5 Digital Capacity in Community Transport Development

Experiences from the Man and the Biosphere Area Tobago

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Experiences from the Man and the Biosphere Area Tobago

J. R. Kotzebue

In October 2020, the United Nations Educational, Scientific and Cultural Organization (UNESCO) declared the North-East region of Tobago a Man and the Biosphere (MAB) reserve. It became the largest MAB area in the Anglophone Caribbean Small Island Developing States (UNESCO, 2020). The UNESCO's three-zonation strategy focus on three key functions: conservation, sustainable development and logistic support. Protection and conservational activities characterise the core areas. In the surrounding buffer zone are activities permitted that are compatible with the core areas, like human settlement, tourism, research, and education. The program fosters sustainable resource management and development in the outer populated transition areas. The transition zone allows a smooth shift from the protected to the unprotected areas (Figure 5.1) (UNESCO, 1995). The collaboration with the stakeholder constitutes an essential element, and the roadmap for the MAB Programme encourages them to contribute to political decisions and to take part in implementing them (UNESCO, 2017).

The MAB reserve is located relatively far away from the main urban, touristic, cultural, and economic centres of Trinidad and Tobago. The fourteen villages that are included in the transition zone of the area are located along the two main roads that connect them with Tobago's economic and cultural centre, Scarborough. The inner transport system fully depends on motorised vehicles. The Tobago's local government, the Tobago House of Assembly Division of Infrastructure, Quarries and the Environment, as well as the Division of Tourism, Culture and Transportation are responsible for an adequate road system. However, the Ministry of Works and Transport that is located in the main island Trinidad is mainly responsible for the national transport planning. However, the transport development and planning is project based, because of a lacking in national transport strategy and integrated town and county planning. The planning

process is centralised and gives no or little opportunities for citizens to participate. Accordingly, the close collaboration with citizens and stakeholders as required by the MAB programme is something new. Therefore, the village of Charlotteville has tested a (Public) Participatory Geographic Information Systems ((P)PGIS) to collaboratively develop a long-term sustainable transport strategy for the community in a pilot study.

Using ICT is becoming more important. An increasing trend emerges for Public Participatory Decision Support Systems (PSDSS), ((P)PGIS), and web-based Volunteered Geo-graphical Information (VGI) tools in many metropolises (Brown, 2017). Although the tools differ, geographic information and a participative process are core elements (Brown & Kyttä, 2014). Hence, these online tools could be considered as social-geo-communication tools (Brodersen, 2017; Vogler & Hennig, 2014). These tools offer the opportunity to strengthen the collaboration, but scholars also highlight the challenges like digital divide, poor geographical and socio-economic presentation, and biased results (Kahila-Tani, Kytta, & Geertman, 2019). The public still has often difficulties to understand the processes and results generated from digital planning tools (Geertman, 2006; Pelzer, 2017; te Brömmelstroet, 2017).

Studies show that the potential of the digital tools is context dependent. For instance, the character of the policy and planning processes, the digital literacy of participants, user- friendliness of the tools, and the communicative value of the output can be decisive (Geertman, 2006; Magee et al., 2020; te Brömmelstroet, 2017). These factors mainly stress upon the individual processes, single tools, individual and organisational capabilities. However, community and capacity-building literature highlights the importance of the community's capacities for sustainable development (Craig, 2007; Eade, 1997). Therefore, the question posed in this paper is: What role does the digital capacity of the community play in digital context-sensitive transport solution development?

To respond to the question, the first section describes the case study area and the web-based tool. The paper will continue by elaborating on the concept of digital capacity in the community's context and introducing a methodological framework. It allows assessing the role of the digital capacity in an ongoing process. The concluding section highlights some recommendations for the use of digital tools in MAB areas and transport planning.

The MAB Area

The core of the MAB area comprises the Main Ridge Forest Reserve that became protected in 1776. The area encompasses 3,937 ha with the ridge highest peak of 549m (GovTT,

2021b). Fourteen communities are part of the transition zone of area. The biggest communities are Moriha, Roxborough, Louis D'or and Charlotteville (Table 5.1) (CSOTT, 2011). Although Charlotteville is an important transport hub from a touristic point of view, because it has one of the two ports in Tobago for cruise ships, it is hardly accessible. The remoteness also affects the population growth as its population is declining (CSOTT, 2011). The village hosts the Environmental Research Institute Charlotteville (ERIC), which has successfully implemented community-based environmental and protected area management projects in the area. Therefore, the pilot study was conducted in Charlotteville (Figure 5.1).

Table 5.1 MAB Communities and Population

COMMUNITY	POPULATION
Moriha	2,151
Roxborough	2,089
Louis D'or	907
Charlotteville	863
Argye	625
Hermitage	609
Delford	594
Cascara	580
Belle Garden	544
Bellys Hope	492
L'anse Fourmi	273
Bloody Bay	144
Speyside	18

Note. Compiled by J. R.Kotzebue

The topography of the villages in the transition MAB area varies and changeover is from flat land near the coast to hilly terrain at the base of the core area, the Main Ridge Forest Reserve. Charlotteville developed in a sprawl like a network across the hillside near the forest reserve, partly because of the lacking in holistic land use planning. Two major roads, the Windward Road along the Atlantic Sea at the east coast and the Charlotteville – L'Anse Fourmi on the Caribbean Sea on the west coast connect the remote villages with Scarborough the main city of Tobago (Figure 5.1).

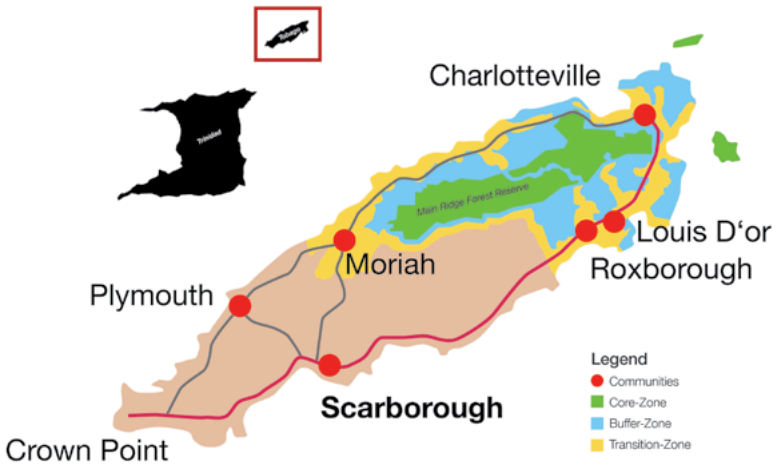

Figure 5.1 Tobago MAB Area with its Three Zones and the Major Communities
Note. Copyright by Göttsche (2021)

Both roads have narrow lanes, which allow, partly, only one vehicle to pass at a time in certain sections, and have many landslide occurrences. This results in challenges for the transport system that fully depends on motorised private cars (often shared), private-owed 9- to 25-seated minibuses on fixed routes (maxi-taxis), registered and unregistered taxis. The state owned Trinidad and Tobago Public Transportation Service (TTPS) that also provides a scheduled service is often unreliable (PAC, 2019). Although car ownership is increasing, the minority has a car in the remote areas and many non-drivers have to walk to the village centre or the main roads to get a transport opportunity.

PGIS and Digital Capacity

Participatory Geographic Information Systems

The pilot study introduced a type of Participatory Geographic Information Systems (PGIS), a web-based and social geo-communication platform that enables the participants to visualise transport ideas, discuss concerns, needs and solutions. The platform combined Google Maps mapping with an open-source content management system and social media. Participants could add a marker on the digital village map, upload descriptions, photos, videos, and rate and comment contributions.

PGIS aims at collaborative mapping in groups and is a reflective mapping to visualise, e.g., the community perspective (Brown & Kyttä, 2014). It combines community participation and geographic information systems (Weiner, Harris, & Craig, 2002). Community participation is contextual, with a diverse range of intensity, scope, and frequency (Sanoff, 1999). Arnstein's Ladder of Citizen Participation has illustrated this (Arnstein, 1969). Community control does not necessarily mean that the community takes over government tasks, but that the community becomes empowered to steer implementation (Sanoff, 1999).

Therefore, the approach differs from the computer-based tools that started in the 1960s in western countries (Klosterman, 1997). These early decision support systems (DSS) and planning support systems (PPS) were primarily designed for engineering, management, and planning experts (Batty, 2013; Eom & Kim, 2006). Meanwhile, Web 0.2 enhanced the options to involve the public, to generate and to share geospatial information like Volunteered Geo-graphical Information (VGI) (Goodchild, 2007; Rinner, Keßler, & Andrulis, 2008). A heterogeneous field of public participatory decision support systems (PSDSS) and (Public) Participatory Information System ((P)PGIS) increasing the opportunities to engage non-expert and the public in transport development (Keenan & Jankowski, 2019; Le Pira et al., 2017; Tulloch, 2007). However, to get people and a community engaged, they need the capacity to do so.

Digital Capacity

The Oxford Dictionaries define capacity as the amount of something that can be produced and that someone or something can contain (OUP, 2020). However, this definition proves not to be useful for the PGIS. In the field of community participation and public administration, the concept of capacity gained importance in the 1970s. Although debated, it had been defined as ability to anticipate and influence change, to make informed, intelligent decisions about policy, to develop programs, implement and evaluate applied actions, to attract, absorb and manage resources (Honadle, 1981). This definition implies that capacity has an input, a process, and an output aspect.

By comparison, the concept in the digital context shows an input and output logic. It refers "to the skills, competencies, attitudes, infrastructure and resources that enable people to work, live and learn in a world that is increasingly digital" (NFTL, 2015 p. 5). Another illustration of this type of definition is: "Digital capacities are users' abilities to mobilise material and symbolic resources to maximise benefits, opportunities and aspirations afforded by changing digital technologies and techniques". (Magee et al.,

2020) p. 1002. Hence, digital capacity is vital to being active in the physical and virtual world (Zhuang, Yang, Bo, Zhang, & Huang, 2016). Contrast these definitions with the digital literacy concept that describes "the ability to understand and to use information in multiple formats from a wide range of sources when it is presented via computers" (Gilster, 1997 p1) It highlights the cognition and the ability to understand information, and therefore, the process. The fast ICT development request that users must constantly advance their abilities and capabilities, which are part of the capacity (Bawden, 2008).

Regarding PGIS, digital capacity aims at community development, and capacity-building is a core concept. However, the capacity-building literature in this field draws on a diverse picture (Chaskin, 2001; Craig, 2007). Nonetheless, Morgan (2006) has distilled five characteristics of capacity that also shows input, process, and output aspects:

1. Capacity is related to empowerment and the identity of the community. This is linked to the capability e.g., assets, properties and power that contribute to sustaining and developing the community.
2. Capacity refers to the collective ability to establish relationships, mutual learning, that allows community groups, organisations, and individuals to sustain and develop the community.
3. Capacity is relational, and context-depended. One cannot build from a single aspect.
4. Capacity is about public values, and it contributes something to public life.
5. Capacity is a potential and involves many factors that can influence it.

In the light of the above digital capacity in the context of PGIS could be understood as the personal or community's ability and capability, like skills, soft and hardware, infrastructure to generate, employ, create relationships, opportunities and learning through ICTs that sustain and contribute to the community's development and values.

Method

A Digital Capacity Framework

To assess the role of digital capacity in the pilot study, the paper builds on Peter Morgens' capacity concept with its five characteristics, as explained. Accordingly, capacity can be viewed in an input (a), process (b), and outcome (c) framework (Figure 5.2). The input (a) refers to factors like digital skills, competencies, attitudes, digital infrastructure, and resources that can potentially empower the community. Also, digital accessibility that

allows people with disabilities to employ technology, and the communities' motivations and goals can be input factors (Eade, 1997; Kulkarni, 2019). Examples of digital skills are information management, communication, collaboration, creativity, critical thinking and problem solving (Van Laar, Van Deursen, Van Dijk, & De Haan, 2017).

The process (b) includes the interaction of single actors, organisations, and the relationships that make a community. To improve the community in the digital and the physical world, it is crucial if and how a community uses its input to create or mobilise relationships. A critical dimension of relationships in a community is the sense of community, which implies that people feel like a community member, have an influence, feel integrated and share emotional connections like values, cultural events, and positive interaction (Abfalter, Zaglia, & Mueller, 2012; McMillan & Chavis, 1986). The process also includes contextual factors that influence the relationship like the socio-economic, the policy and governance, and the spatial context.

The output (c) relates to the results of the input and process. It is essential that the output match with the community's values and needs to contribute to the community buildup. Essential is that the outcome has the potential to create benefits and opportunities for the community. This aspect can be related to the time dimension because outputs can be beneficial in the short term, but might be meaningless in the long-term perception of the community (Craig, 2002; Mizrahi, 2009). Therefore, it is important that the outputs contribute to outcome that sustain the community.

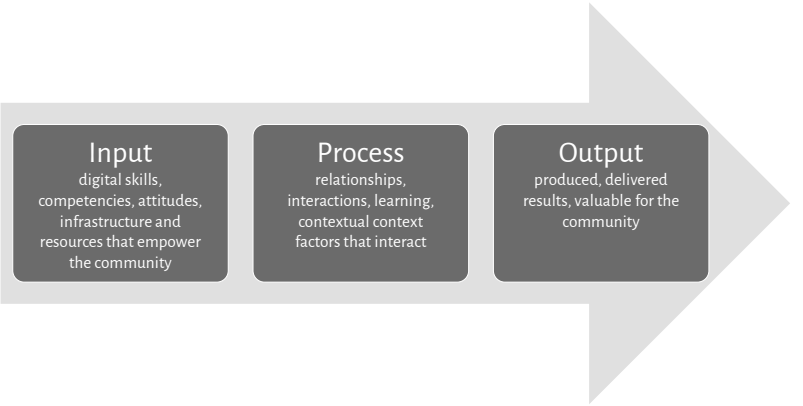

Figure 5.2 Digital Capacity Framework
Note. Copyright by J. R.Kotzebue (2020)

The Data Collection

The MAB's village, Charlotteville, functions in the pilot study as a Living Lab (Higgins & Klein, 2011). Together with the investigator, the community created sustainable and context-sensitive transport solutions as an experiment in a real-world context. In contrast to a real lab, the Living Lab is not a controlled setting and lacks a control group (Dekker, Franco Contreras, & Meijer, 2020; Higgins & Klein, 2011). This case-based learning includes trial and error, requires quantitative and qualitative research phases to identify and understand contextual factors (Johnson & Onwuegbuzie, 2004).

The collection of data included a survey that resulted in 108 valid responses (n 108). Although the response rate is low, the value of the research is not necessarily lowered because of the response representativeness (Cook, Heath, & Thompson, 2000). Baruch and Holtom (2008) confirm the importance that respondents are representatives of the population. In this light, there is little proof that a low response rate with high representativeness leads to selective reporting (Rutherford, O'Boyle, Miao, Goering, & Coombs, 2017). According to the demographic census of 2011, Charlotteville has 863 permanent residents, 51 % male and 49 % female. The survey corresponds to the gender relation, because 52 % female, 55 % male and 1 % other participants replied. In addition, the pilot study comprised seven structured interviews with key experts and stakeholders, and ten unstructured interviews with community members. A summary of the results is included in the communities' Sustainable Transport Strategy 2020–2030 (Kotzebue & Crichlow, 2020).

The fieldwork included analysing secondary data, observations, systematic descriptions of events, the behaviour, and the context. Extra observations help better to understand the phenomenon (Kawulich, 2005). The data collection occurred in a real-life setting, so that reliability can only be granted to the aspect of consistency of the responses and behaviour (Suen & Ary, 2014). The generalisation of the results is possible within the community, but needs more research to confirm the noted findings.

Results

The Input Factors

Specific data about the cell and smartphone subscribers in Charlotteville are not available. Therefore, the digital core skills and access are derived from the national market situation. The general trend shows that many people have one or more cell or

smartphone subscriptions, 1.99 million (GovTT, 2021a). Currently, Trinidad and Tobago has a population of approximate 1.3 million (CSOTT, 2021). Merely 323.900 people have a landline phone by comparison. Regarding internet access, 770,200 subscribers have a mobile and 376.800 a fixed internet subscription (GovTT, 2021a). Most people have a cell phone, but many are not smartphones and internet access in remote areas is poor or variable. During the COVID- 19 pandemic, the mobile internet subscriptions increased by 17,9 % in one year (GovTT, 2021a).

The study's observations show that not all households have computers or tablets, but computers are accessible at the public library in the case study area Charlotteville. The most frequent users are children and teenagers. This age group also partly has access to computers in the schools. When addressed at the household, the majority refused to fill in an online survey and opted for the paper version when offered. Most participants also refused to map concerns or ideas with the PGIS tool individually. During the workshops, the participants refused to work with the tablet or laptop, even when they had the possibility to learn how to use the tool. Considering the geographical skills, e.g., many schoolchildren had difficulties orienting and to recognising cartographic symbols on a paper map. However, satellite photos helped most participants to orient themselves. Many participants knew Google maps and used it to advertise a touristic accommodation, restaurants and other businesses, but individually using it to think about context-sensitive transport solution-finding was new for many individuals.

The Process

The context- and community-sensitive transport solution development engages a geographically well-defined community. Considering the sense of community, the survey asked people about the core values of the community. Correspondents could either finish the sentence: "I get happy when people in my community" or could freely express themselves.

The survey showed that mutual aid is crucial for community members. The core values of the community are "respect" 20 %, "togetherness" 18 %, and "cooperation" 16 %. Additionally, 21 % of the participants indicated that the community helps and supports them. On the one hand, this signals a will of cooperation among community members. On the other hand, around 17 % of the participants indicated that the community is doing nothing for them. The picture shows a dichotomy between cooperation and exclusion.

The importance of collaboration also became visible while using the tool. Participants became active only when someone with technical skills or a respected person, like a family or community member, accompanied the participants. Community members needed not only to discuss the tool but more importantly the ideas and solutions. For instance, schoolchildren were constantly asking for teachers' feedback before they agreed on an idea. In the church, the discussion improved through the active involvement of the pastor. Many needed to discuss the transport issue with family members, neighbours, or friends at family level, before they responded to the survey or expressed ideas. A similar observation was noticed on the street. An exemption of this group had been community members who felt left out. They often used the opportunity to be contacted at the household level to express their needs. The individualistic participatory approach does not match the community's values and attitudes.

The desire for joint solution finding is part of the local community council, the voluntary associations, and non-profit organisations culture that are locally active. Charlotteville has several heritage protection groups and a police youth club. In addition, the Environment Research Institute Charlotteville (ERIC), a local non-profit organisation, collaboratively advocates for the protection of the marine and forest areas. The government demonstrates little participation in transport projects and community development. For instance, the community frequently reported collaborating in many surveys and assessment studies without follow-up and implementations.

Moreover, the structured interviews showed that most experts, leading stakeholders, and many community members regard the Tobago House of Assembly (THA) as responsible for sustainable transport development. At the same time, they simultaneously highlighted the weak political prioritisation of sustainable transport development. The political leaders pay little active attention to the subject and programmes. For instance, none of the authorities responded to survey requests or followed invitations to the workshops. The political system also provides insufficient finances, and human and technical resources for implementing and developing sustainable transport policies and practices.

The Outcome

The PGIS resulted in 29 ideas, 12 comments, and a long-term community-sustainable transport strategy. The strategy reflects, describes, and assesses the community transport solutions, and it stresses the community's transport needs. The satellite view of the virtual map supported the participants to locate the idea and their needs. However, the

individual digital skills and merely the digital tool do not empower the community. The community needs feedback, mutual learning, the support of experts and community leaders. The tool should create collaborations, transparent and open discussions, but the community has little culture to use ICT for critical thinking and discussions. Social media platforms are mainly used to show, inform, and rate information, but not for policy issues and debate. Nonetheless, after the digital tool phase, 114 signatures for road safety and speed bumps were collected by the local police youth club. It is unclear if all supporters of the petition participated in workshops. However, the community could view the strategic community plan and it shows that the outcome of the PGIS and the workshops delivered valuable results for the community to enhance sustainable transport development.

Conclusion and Recommendation

The PGIS project in the MAB achieved numerous ideas and suggestions for the future that can be summarised in the vision: Reliable and safe transport opportunities that are available when needed to reach your destinations. A primary goal of the pilot project was to test digital tools for context-sensitive transport solution development in the MAB area and clarify the role of the digital capacity of the community.

Following the input, process, and output framework, the input showed community members generally have temporal internet access and depend on social institutions like the library and the school, which provide support, hardware, and software. In addition, the participants hesitated to use the tool independently. This phenomenon became clearly visible during the COVID-19 pandemic, which created an environment of social distance. During this time, the mapping platform remained unused. Further research is needed to explain the case-specific causes, but a principal reason for using online applications is their usefulness in personal life. The tools must fit into daily activities (Mehra, Paul, & Kaurav, 2020). Both the tool and the subject were new, not part of daily activity, so learning is required.

Concerning the process, many community members jointly mapped with the experts and expressed and visualise their needs and ideas. The interaction, collaboration, and mutual support of the community are essential. Studies confirm this finding that group discussion, interactive feedback and trust foster the use of PGIS tools (Brown & Kyttä, 2018; McCall, Martinez, & Verplanke, 2015). Nonetheless, the need for collaboration also creates dependencies. The online collaboration requires proficient facilitators and moderators (Šuklje Erjavec & Ruchinskaya, 2019). Increasingly, digital public

engagement is outsourced to private profit-oriented platforms that filter information for the interest and goals of the contracting entity. The role of the facilitator, moderators and profit-oriented companies is still under-investigated, especially when concerning rural and peripheral areas.

Occasional, project-based use of digital tools will not empower the community to learn and to accept the tool as an opportunity for proactivity. The remote geographical location of the community influences the digital capacity. These areas have poorer digital infrastructure from the input perspective and strong collaborative needs. Compared to urban areas with an enhanced digital infrastructure, the web-based tools empower individuals that can collaborate without being aligned to local interest groups (Williamson & Ruming, 2019). Accordingly, users of these tools show an individualised collective behaviour in urban areas.

In conclusion, digital capacity is decisive for the use of digital tools in transport planning. However, the input, e.g., the improvement of individual digital skills and digital infrastructure, is insufficient for beneficial use. The process and the relationship with others are also crucial for digital capacity. Concerning the future use of digital tools in transport development, the study shows that tools and approaches must be adjusted to the context. If merely the experts, well-equipped, and skilled individuals understand the digital tools, it will empower the community insufficiently. Meaningful participation and learning are tightly linked, and therefore, it is recommended to conceive the understanding and use of these digital tools as learning for sustainability in the MAB areas.

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