

In moving the GMB process online, we examined adequate means to replace the face-to-face setting of the GMB activities. For a convergent activity, a workspace to allow for independent work and reflection was required. We selected the semi-structured interview as its flexible format also allowed us to discuss the research process, understand the participants' background and existing perception of carsharing, and build personal connections with the respondents. Particularly, the personal connection was highly useful as it allowed a more personalized preparation (e.g. group allocation) of the online workshops. Previous research has examined the use of interviews and other methods, such as the Delphi method, for this purpose (Rees et al., 2017; Richardson et al., 1989). For the divergent activity, a collaborative platform allows synchronized viewing of a causal map and supports interactive discussion. We selected Zoom and Miro and modified the divergent standard scripts from Scriptapedia (2020) to accommodate the constraints imposed by the remote environment. The GMB sessions were kept concise to minimize the concentration fatigue of the respondents. Two mockup workshops were also carried out to test the scripts and the online settings with a group of volunteers.

The stakeholder identification and invitation process were effective; we identified relevant stakeholders who were keen and available to participate. The high levels of willingness and engagement observed may be a possible benefit of moving the GMB process online, which made it easier and more convenient for stakeholders to join. However, there were also two last-minute no-shows. It is also possible that there is a high level of interest in the subject of this study, however, these attributes were not quantified.

During the workshops, we observed that the participants were reluctant to engage in the discussions, some limited their participation to the minimum of Yes/No responses. Certain participants that were active in their interviews were subdued and needed the facilitators' encouragement to engage. This timidity may also be due to unfamiliarity among the participants or to the challenge to focus. However, it was challenging for us to detect subtle reactions of the participants as several of them also turned off their cameras, making it impossible for us to observe if they were fully engaged with the activities or to read from their facial expressions. However, in certain instances, personal messages via Zoom or Line chats were effective means to stimulate the engagement of individuals. An ice-breaking session before the workshop may have helped to familiarize the participants with the tools and with each other. Similar observations and recommendations on this issue were also made by Wilkerson et al. (2020).

Additionally, the video conference environment in Zoom does not facilitate parallel discussions between different individuals in the same room. Although the chat box was open and available to use, no participants were observed using it. Also, the teleconference setting eliminated opportunities to interact informally. We also found that during the breakout sessions, it was difficult for the main facilitator to monitor the process in each breakout room effectively. As Zoom only allows the meeting host to join one breakout room at a time, the main facilitator could only monitor that particular breakout room, whereas, in a face-to-face setting, a facilitator can monitor multiple groups situated within a single room and walk around to address arising issues as needed. However, we found that a communication channel for the research team was an effective means to address any arising issues in the breakout rooms. S

In the sessions, the internet connection of most participants was stable and provided uninterrupted sessions, except in one or two instances when certain participants were disconnected. However, noticeable lags could be observed when the facilitators shared their online collaboration space screen via Zoom's shared screen function. To overcome this issue, the participants were directed to view the on-going activity on the working space directly from Miro's interface while listening to the facilitators via Zoom. Concerning the calling environment, most participants joined from undisturbed quiet places, except one person who had strong background noise, making his contributions inaudible at times.

V. CONCLUSION

This study contributes to the wide implementation of carsharing in Bangkok city, Thailand, by constructing a shared understanding of the subject using a remote participatory Group Model Building process. The process also demonstrated how GMB can bring together relevant stakeholders and provided a systematic approach to facilitate exchanges of knowledge and experience among the participants. The process helped to enhance their insights into the novel mobility concept and improve their understanding of the complex interactions involved. This shared understanding is an important basis to support successful implementation of the concept. The resulting system structure of the process, which consists of three feedback loops, can also provide a basis for a formal model and policy analysis regarding the mobility concept. The remote setting of GMB also helped to minimize the risks of exposure to the coronavirus for the participants and the research team.

Lessons learned from the participatory process in this study can be useful for researchers and practitioners seeking to implement novel mobility concepts, such as Mobility-as-a-Service, to promote sustainability in developing countries. The process can be applied to align participants' understanding of a novel mobility concept (in this case, carsharing) and build consensus and commitment in supporting the implementation of the concept. It can also take stakeholders on a learning journey to explore different perspectives on the concept and generate information useful for its planning process in a systematic manner. The application can help to address factors, such as a lack of shared understanding about the concept, that may slow down or hinder its implementation. This study is also one of the first to demonstrate how the group model building process, which typically carried out in a face-to-face setting can be implemented in a remote setting. The protocol formulated in this study reduces the risk of coronavirus infection for potential participants and the cost and time involved for the participants.

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