MEASURING COMMUNITY REVITALIZATION SUSTAINABILITY: EXPLORING SUSTAINABLE PRACTICES AND IMPACTS OF SUSTAINABLE BUILT ENVIRONMENT INITIATIVE (SBEI) PROJECTS IN MICHIGAN COMMUNITIES

By

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ABSTRACT

For years now, Michigan has been working toward revolutionizing the way its communities are designed, employing the ideas of sustainable development to mitigate the impact of urbanization on the community and environment and emphasizing promoting local resources. It is reported that several Michigan communities have been facing issues for the last few years (e.g., underutilized urban spaces, poor pedestrian movement facilities, lack of public places for city people, poor city appearance, safety, etc.). To address these issues and employ sustainable planning and design ideas for local affairs and opportunities, Michigan State University Extension (MSUE) and the School of Planning, Design, and Construction (SPDC) have jointly developed the Sustainable Built Environment Initiative (SBEI) to revitalize specific parts of cities and townships. In this regard, community meetings have been held since 2013 with a series of focus groups for each community with various stakeholders to obtain iterative input through a feedback process. The input and ideas obtained from these community meetings are used to generate actionable short, medium, and longer-term strategic plans and achieve specific sustainable goals.

This study analyzes the SBEI projects in light of the future sustainable development of each community. The data for this study is collected from 14 previous SBEI projects that have taken place in 13 Michigan communities since 2014. Then interviews with diverse stakeholders, including local planners/city managers/associated entities, were conducted to understand further and analyze how these projects impact the future development approach over time. A holistic systems-based analysis of those areas from the perspective of individuals embedded in their social and institutional context is developed. In addition, three communities are selected to perform a sustainability assessment, for which a sustainability tool with indicators is used with metrics. The study attempts to evaluate whether the executed projects have met the expectations of the researchers and the community residents regarding sustainability and how the projects contributed towards the overall sustainability of the community. The findings are expected to play a significant role in future decision-making for communities dealing with sustainability challenge.

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CHAPTER 1: INTRODUCTION

1.1 Urban Core Problems in Cities and Small Towns

According to Jane Jacobs, an active city encompasses elements such as mixed-use, human-scaled designs, crowded, dense, and busy sidewalks during the day and night, and a mix of old and new buildings. A shift in the city fabric has been observed in the last few decades, where cities are found to be lagging in holding a place for activities and attraction for the dwellers (Jovanović, 2013). The automobile industry's rise has allowed people to relocate the nexus of their community and commercial life at out-of-town malls. Recently, even the number of malls is being reduced due to the rise of online shopping, with 1 in every 4 expected to be closed by 2024 (Bhattarai, 2021). Recent surveys suggest that remote office work will likely be a permanent feature of the current era leaving out the city's commercial spaces unoccupied. These changing circumstances are more prominently observed in small cities. Most small cities and towns in the US are deserted on the weekends (Mihic, 2016). Even the hearts of the cities are remarkably barren outside of traditional business hours because there is no reason for anyone to be there outside of traditional business hours (Nikolaenko, 2017). The movement of retailers and local store owners to outlying locations, the influence of suburbanization, the rise of big box developments, and the growth of freeway systems allow traffic to circumvent downtowns (Visvaldis et. al, 2013). In addition, poor business diversity, traffic management, parking issues, poor street infrastructure, poor accessibility/connection, empty storefronts, and vacant buildings add to the grounds small cities and towns in the US are losing desirability for the residents and visitors (Slack & Jensen, 2020).

To provide an active and healthy lifestyle to the residents of small cities, it is imperative to create outdoor spaces with cultural events; proactively rethinking public spaces and streets for transit, bikes, and pedestrians; relocating parking to the outskirts of downtown and attracting diverse population to visit both in terms of age and race/ethnicity (Garao et. al, 2017). People prefer to live in places that are rich in culture and history, provide a high quality of life, and the ability to find personal meaning (Mitchell, 2018). Significant public-private collaboration is required to accomplish the goal of turning current cities into such vibrant places, given the extensive intervention required to revitalize their spaces. It is also worth noting that while identifying the appropriate measures to revitalize the cities are important, aligning the action steps of those measures toward sustainability is also indispensable in order to address the current sustainability challenges such as resource scarcity, pollution, and climatic hazards.

1.2 Sustainable Built Environment Initiative (SBEI)

Communities in small cities portray an in-between urban scale where sustainability challenges can be addressed at a local level (Bruen, 2014). According to the US Department of Housing and Urban Development, “Sustainable communities are places that have a variety of housing and transportation choices, with destinations close to home. As a result, they tend to have lower transportation costs, reduce air pollution, and stormwater runoff, decrease infrastructure costs, preserve historic properties and sensitive lands, save people time in traffic, be more economically resilient and meet market demand for different types of housing at different price points.”(*Sustainable Communities Resource Center*, n.d.)

The Sustainable Built Environment Initiative (SBEI) at Michigan State University (MSU) has been serving the communities in Michigan to battle community issues in a sustainable manner for more than a decade. Initially known as the ‘Small Town Design Initiative’ the purpose of this program is to assist communities to thrive by providing them with planning, design, and land use recommendations. This initiative is a joint venture by Michigan State University Extension (MSUE) and the School of Planning, Design, and Construction (SPDC) in MSU, to address sustainability challenges and improve the quality of life in Michigan communities. Collaboration among experts in Landscape Architecture, and Urban & Regional Planning programs in SPDC, along with MSUE’s institutes and Extension educators, empowers to address dynamic and complex community issues. The team generates a future vision for the community that reflects upon the residents' and local leaders' needs and desires. Through meetings and workshops with community members and stakeholders, SBEI offers planning and design solutions to conduct future development projects within the community under a sustainability theme. The visualizations showing the interventions in an existing situation work as a guide toward improvement. Upon securing funding, the projects are implemented following the recommendations and action steps of SBEI. The objectives of SBEI are to “work with communities to develop sustainable planning and design ideas for local issues and opportunities; build consensus and generate ideas to address challenging sustainability concerns; act as a bridge between communities and consulting planning and design professionals, and provide in-community student learning, and serve as a creative and scholarly outreach and engagement work endeavor involving campus faculty and field extension educators.”(*Sustainable Built Environment Initiative*, 2022). Any local government and nonprofit organization unit can apply for assistance from SBEI for their community. Township, charter

township, village, city, and county units of government are eligible to go through an application process to get assistance from SBEI. This study evaluates 14 SBEI projects in 13 communities that went through a collaboration with SBEI since 2014 and conducts an in-depth analysis of three of the 13 communities to assess the sustainability standard in those communities.

Each community is different in its needs and requires customized solutions in planning and design. The scale of the project also varies for each community. While some communities focus on specific streets or corridors in the community, others may wish to incorporate a whole downtown or neighborhood. The communities selected for this study include small interventions such as reimagining a public plaza in Cadillac, Michigan as well as large-scale interventions such as developing several zones to improve the whole area in Edwardsburg, Michigan. Some examples from different communities where the SBEI team worked include river-street and riverwalk improvement, urban parks/fairgrounds revitalization, improvement of downtown streetscapes, bikeways and trails, open space systems, beautification, land use, signs, industrial/commercial reuse, urban agricultural, land preservation, ecosystem management, neighborhood/residential development, and climate and health adaptation plans. In these projects, SBEI incorporates sustainable solutions for communities through placemaking, low impact development, climate adaptation, low energy use, and promoting mixed-use development. With all these measures, SBEI attempts to create vibrant city spaces full of activities that will attract residents to live, work, and play. Varieties in the scope of work of SBEI put this program in a unique position to evaluate development challenges and barriers prevailing in Michigan communities.

For the identification of existing issues and future visioning SBEI projects relies heavily on community feedback. Community meetings held at different stages of the process work as a platform to build consensus regarding how the future of the community will look. Engaging community residents through meaningful conversation is a crucial part of communicative planning (Fischler, 2000). Interactive sessions to keep people motivated to participate are considered a success in a public participation-based decision-making process. SBEI provides the structure to mediate the community meetings to bring the best outcome out of it in forms of consensus on various community issues and challenges. Providing a clear understanding of potential assets, challenges, and probable practical solutions where residents feel valued and heard is essential to keep the community moving during the project.

How the SBEI projects helped evolve the communities in the realm of sustainability can play a significant role in planning and designing of sustainable community revitalization efforts in the future. In this respect, the current state of 14 SBEI projects in 13 communities that is assessed in this study through interviews with local leaders and evaluation of the local ordinances. These communities are at different phases of implementation of their respective SBEI projects. It is worth noting that, as communities are aware of the standards of sustainability through the SBEI project process, it might influence the overall state of the community sustainability beyond the initial scope of the specific SBEI projects. Besides the evaluation of 14 SBEI projects, a sustainability audit tool is employed to evaluate the implemented SBEI projects in three communities and the overall state of these communities with relevant sustainability metrics.

CHAPTER 2: LITERATURE REVIEW

In this section, the current knowledge in the field of sustainable community revitalization is illustrated in a series of sub-sections. Starting with the broad area of sustainable development, how the concept of sustainability has been implemented in revitalization projects as well as the indicators/tools to measure sustainability in those projects, are discussed in later sub-sections. The advantages and disadvantages of different sustainability tool sets have also been illustrated here. After that, community-level sustainability which is a smaller and more specific unit of urban-scale sustainability is expanded. Lastly, the significance of the built environment in community sustainability, the challenges of small city communities, and how the built environment affects the sustainability of these communities are discussed. All these studies supported the understanding of the measurement of community revitalization sustainability which is the focus of this study.

2.1 Sustainable development

While the concept of sustainable development is not new, the definition of sustainability as well as the comprehension of how sustainable development can be achieved have evolved over the years. The 1987 Brundtland Commission report for the United Nations is the most common definition of sustainability. It defines the concept as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (UNESCO, 2015). A key component of a working definition of sustainability is the concept of systems thinking. Systems thinking recognizes that no action occurs in a bubble because every facet of the biosphere is part of an interconnected structure with limitations. A sustainable system provides equal consideration to environmental stewardship, social equity, and economic efficiency (Sustainable Communities, Introduction, 2012). In the past, it was more common to simply focus on one or more of these categories separately.

The concept of sustainable development (SD) is based on the interdependence of three dimensions: environmental, economic, and social (Lin et al., 2021). Each of these dimensions closely relates to the other ones and makes a complex web of correspondence. Sustainable communities acknowledge that environment, society, and economy are all interdependent factors that contribute to a community's sustainability. For the last few decades, sustainable development has become an environmental as well as a political movement in various parts of the world (Visvaldis, 2013). During 1992 SD took its position as a political objective in various summits and Rio conferences with some important policy frameworks. Some of the policies include the

comprehensive action plan Agenda 21 (1992 reaffirmed in 2002) (United Nations Conference on Sustainable Development, Rio+20 .:. Sustainable Development Knowledge Platform), Aalborg Commitments (1994) (Aalborg Commitments), Framework "Driving forces Pressures, State of the Environment, Impacts, Response" (DPSIR)(Indicators for Sustainability - Sustainable Cities International) adopted by European Environment Agency (2005), and UN's Global Initiative "Millennium Development Goals (2001) (Kurtas, 2021). Some international non-government bodies such as the 'Cities for Climate Protection Campaign' also offer policy frameworks for sustainable cities (Bruen, 2014). It is an international association of local governments and associations committed to sustainable development. Other organizations such as "The Natural Step" (TNS) are also working on sustainable development issues in cities. International reports such as Ecological Footprint Network, Global City Indicators Program (GCIP), the UN's Human Development Index, and The Intergovernmental Panel on Climate Change contain a wealth of global indicators and data (Visvaldis, 2013). In 1999 EU's Amsterdam Treaty also established SD as one of the main milestones for EU18 (Treaty of Amsterdam). With the aforementioned instances, it is evident that sustainable development has become a widely used concept in the political, local, national, and international spheres.

The goals of SD broadly define what should be achieved in action steps. However, in implementation, they often fall short of making a balance among the dimensions of sustainability (Bruen, 2014). The concept provides a vast abstract field to cover under the umbrella of SD. Things become more complex when there is a lack of cooperation among the government and non-government entities, and the capabilities of stakeholders are limited. Also, the policies and frameworks for SD are considered to pressure developing and less industrialized countries from the wealthier countries to facilitate their economic gain (Ovsiannikova & Nikolaenko, 2017). The conversation continues on the advantages and drawbacks of SD in countries with different socioeconomic statuses. In criticism, there is an argument that no clear evidence has been found as proof to ensure economic growth with SD considering the conflicting nature of environmental and social aspects (Ovsiannikova & Nikolaenko, 2017). Despite the pitfalls in the sustainable development concept, it has become a powerful tool to work with in the present era. Therefore, the significance of planning, evaluation of action steps, target setting, and forecasting is expanding in sustainable development.

2.2 Sustainability in revitalization

In the literature, there is a lack of agreement on the definition and concept of "sustainable revitalization" (Natividade-Jesus et al., 2019). Parallel terminologies are often found in the field of revitalization when it is associated with sustainable urban aspects. The concept of rebuilding some parts of the city is often titled redevelopment, while sometimes it is coined regeneration, reconstruction, renewal, renovation, or revitalization (Schuetze et al., 2017). The Handbook on Urban Regeneration, edited by Peter Roberts & Hugh Sykes (2000), identifies the evolution of urban regeneration as a constant movement from reconstruction in the 1950s to revitalization in the 1960s, renewal in the 1970s, redevelopment in the 1980s, and regeneration in the 1990s. In academia as well as professional practices, the word regeneration is not widely used in the US and also in European countries (Natividade-Jesus et al., 2019). Revitalization and renovation are two of the most conflicted terms in the existing literature. In this study, I resort to using the term 'urban revitalization' since it broadly reflects what Roberts (2000) calls urban revitalization, "A comprehensive and integrated vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change" (Urban Regeneration, A Handbook, 2000.).

Due to the lack of a single accepted theory of urban revitalization, I attempt to explore a few supporting theories in works in the urban area. The first theory is named the neighborhood life cycle theory. It starts in 1920 at the Chicago School of Sociology (Carpiano, 2006). According to the theory, neighborhoods are changing as a life cycle ends within the inevitable decline. This is regarded as the natural system of the urban environment. In 1975 the Real Estate Research Corporation showed that a healthy neighborhood goes through several levels of decline in its life cycle which chronologically are as follows: incipient decline, clearly decline, accelerating decline, and abandonment (Housing – Real Estate Research Corp, 1974-1975). From the insight of this theory urban revitalization is seen to be a tool to reverse the process of decline to keep the neighborhood revitalized with rising property values.

The Handbook of Urban Regeneration by Peter Roberts is a widely accepted source of analysis on urban revitalization theory and practice. In his writing, he contends that revitalization is something rooted in practice rather than theory. He goes on to synthesize the main elements of urban revitalization: (1) an interventionist activity, (2) an activity that straddles the public, private,

and community sectors, (3) an activity that is likely to experience considerable changes in its institutional structures over time, (4) a means of mobilizing collective efforts, and (5) a means of determining policies and actions designed to improve the condition of urban areas (Urban Regeneration, A Handbook, 2000)

2.3 Different tools to evaluate sustainability

To assess the current conditions of cities, study past proposals, and forecast future development, to monitor and document ongoing projects, professionals constantly use various sustainability indicators (Schuetze et al., 2017). The evaluation of revitalization sustainability is a complex process with the interrelation of numerous indicators and sometimes their conflicting interests. However, revitalization projects are significant for policy development that can contribute to the improvement of social, economic, and environmental aspects. For that indicators-based approaches are frequently used to assess sustainability to help the planners and researchers in this field. Previous studies have extensively paid attention to the ex-post evaluation (i.e., the assessment of plans after the execution of projects) of sustainability approaches (Giusti & Maraschin, 2017). In addition, there are several evaluation frameworks for comprehensive assessment from a European standpoint. The most commonly used evaluation or certification systems to measure urban revitalization sustainability are Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND, USA), the Building Research Establishment Environmental Assessment Method (BREEAM, UK), and the Comprehensive Assessment System for Built Environment Efficiency (CASBEEUD, Japan) (Zhu et al., 2019). These are all indicators for ex-post evaluation.

In some studies, all dimensions of sustainability are not considered to minimize the complexity of the process. These studies are often treated as recommendations making proposals based on selective dimensions of sustainability. For example, Buzási and Szalmáné Csete (2017) established an assessment framework focusing on only three parameters of climate change adaptation. They used a questionnaire to measure sustainability for 6 regeneration projects north of Budapest (Buzási & Csete, 2017). Some researchers have specifically focused on social and physical dimensions of sustainability to create a decision-making framework on Residential Environmental Maintenance Index (REMI). The purpose of this study was to support the prime concerns of housing revitalization projects under the Korean legal system (Bae et al., 2019). The environmental aspects of sustainability have not been taken into account there.

In addition, several studies have also proposed complete frameworks for evaluation, taking all dimensions into account. For example, Polat et al. (2016) used the AHP method to evaluate 12 different revitalization projects in Turkey (Polat et al., 2016). The AHP method proposed by Saaty (1980) is a classic method for focusing on different criteria in both ex-ante (i.e., the assessment of plans before the execution of projects) and ex-post assessment (Wedding and Crawford-Brown, 2007). However, the criticism of this method is that it assumes the dimensions of sustainability to be fairly independent, while in real-world decision making the dimensions have a complex causal relationship (Tzeng and Shen, 2017; Spina, 2019).

In another study, Huang et al. (2020) presented an urban revitalization sustainability evaluation model where two of the dimensions have been considered. It was an effort to measure sustainability at a neighborhood scale for building conditions. The proposed method wraps up subjective and objective aspects of neighborhoods to address various concerns and issues such as social, economic, environmental, land use forms, construction conditions, and facility conditions (He et al., 2021). To complement the process a questionnaire survey was conducted with traditional linear statistical methods. Similar methods to this have been used in some other studies (P´erez and Rey, 2013; Buzási and Szalmáné Csete, 2017; Zheng et al., 2017a, 2017b). However, it is still hard to resolve the composite causal relationship among the aspects mentioned above (Shen and Tzeng, 2018). Some studies of ex-post assessment have worked with the Analytic Network Process (ANP). In the ANP the interdependence of the dimensions is taken into account (Chen et al., 2018; Chiu et al., 2019; Spina, 2019; Nestico et al., 2020). The criticism of this method is that it falls short of offering a systematic way for calculating the interdependence of dimensions, questioning the authenticity of measurement (Golcük ¨ and Baykasoglua, ˆ 2016). More recently, advanced methods such as the DEMATEL (Decision Making Trial and Evaluation Laboratory) have been introduced in the evaluation of urban regeneration (Manupati et al., 2018; Vardopulos, 2019; Zhu et al., 2020). Theoretically, it plays a sound role in measuring the sustainability of an urban revitalization project. However, the mathematical process of determining the interdependence of dimensions in this method is so meticulous that it could not be applied to any existing real case.

2.4 Sustainable revitalization for communities

The role of communities in both national and international contexts is getting reinforced as centers of social, economic, and environmental activities in the last few decades. Besides this, with the unprecedented growth of the population and their demands, scarcity of natural resources and

environmental pollution became burning issues in the later part of the 20th century (Garau & Pavan, 2018). To address these issues and concerns, the idea of the sustainable revitalization of communities appeared in the practice of urban development. It has reshaped the approach to planning and design and prompted the associated entities to see things through a lens of sustainability. Around the world, communities are considering innovative ways of investing in the sustainable revitalization that will require fewer resources, protect the environment, and support a strong regional economy (Balsas, 2007). According to a coalition of environmental groups, sustainable revitalization of communities will be a "hot topic" in the next 50 years (Spartan Newsroom, 2011).

Sustainable revitalization has been used for communities since 1994 through the Aalborg Commitments (Aalborg Commitments). The Aalborg Commitments were established in 2004, 10 years after the Aalborg Charter, and is a declaration signed by over 700 cities and towns showing their commitment to a sustainable future. The Commitments were endorsed at the 4th European Conference on Sustainable Cities & Towns held in Aalborg (2004). The event's purpose was to develop a common understanding of sustainability and develop a framework to be used at the local level that would better articulate how to embed sustainability across sectors. The commitments encompass a list of qualitative objectives organized into 10 themes, such as Governance, Local management towards sustainability, Natural commons goods, Responsible consumption and lifestyle choices, Planning and design, Better mobility, Less traffic, Local action for health, Vibrant and sustainable local economy, Social equity and justice and Local to global (Aalborg Commitments). Later, these themes became the foundation of sustainable community planning in cities.

While sustainability is seen as a compact outcome and an integrated approach, communities in towns and cities are dynamic and open to constant remake (Balsas, 2007). To gain substantial results, town planners are often suggested to adopt strategies for a particular community instead of pursuing the big picture of sustainable urbanism. Focusing on a local scale is beneficial to address the social, political, economic, and environmental realities of the specific area (Balsas, 2007). Attaining sustainable revitalization at the local level could be difficult, too due to the nature of the place and the demands of residents. A balance between theoretical demands and the practical situation is required for such cases.

For sustainable revitalization at a community level, the availability of resources, a favorable environment, and engaging stakeholders are needed (Lee & Chan, 2010). The degree of achieved sustainability can be measured through several frameworks. The European Common Indicators for the Urban Environment (2002) has the most recent indicators of community sustainability. Other frameworks include Complete Community Indicators for U.S Towns and Cities (2012), Reference Framework for European Sustainable Cities (2008), Sustainability A-Test (2006), and Sustainable Cities International (2012). In each framework, the ideas differ from each other but all of them address some common aspects of urban life such as transportation facilities, aesthetic streetscape with amenities, public places for gathering for city people, promotion of local products, safe commute to and from school for kids (Lee & Chan, 2010). Some frameworks even focus on the sustainable community from a life event perspective such as living, working, moving, thriving, etc (He et al., 2021).

2.5 Community Engagement as a Tool for Sustainable Development

Community participation with visual communication can promote social learning creating an atmosphere where the diverse group can come together and discuss prevailing issues and associated concerns (Mimura et al., 2014). Effective public engagement in decision-making on urban issues is seen as important for the effectiveness of sustainable development and the quality of the planning outcomes, improving the quality of political decision-making and to validate to the planning policies (Cilliers, 2012). The goal of community engagement is to get the public perspective on community issues and the actual design of future modifications. The communicative approach to planning is not without crisis since distorted communication and lack of agreement during a consensus-building process are hugely common in the practical field (Fischler, 2000). Communicative theorists play a pragmatic role here by alerting the planners to the dangers of this process. As a matter of fact, one's individual values, needs, feelings, fears, and vulnerabilities will reflect upon open communication (Fischler, 2000). Therefore, intervention of planners, experts and government entities are needed to institute consensual decision-making processes. The idea of tangible and intangible products out of communicative planning puts things in a more dynamic spot. Legislation, new regulation, or proposals are seen as tangible products while intangible products are social, intellectual, and political capital through personal and professional relationships, trust building, genuine communication, and joint problem solving (Innes & Booher, 1999). In this scenario, people learn to share knowledge and are more likely to

negotiate potential conflicting issues. The process and outcomes are tied together in consensus building in the community engagement process. If the process is not regarded as fair, open, inclusive, and accountable, the outcome cannot be called legitimate no matter how good it is.

2.6 Significance of built environment in sustainable community

Modern urban studies consider an urban community as a place to provide the convenience of healthy life in the 21st century. The convenience of an urban community is gauged by the security, economic opportunities, welfare, health, comfort, mobility, and leisure that it gives to its people (Balsas, 2007). These facilities are provided and conditioned by the built environment, which satisfies the needs of residents such as needs for living places, transportation, education, recreation, and health care facilities. The urban built environment works as a spatial and material basis of urban areas development. The condition of the built environment shapes the attractiveness of the urban area which defines the dynamic of urban activities (Ball, 1986). The quality of this built environment helps in making an urban space livable.

The existing frameworks for measuring sustainability address a wide range of interconnected factors of community revitalization in an urban area. However, there is a scope of improvement in these frameworks, especially in the context of considering the urban built environment as a spatial and material basis of revitalization (Ball, 1986). In the existing literature, the built environment and its elements are studied by different indicators. However, there is often a lack of compatibility among these studies with one due to their unique approaches to treating the elements. In addition, many studies fall short of characterizing these elements as an integrated part of the whole system, making the assessment of sustainability more complex and the decision-making indistinct in urban planning (Ovsiannikova & Nikolaenko, 2017). In some studies, components of the built environment are addressed indirectly for measuring sustainability. For example, sustainability in the water supply system has been measured by total annual water consumption while the water distribution system has not been considered (Ovsiannikova & Nikolaenko, 2017). To get a holistic knowledge of working systems and work on the improvement of a system to make it more sustainable, the built environment needs to be addressed diligently.

2.7 Challenges for small communities

In the context of revitalization, large and small cities have been treated differently since they have different characteristics (Bruen, 2014). Small cities are more human in scale with less density and less traffic congestion. They are not dominated by large multi-national corporate

interests, lack big-budget projects, feature different retail structures, and have a close link with nearby residential neighborhoods (Visvaldis, 2013). Sometimes they own a high number of historic buildings than large cities.

Large city revitalization used to take place due to mega event operations (e.g., organization of Olympic games), flagship development, cultural planning, and sometimes the use of 'star architects' who designed post-modern structures, such as the Guggenheim Museum in Bilbao (Loftman & Nevin, 1995; Rodriguez & Martinez, 2003). Big events such as these do not take place in small cities. Apart from these large cities get more attention in the regional development agenda (Visvaldis, 2013). The story of the world bank reveals that large cities offer competitive advantages over small cities. In Europe, data analysis for the period of 1995-2004 the NUTS-3 level by L.Dijkstra and H.Poelman has shown that "cities with over 50,000 people were more likely to offer diverse employment opportunities, higher education, specialized health care, a sizeable local market, shops and services such as banking. All of these aspects influence the region's capacity to attract and retain people and its labor productivity". Large cities also provide cheaper transportation resulting in economic benefits for businesses. On the other hand, small cities lack investment and scope to flourish, battling in an interest-based economy (Bruen, 2014). As a result, life in the smaller cities becomes less vibrant and active. Besides, small cities are constantly faced with a variety of difficulties such as struggling to attract new development projects, struggling to attract people to outdoor activities during evenings and weekends, losing local businesses due to an imbalanced competition with discount stores and suburban malls, failing to properly utilize retail and parking spaces often leaving them vacant or underused (Bruen, 2014). Numerous planning efforts are going on around the world to address these concerns. For example, for revitalizing a small town in Porto City in Portugal, major interventions were carried out in the public squares and streets to improve pedestrian mobility and attract people to the downtown (Balsas, 2007). Improved pedestrian mobility has not only enhanced safety and comfort for the people on street but also promoted economic activities around the public squares and plazas for retailers. At the same time, it is expected to reduce dependency on motorized vehicles, reduce the usage of fossil fuels and eventually be environmentally beneficial.

2.8 Scope of the study

In terms of sustainable revitalization, small cities are generally more sustainable than big cities since there is less pollution and congestion. However, this only focuses on the environmental

aspect of sustainability. Addressing the socioeconomic dimensions is critical in small city revitalization initiatives. Revitalization in these cities tends to focus on improving public space, streetscaping, pedestrian connectivity, retail store modernization, and incorporating roadside amenities to keep the cities active and lively (Balsas, 2007). Proper evaluation of the impact of these steps in promoting sustainability in small cities or communities in the social, economic, and environmental dimensions through the built environment is also just as important to advance our understanding and planning efficacy. There are some evaluation efforts for measuring sustainable revitalization in communities of European countries. In US revitalization activities at a community scale, their process, and the evaluation of sustainability with indicators is an understudied area in the academic literature on sustainable revitalization planning.

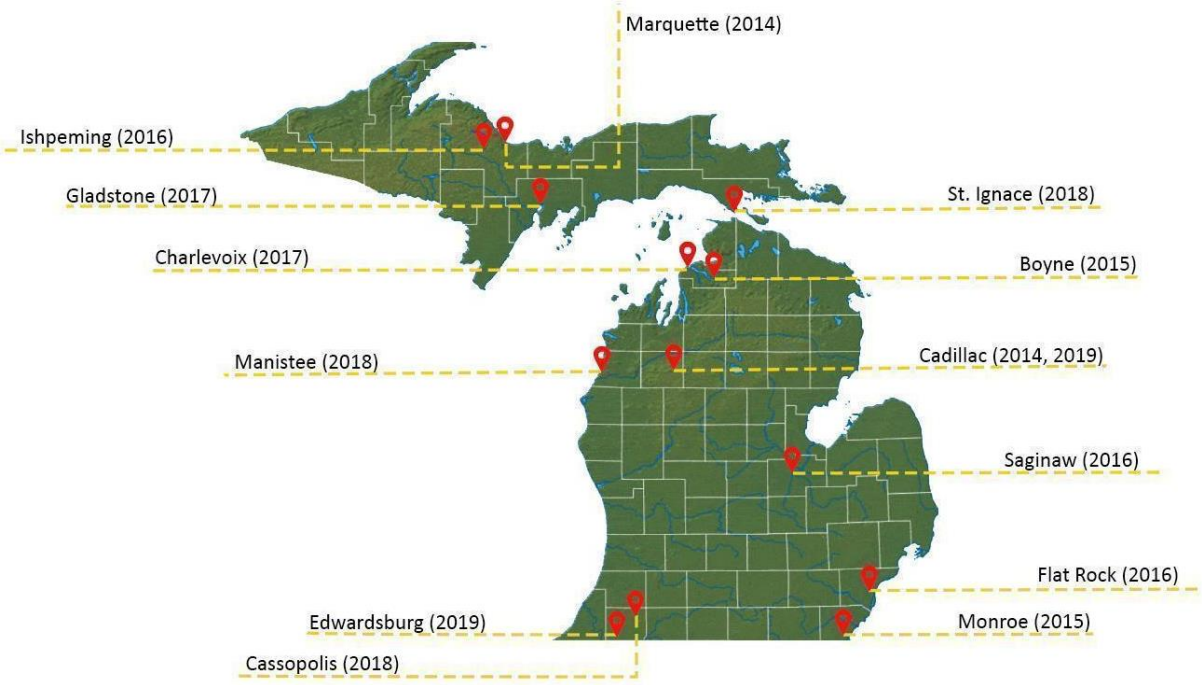
To address this deficiency, in this study 14 SBEI projects in 13 small communities in Michigan are assessed to analyze the SBEI effort in promoting community sustainability. 3 communities among those 13 are chosen for case study to perform a thorough evaluation. The goal of this study is to utilize a sustainability tool to evaluate the current sustainability standard of these communities, evaluate the planning recommendations provided by SBEI to assess if they meet the criteria of sustainable revitalization in the communities, and evaluate the contribution of SBEI projects. The study also aims to portray an assessment of the implemented projects to understand how the projects are influencing these communities' future approaches toward sustainability.

CHAPTER 3: METHODOLOGY

3.1 Study Area

This study aims to measure the sustainability of the urban built environment and evaluate the Sustainable Built Environment Initiative (SBEI) project's impact on small communities in Michigan. By studying the sustainability trend in three sample communities and assessing the influence of 14 SBEI projects in 13 communities (Figure 3.1), this study sheds light on the current situation in the communities and their approach toward future development.

Figure 3.1: Location and completion year of 14 SBEI projects in 13 communities in Michigan



The SBEI team has worked closely with over 25 communities providing individualized planning and design solutions. For this study, 13 among those 25 community leaders responded for the project's evaluation interview. As shown in Figure 3.1, these communities are Marquette, Monroe, Saginaw, Boyne, Flat Rock, Ishpeming, Gladstone, Charlevoix, Manistee, Edwardsburg, Cassopolis, St. Ignace, and Cadillac. It should be noted here that, Cadillac is counted twice since SBEI worked on two separate projects in Cadillac. One in 2019 that focused on portions of the City of Cadillac, Clam Lake Township and Haring Charter Township. The other was in 2014 that focused a lakeside block of downtown Cadillac in between W Harris St and W Cass St. The map shows that the communities studied are scattered throughout Michigan, located in the upper peninsula and the north, west, east, southeast, and southwest parts of Michigan. The oldest project

sites included in this study are in the cities of Cadillac and Marquette (2014), while the most recent one is in Edwardsburg (2018). Among the communities, there are small villages such as Cassopolis and large city areas such as Marquette. Out of the 13 communities, 7 are located either by the shore of the Great Lakes or by small/medium-scale water bodies. A common trend observed in the communities is to rely on the lakes for recreational and economic activities. From the perspective of sustainability, preserving the quality of their recreational resources including the lake water has been a top priority of the communities. Under present circumstances, many of the communities are highly dependent on personal vehicles, even when the walkability score is good. The population size, area of the city/village/township, county name where SBEI project took place, establishment year, SBEI project year are provided in table 1 to show the diversity of the communities studied for this thesis.

Table 1: County name, area, population, establishment year and SBEI project year of 14 SBEI projects taken for evaluation in this study

Name of the SBEI project area	Area (city/village /township)	County Name	Population (city/village /township)	Establishment Year	SBEI project year
Cadillac (Heritage Plaza)	8.94 sq mi	Wexford	10,371	1877	2014
Marquette	19.40 sq mi	Marquette	20,629	1871	2014
Monroe	10.21 sq mi	Monroe	20,462	1837	2015
Boyne	5.34 sq mi	Charlevoix	3,816	1907	2015
Ishpeming	9.36 sq mi	Marquette	6,140	1873	2016
Flat Rock	6.71 sq mi	Wayne	10,541	1965	2016
Saginaw	17.81 sq mi	Saginaw	44,202	1857	2016
Gladstone	7.99 sq mi	Delta	5,257	1889	2017
Charlevoix	2.05 sq mi	Charlevoix	2,348	1905	2017
Cassopolis	2.23 sq mi	Cass	1,712	1863	2018
St. Ignace	2.65 sq mi	Mackinac	2,306	1883	2018
Manistee	4.53 sq mi	Manistee	6,259	1846	2018
Cadillac (Mitchell Street Corridor)	8.94 sq mi	Wexford	10,371	1877	2019
Edwardsburg	1.02 sq mi	Cass	1,304	1911	2019

Most small communities studied here have an active pool of citizens and local authorities trying relentlessly to improve the quality of life for the community residents. Needless to say, each of these communities has different assets to work on and challenges to address. While working

with one specific community, the SBEI team identifies the assets and resources to capitalize on and creates unique plans to utilize the resources for the betterment of the community. The primary purpose of the projects is to create vibrant places within the community, promoting pedestrian safety, walkability, and active social gathering spaces.

3.2 Community Engagement

Participation of community residents and local leaders is an integral part of the SBEI projects. These projects are continually directed by public input through interviews, stakeholder meetings, and community engagement workshops. The overall framework of each undertaken project has three phases. The first phase focuses on identifying existing issues and challenges in the community and the engagement of different stakeholders. This phase is the future visioning step where the community residents express their aspirations for future development. They are asked to talk about everything they are proud of about the area as well as things that make them sorry. The second phase provides planning and design goals to the communities through a set of policy recommendations and visualizations. These visualizations provide options about future development and how those may look after the execution of the plans. In this phase, the images are displayed to the community for their feedback. Through sticky notes and feedback sheets, the residents express their thoughts about the design. Residents feedback are documented by the SBEI project facilitator at each meeting. Upon receiving the input, the final designs are prepared to address the comments. These modified images along with the planning goals, recommendations, and action steps are presented at the final meeting in front of the community residents and the local leaders. Figure 3.2 shows the three community meetings of SBEI project in Edwardsburg in 2019. The timeline of the community meetings for all the 14 SBEI projects in Michigan are shown in Table 2.

Figure 3.2: (a)First, (b) second and (c) third community meeting at Edwardsburg in 2019

Table 2: SBEI project area and meeting dates of stakeholders for each project

Name of the SBEI project area	Meeting 1 date	Meeting 2 date	Meeting 3 date
Cadillac (Heritage Plaza)	December 5, 2013	March 4 & 5, 2014	July 15, 2014
Marquette	February 27, 2014	April 29 & 30, 2014	July 24, 2014
Monroe	March, 2015	April, 2015	August, 2015
Boyne	May, 2015	July, 2015	September, 2015
Ishpeming	May 17, 2016	August 31, 2016	December 1, 2016
Flat Rock	February 17, 2016	June 8, 2016	October 11, 2016
Saginaw	November 19, 2015	February 26, 2016	June 7, 2016
Gladstone	February, 2017	June, 2017	September 11, 2017
Charlevoix	June 7, 2017	August 17, 2017	November 13, 2017
Cassopolis	January 31, 2018	May 9, 2018	July 11, 2018
St. Ignace	June 14, 2017	September 12, 2017	December 11, 2017
Manistee	August 28, 2017	December 7, 2017	May 14, 2018
Cadillac (Mitchell Street Corridor)	August 23, 2018	January 31, 2019	August 6, 2019
Edwardsburg	February 25, 2019	June 25, 2019	23 September, 2019

For this study, local leaders of 13 communities are interviewed to get insight on 14 SBEI projects (2 projects in Cadillac) regarding how they moved forward with these projects. They are asked about the current focus of improvement in the communities and how the SBEI program has impacted some of their later advents from a sustainable point of view.

3.3 Case Selection and Plan Evaluation

Three communities are selected as case studies where an extensive assessment has been conducted focusing on the sustainability parameters. The criteria for this selection include the communities being relatively well-equipped to address the issues their residents face. Also, they have a proactive organization to implement the recommendations provided by the SBEI team. The communities are unique in their sizes and characteristics and offer diverse issues to work on. The three communities are Cassopolis, Cadillac, and Marquette in Michigan. These are the county seats of Cass County, Wexford County, and Marquette County, respectively. The county seat is a term that refers to the center of administration for a county. It is considered the most important town in a county where the local government administration office is located (*County Seat Definition*, 2022). Since the SBEI team works closely with Downtown Development Authorities/local leaders, these county seats have comparatively favorable circumstances to implement development plans. The comprehensive plans/master plans, zoning ordinances, and Capital Improvement Plans (CIP)

of these communities are reviewed to get a holistic idea of their future approach toward community development and the current practice of sustainable development.

3.3.1 The City of Cadillac

Cadillac is located in the northwest part of the lower Peninsula in Michigan. It is the County seat for Wexford County, being the county's largest urban center with a population of 10,324 based on the 2020 U.S. Census. 95.3% of the residents are white here with 2% African American. 49.3% of the population is female and most of the population (49.4%) fall within the age group 18-6 (U.S. Census Bureau QuickFacts, n.d.). The average age of a resident in Cadillac is 38.8 years old (younger than the State of Michigan at 39.3). The city is located at the intersection of several major highways, including U.S. Route 131, M-55, and M-115. According to the U.S. Census Bureau, the city has a total area of 9.02 square miles, of which 7.16 square miles is land and 1.86 square miles is water. The 1,150-acre Lake Cadillac is entirely within the city limits. The commercial center of the city is located on the eastern edge of Lake Cadillac. Mitchell Street is the traditional corridor of travel through town which is the city's tree-lined main street.

There are three industrial parks in the city containing about 7% of the total land use. These industries generate 47% of the city's tax, impacting the economic performance of the area greatly. The city of Cadillac has a small-town feel which the residents prefer to preserve. However, the summer in Cadillac is full of tourists from different parts of Michigan. The city center is close to lake Cadillac and draws the attention of visitors by providing facilities for boating and fishing. The city's immediate proximity to two lakes, Manistee National Forest, Pere Marquette State Forest, Mitchell State Park, and several major highways has established tourism as an important sector of the local economy.

SBEI project at Cadillac

The SBEI Project at Cadillac titled 'Cadillac Heritage Plaza Place Plan' took place in 2014. The project focuses on the Heritage Plaza area, a lakeside block of downtown Cadillac. A new plaza design was needed to help provide a framework for future development that would protect the area's historical, environmental and aesthetic qualities. The plaza was designed to be a gathering place in downtown for the city residents throughout the year offering various public amenities.

With the US-131 freeway by-pass opening around 2004, downtown Mitchell Street beside the plaza area no longer served as the primary through route for much of the north/south movement

of transient vehicular traffic through the regional area. The downtown lost its charm of being a destination place, losing many transient visitors. Improvements and modifications were made to the downtown segment of Mitchell Street in 2009 to make the roadway more pedestrian friendly and aesthetically attractive to residents and visitors. These included curb bump-outs at significant intersections, enhanced crosswalk markings, gateway treatment, new lighting, and landscaping. While the changes helped work towards the achievement of the goal, additional work was needed. This plaza project is designed to be the missing piece in the downtown to regain its lost, vibrant ambiance and promote business opportunities. Addressing this space has coincided with current projects, including the new Baker College student housing, new businesses, and connections to the White Pine Non-Motorized Bike Trail. This placemaking-based project area includes 20 enterprises, upper-story apartments, the Cadillac City Park, the Rotary Performing Arts Pavilion, Lakefront Park, Keith McKellop Pedestrian Pathway, and the eastern shoreline of Lake Cadillac.

Figure 3.3 Location of the City of Cadillac in Michigan and Wexford County (left), Location of SBEI project area in Cadillac (right)

In the community meetings of the project, participants frequently commented on the need for a better connection between Lake Cadillac and Mitchell Street, two of the prominent physical figures of the downtown. They also mentioned about lack of places for social and community gatherings. Addressing the user requirements such as event types, crowd size, flexible spacing, and seasonal usage that would bring people to the plaza created the overall sense of the newly designed place at downtown. Many of the fundamental design principles are centered around echoing the resident's thoughts regarding how they want the areas to look. Through the iterative community engagement process, the team came up with 8 planning and design goals. They are Physician Design and Walkability, Environmental Sustainability, Cultural Economic

Development, Entrepreneurship, Multiculturalism, Transportation Options, Messaging and Technology, and Education.

3.3.2 The Village of Cassopolis

Cassopolis is a village in the U.S state of Michigan and the county seat of Cass County. The village has a total area of 2.25 square miles, of which 2.00 square miles is land, and 0.25 square miles is water. Cassopolis is the town associated with Diamond Lake, the largest lake in southwestern Michigan. According to the U.S. Census Bureau, the population of Cassopolis in 2017 was 1,703. The primary access routes of M-60 and M-62 meet and cross directly through the Village of Cassopolis in Cass County. Thus, the amount of traffic coming through the Village along these roads can be a real asset to the economy of Cassopolis. Cassopolis is part of the Michigan Main Street Program, providing communities with various training opportunities to continuously pursue improvements in their downtowns.

The Village is diverse, with 60% white, 29.3% black, 2.6% Asian, and 4.5% Hispanic. The average age of a resident in Cassopolis is 29.7 years old (younger than the State of Michigan at 39.3). In 2010, it was 34.6 years old. 50.9% of the population is male (Census Profile, 2021). As the county seat, Cassopolis houses both Village and County government facilities. The location of these facilities brings local service to residents and employment opportunities for those who live in the area. The occupation of people in Cassopolis is broadly diversified among the service industry and manufacturing field. 49% of the population is engaged in the service industry, while 27% work in manufacturing. Cassopolis takes great pride in its many parks and recreational opportunities. The school parks, Southside Park, Clisbee Park, and Don Horne Park, offer play equipment and sports-related areas that the community uses quite frequently, especially the youth. Stone Lake Park is yet to be developed but provides a recreational area on Stone Lake.

SBEI Project at the Village of Cassopolis

The SBEI project at Cassopolis titled ‘Village of Cassopolis Broadway Corridor Vision’ happened in 2018. The project aims to develop a vibrant downtown for the area focusing on the Broadway Street corridor. The project intends to envision a lively and thriving streetscape and harbor amenities in public spaces that will make the downtown a place to live, work and play. The specific areas addressed are a cohesive vision for the Broadway Corridor, Broadway Street Corridor Shopping District, and a connection to Stone Lake. The corridor has a number of community assets, including the Historic Carnegie Library and the Historic County Courthouse

on the north, storefronts and second floor living spaces in the heart of the village; Stone Lake, and the Pioneer Log Cabin to the south. These assets are in place to be an attractive destination for residents and visitors throughout the year.

The village of Cassopolis was undergoing its masterplan update at the same time when the SBEI project took place there. As a result, the SBEI project was considered the first step toward a broader county-wide visioning process. The planning and design recommendations mentioned in the SBEI project have been a part of the current masterplan providing additional input into the masterplan update process. With a thorough and collaborative approach, the MSU team worked with the Cassopolis community to address the objectives and formulate an action plan of realistic solutions to achieve a more sustainable built environment.

Figure 3.4 Location of the Village of Cassopolis in Michigan and Cass County (left), Location of SBEI project area in Cassopolis (right)

Participants expressed their concerns for the Broadway Street Corridor area in the meetings regarding its safety, function, and aesthetics. Concerns included a lack of pedestrian facilities, activities, green space/parks, water recreation, and an empty storefront. The community feedback focuses on four themes to move forward: Streetscape Aesthetics, Connectivity, Culture & Scenery, and Adaptive Reuse.

3.3.3 The City of Marquette

The City of Marquette is located in Marquette County in Michigan. According to the US Census Bureau, the city has a total area of 19.45 square miles, of which 11.39 square miles is land and 8.06 square miles is water. The city lays in the central area of the Upper Peninsula and is connected regionally through major highways such as US-41 and M-28. Marquette serves as the county seat of Marquette County. Marquette is located on the shores of the Lake Superior, the world's largest freshwater lake. According to the 2020 US Census, the population is 20,629.

93.3% population of the city is white while 2% is American Indian and 1.7% African American. The average age of a resident in Marquette is 28.6 years old (younger than the State of Michigan at 39.3). 49.3% of the population is female.

Northern Michigan University is located in this city, providing a highly skilled labor pool for the city. Apart from Northern Michigan University, the largest employers in Marquette are the UP-Health Systems-Marquette, Marquette Area Public Schools, Charter Communications, and Blue Cross Blue Shield of Michigan. The city includes several small islands, such as Middle Island and Presque Isle Pt. Rocks, White Rocks, Gull Island, Lover's Island, Ripley Rock, and Picnic Rock in Lake Superior. The City of Marquette has several parks and recreational facilities for the residents and visitors. Presque Isle Park is the largest one, covering 323 acres of land area, primarily forested.

SBEI Project at the City of Marquette

The SBEI project at the City of Marquette took place in 2014 and was titled 'Marquette Baraga Avenue Placeplan'. Baraga Avenue is located in downtown Marquette between Third Street and Lakeshore Boulevard. It is a 75 feet wide road running through downtown Marquette. The project's primary objectives were addressing development and redevelopment opportunities and improving traffic, transportation, walkability, and access to adjacent neighborhoods.

Figure 3.5 Location of the City of Marquette in Michigan and Marquette County (left), Location of SBEI project area in the City of Marquette (right)

Feedback from residents and stakeholders laid the base of primary design principles. Visitors to this area expressed that they are in need of public space that would be safe and comfortable for pedestrians, reducing vehicular dominance on the street. The perpendicular parking was converted to an angular parking arrangement in the new design to address this issue. This arrangement freed up space for wide sidewalks that could accommodate indoor and outdoor

roadside cafes and restaurants. This change is expected to promote active nightlife in the city center. Redesigning parking, traffic calming, walkability, a public gathering space and improving the streetscape were several elements the team examined to improve this eclectic city street, which is home to a coffee house, garden shop, bakery, a laundry service and a museum among other businesses. The parking can function as parklets in the warmer season to create an inviting atmosphere for the seasonal visitor as well. In winter the same spots could serve as access points for snow storage and removal. While parking issues occupied most of the conversation during the project meetings, many of the stakeholders expressed concern for existing businesses along Baraga that need designated spaces for service drop-offs and pick-ups. To ensure local business efficiency, some roadside space was designed to be dedicated to these properties to increase ease of access to commercial frontage.

To promote business and new investment the SBEI team emphasized on a mixed-use development on Baraga which would also carry the vibe of a thriving downtown. The street was designed to be a multi-functional space for festivals, day and nighttime activities, fairs, and large-scale events. To accomplish all these changes the SBEI program provided the City of Marquette with planning and design solutions under 8 broad themes: Physical Design and Walkability, Environmental Sustainability, Cultural Economic Development, Entrepreneurship, Multiculturalism, Transportation Options, Messaging and Technology, and Education.

3.4 Data Collection and Measurement

3.4.1 Feedback from 14 SBEI projects in 13 Communities

In-depth interviews are conducted with the local leaders of all the 14 projects from 13 communities (two separate projects from Cadillac) to identify issues, challenges, current sustainability trends, and how SBEI contributed to those communities. The person contacted from each community was either the main contact during the respective planning process, or if that person was no longer associated with community or could not be reached, the SBEI team contacted a local official who had either participated in the planning process and was a local official at the time or participated in the planning process and is now a local official or did not participate in the planning process but is a current municipal official or member of the planning commission. Among the 13 interview participants from 14 SBEI projects (from 13 communities), 6 are city managers, 1 is economic development directors, 1 is Community Development Director, 1 is administrative

assistant, 1 is village manager, 1 is project director, 1 is member of Planning Commission, and 1 member is from the MSU Extension.

In the interviews, representatives/community leaders participate in a one-to-one zoom video session. Information provided by the participants in the primary data for this study. Snowball sampling was used to select and contact the interviewees. A copy of an informed consent document was provided, and the interviewees were informed that their responses would be confidential, and they could choose whether to answer any question or not. All interviews were recorded, and each lasted around 45 minutes. The interview questionnaire went through an IRB approval process before the interviews were conducted. The IRB approval code is STUDY00007408. Table 3 below shows the dates of each interview for 14 SBEI projects.

Table 3: Zoom interview dates for 14 SBEI projects

Name of the SBEI project area	Interview Participant	Interview dates
Cadillac (Heritage Plaza)	City Manager	27 April, 2022
Marquette	Community Development Director	14 July, 2022
Monroe	Administrative Assistant	8 July, 2022
Boyne	MSU Extension Member	18 July, 2022
Ishpeming	City Manager	7 July, 2022
Flat Rock	Economic Development Director	5 May, 2022
Saginaw	Project Director	15 April, 2022
Gladstone	City Manager	4 May, 2022
Charlevoix	City Manager	29 April, 2022
Cassopolis	Village Manager	11 April, 2022
St. Ignace	City Manager	23 June, 2022
Manistee	City Manager	7 July, 2022
Cadillac (Mitchell Street Corridor)	City Manager	27 April, 2022
Edwardsburg	Planning Commission Member	10 June, 2022

The interviews were framed as a conversation with prompting questions to put the interviewee at ease and to allow for dynamic responses. In the interviews, 15 questions are asked to the interview participants. Their responses to 6 out of these 15 questions are analyzed in this study since these questions are focused specifically on community sustainability and the contribution of the SBEI projects in the current sustainability trends of those communities. The responses of interview questions are listed in Section 4.1.2, Chapter 4 of this thesis. All the 15 questions are included in the appendix of this thesis. The interview responses are the primary source of data for this thesis. Based on the response from the participants, the author assessed how

SBEI projects have shaped the sustainability practice in the associated communities. The interview questions are listed below:

I. What is your community focusing on currently for community development? Why?
II. How important is sustainability within your community?
III. Can you provide any example where sustainability has been integrated within the community?
IV. Do you think the SBEI project has enhanced the community's future approach towards sustainable development?
V. Overall, what are your impressions of the SBEI process?
    a. What was most beneficial?
VI. Overall, what are your impressions of the SBEI process?
    a. What could be improved?

3.4.2 Sustainability Assessment for 3 Communities

Firstly, the current condition of the three communities is measured using a sustainability audit tool. Data for this measurement is collected from these 3 city's websites, current master plans, zoning ordinances, capital improvement plans, and interviews with local leaders. Later, the recommendations provided by the SBEI team are analyzed and the degree of their alignment with the `indicators of the sustainability measuring tools (see Table 4) are evaluated. Finally, the implemented projects in these three communities are assessed with the same sustainability audit tool to understand how the projects have assisted these three communities toward sustainability. The sustainability assessment tool used in this study is discussed below.

The sustainability measurement tool is developed by SPDC with funding from the U.S. Department of Housing and Urban Development (HUD) via a Sustainable Communities Regional Planning Grant (grant number #RC101486). This grant created the "Mid-Michigan Program for Greater Sustainability," which consists of nine sustainability-focused projects throughout the Mid-Michigan area. The online version of the tool, including additional resources and best practices is available at: Advanced Self-Assessment Tool . This assessment tool is a compilation of 32 indicators of sustainability, divided into the categories of Livability, Governance, Environment, Community, and Economy. Each indicator has associated metrics. In total, 71 metrics are included in this tool to provide a holistic, systems-based analysis of sustainability evaluation.

This tool has been designed by the research team at the Michigan State University School of Planning, Design, and Construction. Additional input and peer review was provided by members of the Sustainable Corridor Design Portfolio Task Force, including the principal planner and community planning and development director from Meridian Charter Township, executive director from Eaton County, and director of community economic development and township supervisor from Williamstown Township. Technical review was provided by Kuntzsch Business Services, Inc. For this indicators tool, resources have been analyzed from the United States Green Building Council (USGBC), American Planning Association (APA), U.S. Department of Housing and Urban Development (HUD), U.S. Environmental Protection Agency (EPA), U.S. Department of Transportation (DOT), Local Governments for Sustainability (ICLEI) and the Michigan State University Land Policy Institute (LPI) and School of Planning, Design, & Construction (SPDC), among others. This tool is a synthesis and adaptation of best practices from these sources and launched in 2014.

Table 3 presents the five categories and indicators under the categories of the audit tool. Specific metrics are developed to determine if an indicator is currently being met. To respond to each metric, the degree to which a particular community successfully addresses the question is indicated. For each metrics, communities are scored on a scale of 1 to 5, 1 meaning the community does not currently address the question in any way nor does it have plans or policies in place to address the issue, and 5 representing the community has fully managed the question and will continue to do so based on existing plans or policy. Based on the information available in the community's local ordinances (Masterplan, Zoning Ordinance, Community Improvement Plan, Community Strategic Action Plan and Official website) and the responses from the local leaders, the author scored the three communities under the 32 indicators mentioned below in Table 4.

Table 4: Synthesis of the five sustainability categories and the assigned sustainability criteria

Sustainability Categories	Sustainability Indicators
Livability	1.1. Education & Lifelong Learning 1.2. Responsible Buying & Consumption 1.3. Encourage Healthy Lifestyles: Health, Nutrition, and Recreation 1.4. Promotion of Diversity 1.5. Value Existing Communities 1.6. Mixed-Use and Transit-Oriented Development – Includes Mix of Uses & Walkable Neighborhoods 1.7. Provide Safe & Diverse Modes of Transportation 1.8. Wide Range of Housing Opportunity

Table 4 (cont'd)

Governance	2.1 Policy / Ordinances / Taxes 2.2 Regional Collaboration and Feedback 2.3 Enhance Economic Competitiveness 2.4 Transparency and Accountable Implementation 2.5 Urban Boundary System 2.6 Waste and Toxics Management
Environment	3.1 Energy 3.2 Air Quality 3.3 Water 3.4 Climate Change 3.5 Preserve Natural Resources 3.6 Open Space Preservation 3.7 Maintain Biodiversity
Community	4.1 Civic Engagement 4.2 Conflict Resolution & Mediation 4.3 Fostering Relationships & Shared Interests 4.4 Community Visioning 4.5 Culture, Art, Ethnicity, Heritage, and Celebration 4.6 Justice & Equity 4.7 Wide Range of Housing Opportunity
Economy	5.1 Coordinate and Leverage Federal Policies and Investment 5.2 Protect Local Staple Industries 5.3 Maintain Healthy, Local Business 5.4 Technology

The 5 categories to measure the sustainable practices of any specific community, as mentioned above in the table, are further explained below. Five categories are livability, governance, environment, community, and economy.

Livability: Livable communities are coordinated, collaborative environments that address their citizens' vision and needs by providing mixed-use neighborhoods and diverse housing options. These communities provide multimodal transportation options.

Governance: Sustainable governance engages citizen participation; it will function effectively and efficiently for all community members while cooperating to solve common problems

Environment: Preserving the natural environment is essential for maintaining community sustainability. Healthy ecosystems balance economic and conservation needs by assuring adequate resources to meet future needs.

Community: Sustainable communities develop clear visions for future courses, partner with different sectors, identify resources, and engage citizens to address common issues by creating peaceful solutions.

Economy: Economically sustainable communities establish local economies that are economically viable, environmentally sound, and socially responsible.

Under 5 categories, there are 32 indicators and under these indicators, there are 71 metrics that ask questions on various aspects of a community. For each question, a community is given a score on a scale of 1 to 5. For example, in response to the Livability metric: *Are density bonuses or other incentives offered to improve residential access to services and amenities?* A community's response may reflect the following relative to the 1-5 scale. This evaluation process for each question is open to interpretation based on community circumstances.

1. No density bonuses or incentives are offered, nor have they been seriously considered
2. No density bonuses or incentives are offered, but the planning commission has considered updating the zoning ordinance to incentivize mixed-use development in the central business district
3. The community is in the process of updating the zoning ordinance to provide density bonuses for mixed-use development
4. The community zoning ordinance provides a density bonus for mixed-use development, but developers have not widely used the bonus
5. The community zoning ordinance provides a density bonus for mixed-use development, and developers are taking advantage of the bonus frequently.

The points for each question are tallied at the end of each of the five categories within this tool. The category score falls into one of three sustainability classes: High, Medium, or Low. A High sustainability rating means that a community has addressed that topical area of sustainability with excellence. A Medium rating indicates that some sustainability measures have been taken within the community, but there is still significant opportunity to improve. A Low rating shows that the community is not currently addressing the sustainability category effectively. The detailed tool is provided in the appendix of this thesis.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 SBEI Projects' Impact on 13 Communities

In this section SBEI projects' influence on sustainable community revitalization is analyzed based on local leaders' insight and evaluation of local ordinances. To understand the perception of local leaders about the impact of the SBEI projects on their communities, in-depth one-to-one zoom interviews are conducted. The responses of the questions are expanded in the next two sub sections, sub section 4.1.1 and 4.1.2. These questions are of special interest because they are designed to understand the community's current condition regarding sustainable development and how the SBEI projects have impacted their attitude toward community sustainability.

4.1.1 Current Issues and Focus of Development in Communities

The first question focuses on identifying the existing issues in the selected communities and those communities' current development initiatives to address these issues. Typical responses for current development initiatives include improvement of infrastructure, amenities, local business, aesthetics, streetscape, pedestrian facility, mixed-use development, and housing to assist in dealing with pressing issues in the associated areas. For 11 out of the 13 local leaders (from 14 SBEI projects) report that lack of entertainment/amenities is one of the major concerns in their respective communities (Figure 4.1). Lack of recreation such as movie theaters, art, musical shows, and cultural shows leads small towns to be 'dead places'. Therefore, the cities aim to revitalize and improve their outdoor spaces, recreation facilities, and pedestrian amenities.

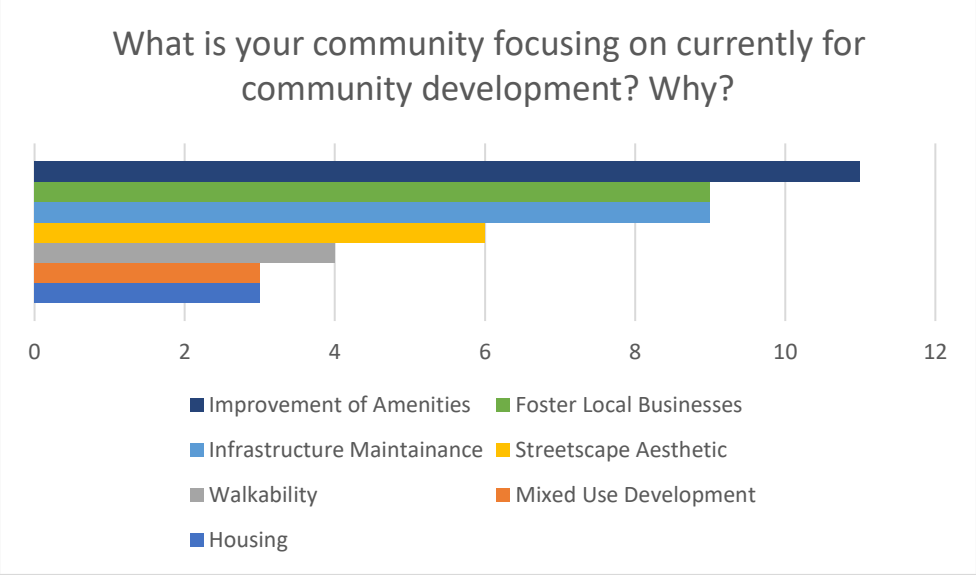
Poor maintenance of the existing infrastructure is another common issue in small communities. 9 out of the 13 interviewed leaders report that a lack of maintenance causes poor living standards for the community residents in small towns (Figure 4.1). Many communities do not adequately maintain utility services such as water and sewerage lines and drainage. The roads and sidewalks are cracked, crosswalks are not well painted, and streets are not well-lighted at nighttime. Communities are concerned with decaying and ill-maintained housing stock as well. Therefore, communities are planning to improve the housing stock and infrastructure to serve the communities better.

Lack of business growth and vacant storefronts are widespread phenomena in small communities, reported by 9 out of the 13 interviewed leaders. Residents and local authorities feel minimal scope for new investment in small towns. For example, big cities organize mega events

like Olympics and expositions, giving them huge infrastructure development marketing and funding. Along with the new infrastructure, new businesses have the potential for growth in those cities. People from different walks of life come to the towns, and there is considerable scope for an economic boom. On the contrary, small towns lack significant events and attractions and fall short of drawing people. There is no remarkable growth in business in small towns since investors do not find it profitable to invest there. Additionally, many communities have reported the closure of some of their businesses due to the Covid-19 pandemic. Therefore, communities emphasize mixed-use development fostering local businesses and assisting new businesses through incentives, as well as supporting them through organizations such as the Chamber of Commerce, the Downtown Development Authority (DDA), etc.

Poor aesthetics is identified as one of the reasons why small towns fail to attract people to their core. 6 out of the 13 interview participants stated that a brand or theme for their respective areas to promote marketing is missing (Figure 4.1). As a part of beautification, planter boxes, petunia pots, murals, wall arts, and welcome signages at the entrances are being installed. Tactical urbanism is being promoted in many communities to incorporate art on the streets to attract people. In this regard, signage/wayfinding is also being installed in different parts of the cities to market the community assets.

Figure 4.1 Showing frequency of responses to the question "What is your community currently focusing on for community development? Why?"

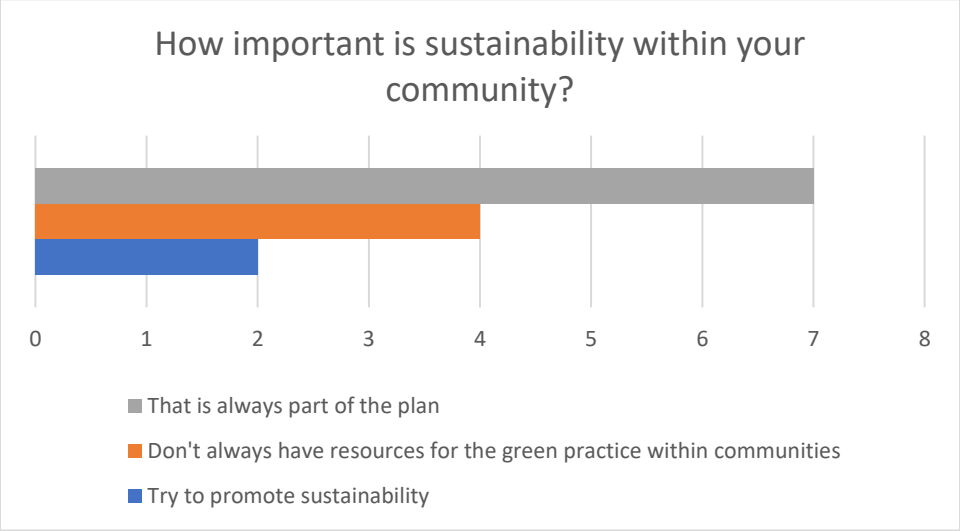


4.1.2 Contribution of the SBEI Projects to Current Sustainable Initiatives

The following 6 questions expand on the communities' perception of sustainability, examples within the communities where sustainability has been integrated, the contribution of the SBEI projects, and how SBEI projects could better serve the community in the sustainability scheme.

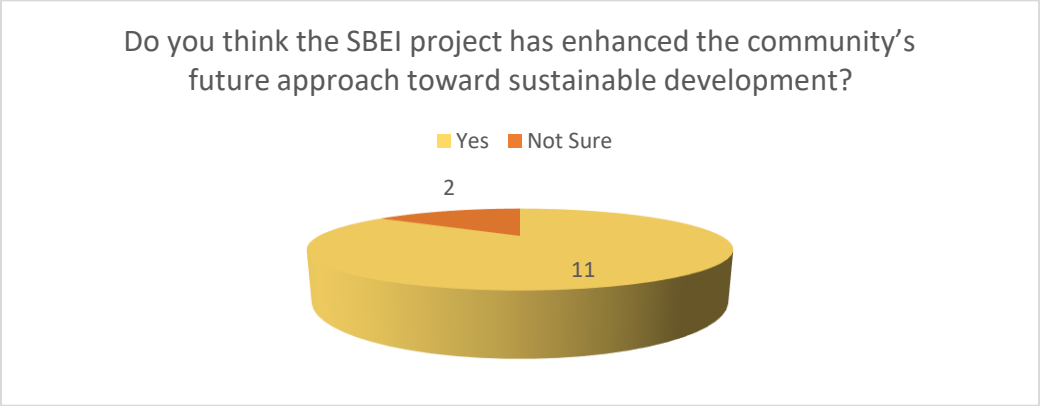
The first question seeks to shed light on the current stage of consciousness of the community leaders regarding sustainability asking 'How important is sustainability within your community?'. For 14 SBEI projects, 7 interview participants stated that sustainability has always been a part of their development plans, or at least they try to promote sustainable development ideas (Figure 4.2). 4 of them remained reluctant about incorporating the concept of sustainability in different aspects of their communities. Some of the local leaders mentioned that the projects are often done in haste, and there is often not enough time, workforce, or resources to integrate green practices within those projects. However, community leaders generally hold strong positive convictions about sustainable revitalization and its necessity in the current urban context. They mentioned that the SBEI projects in the communities created essential awareness about sustainability. Through the community meetings held for the SBEI projects, community residents were informed about the communities' future and felt involved in the communities' development process. The sustainable built environment concept spread throughout the communities, which brought a positive vibe among the people and helped the community to organize better.

Figure 4.2 Showing frequency of responses to the question "How important is sustainability within your community?"



When asked if the SBEI project has enhanced the community's future approach toward sustainable development, 11 out of the 13 community leaders responded positively (Figure 4.3). The communities found the projects to be stepping stones toward sustainability through the built environment. As part of the SBEI project, every community had received a detailed report before the collaboration between the SBEI team and the community ended. These reports worked as the foundation for the communities when preparing their long-term community plan, such as the masterplan/zoning ordinances/Community Improvement Plan (CIP) updates. Therefore, SBEI projects influenced the community's future approach by highlighting the sustainable techniques to revitalize the small communities and downtowns in Michigan.

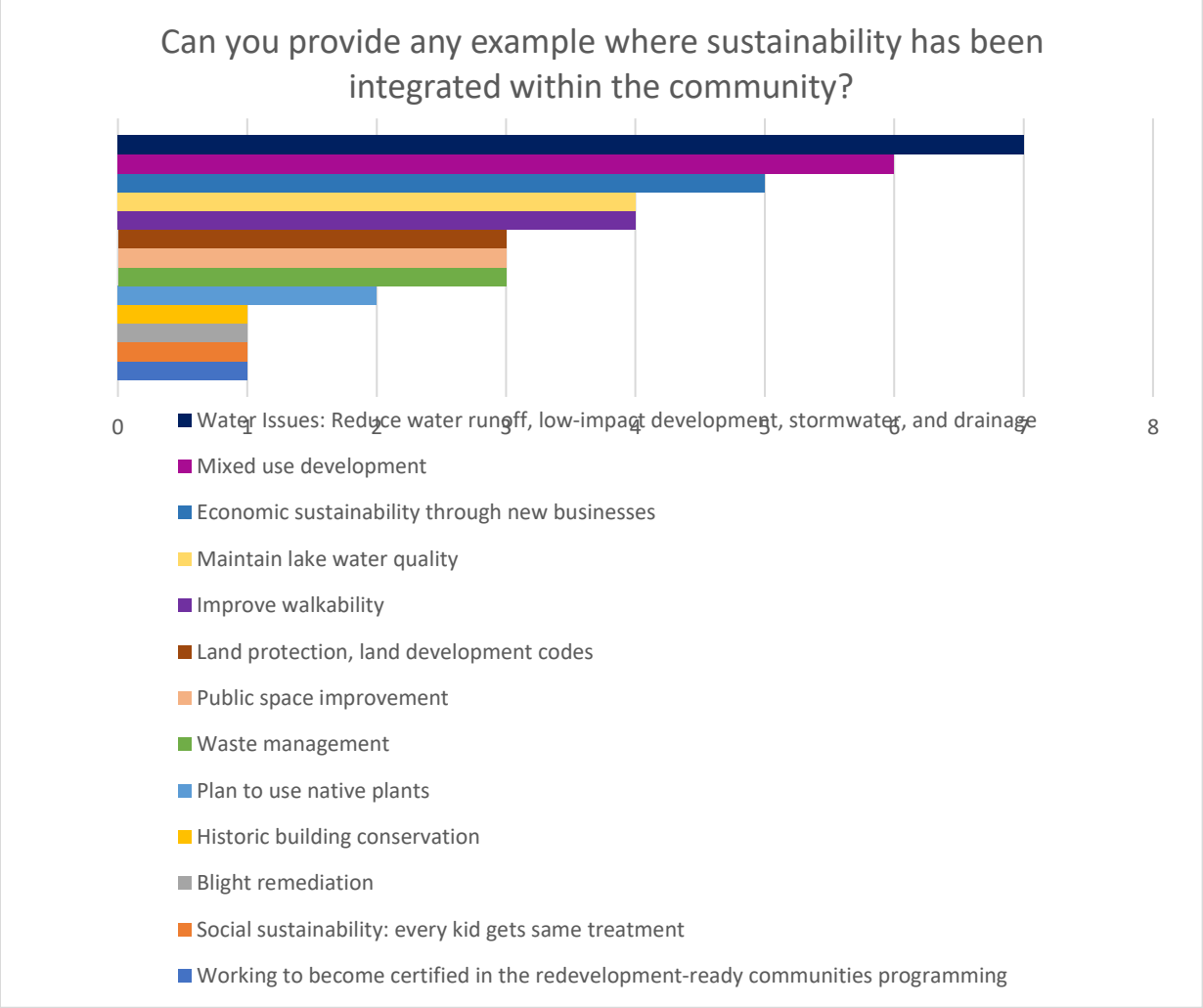
Figure 4.3 Showing frequency of responses to the question "Do you think the SBEI project has enhanced the community's future approach toward sustainable development?"



To a question prompting to provide examples of ways sustainability has been integrated within the community, the top responses are displayed in figure 4.4. The most common response was the management of water sources and the supply to ensure clean and fresh water for community drinking and recreation (Figure 4.4). One of the reasons for this common response is that 8 of the study areas are either beside the Great Lakes or lakes of a smaller scale. Since these lakes have become a supreme identity of those communities impacting their local economy, recreation, and natural beauty, maintaining this lake water quality has become a prime concern for the communities. Many communities in this study face flash flooding due to heavy rain, and surface water runoff is a common phenomenon in these areas. Several communities have implemented low-impact development to reduce water runoff and maintain lake water quality. The water treatment plants and wastewater management plans have received priorities to ensure healthy living for the community residents.

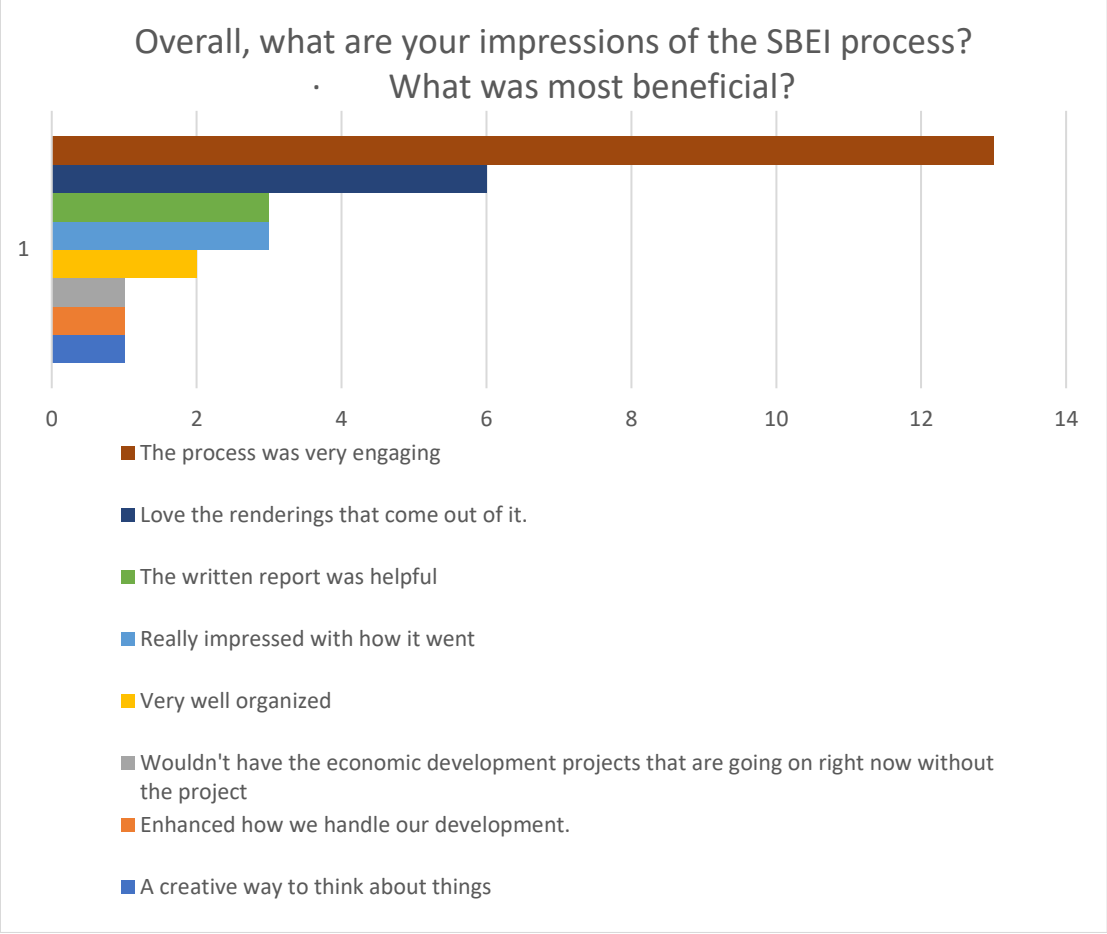
The communities are also focusing on mixed-use development. 6 out of the 13 interviewed leaders mentioned that by promoting mixed-use development, they are improving walkability in the downtown area and enhancing pedestrian safety and accessibility. Downtowns are being improved in aesthetics and functionality, attracting new people and businesses. Several communities have enacted land development codes to protect their land and water. In these communities, negative environmental impacts due to the establishment of industries are being mitigated by the industries themselves, a requirement set by the local jurisdiction. Communities also focus on preserving historic buildings, planting native tree species, reducing blight in the community, and providing equal opportunity and facilities to its people. One of the communities has significantly reinforced composting waste within the community with a target to compost 90% of its solid waste.

Figure 4.4 Showing frequency of responses to the question "Can you provide any example where sustainability has been integrated within the community?"



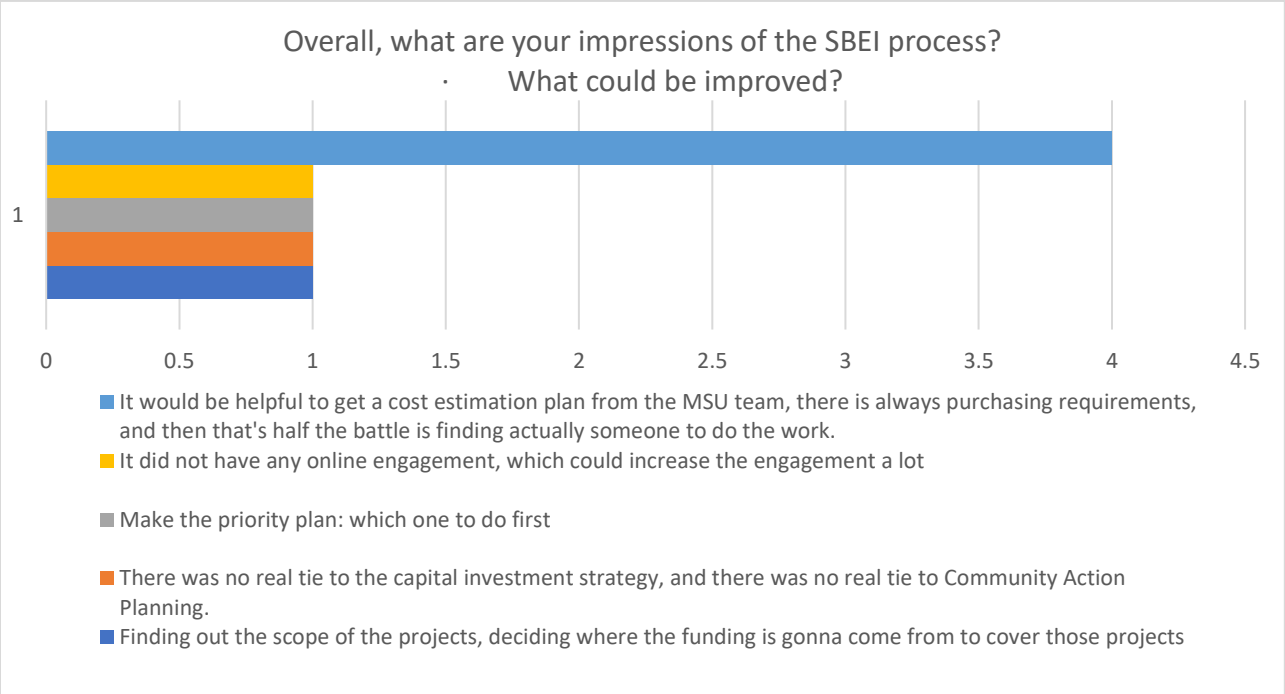
To understand the strong suits and drawbacks of the SBEI efforts, the participants are asked about their impression of the SBEI projects. All of the 13 interviewed leaders found the process genuinely engaging and helpful (Figure 4.5). The meetings in different phases of the projects contributed to meaningful conversations among community residents. Learning about the assets and challenges of the communities from the people, the SBEI team provided realistic solutions to improve the current condition in an organized way. To overcome the challenge of communicating with different classes of people in a community in a meaningful way, photo visualizations were employed as an effective tool to exchange information and receive community feedback. The use of visualizations was extremely helpful in building social capital irrespective of race, age and language barrier, if there was any. Community leaders found the written copy of the report handy, where the community received details of each meeting, public input particulars, design images, and action steps to help understand the implementation process of the designs.

Figure 4.5 Showing frequency of responses to the question "Overall, what are your impressions of the SBEI process? What was most beneficial?"



When asked about the drawbacks, 4 out of the 13 interviewed leaders mentioned the necessity of a cost estimation plan from the SBEI team (Figure 4.6). According to the local leaders, cost estimation is important to implement any project as the communities need to prepare purchasing requirements and apply for grants that fit the size of the project. Finding an organization to prepare the design for a specific site and preparing a budget to execute that design is another challenging task. One community leader noted the necessity to incorporate online feedback from people since many residents may not be able to join the community meeting in person. Lack of connection with the community's Capital Improvement Plan (CIP) and community's strategic action plan has also been identified as a weakness of the SBEI projects. Furthermore, the local leaders need to know the prioritization of the action plans mentioned in the SBEI reports, as revealed by the interviewees. In the report, the team provides a handful of broad goals for the communities under which several recommendations and associated action steps are discussed. The action steps illustrate the steps to achieve the goal without noting any preference for their implementation order. This is primarily left to the community to decide. However, it is found that the lack of the preferred ordering of the proposed action steps poses issues and spurs confusion when any local leader transfers from the area and someone new comes with limited prior knowledge about the community.

Figure 4.6 Showing frequency of responses to the question "Overall, what are your impressions of the SBEI process? What could be improved?"



4.2 Use of Audit Tool for Case studies

In the following three sections, three communities are evaluated with the sustainability audit tool. The assessment is done in three sub-sections for each community. Firstly, the whole community's sustainability is assessed with the audit tool, then the planning recommendations provided for each community are assessed with the same audit tool. Finally, the implemented parts of the SBEI project are assessed with the audit tool.

After assessing the whole city, each city is given a score under the five categories of sustainability audit tool: livability, governance, environment, community, and economy. Then the SBEI recommendations are assessed and given a score under those five categories to compare what percentage of the city's sustainability can be attributed to the SBEI recommendations. While any particular activity for any city may not be the direct output of the planning recommendation provided by the SBEI, this exercise will reveal if the recommendations align with the community's sustainability goal. The lower scores will also represent which categories need more attention for future SBEI projects to align the recommendation with the sustainability goal. It is worth mentioning that while the SBEI-provided designs are site-specific, they are replicable in other parts of the city if the city chooses to do so. Along with the design images, SBEI also provides planning recommendations that can be executed on a broader scale. For example, some of the common planning recommendations under SBEI projects are: to improve walkability and pedestrian safety, enhance aesthetics (by streetscape beautification, façade improvement, art), utilize sustainable techniques (use of pervious pavement, rain garden), promote mix use development etc which is applicable for entire city. While the primary purpose of this paper is to measure how the SBEI projects are performing on a sustainability scale, assessing the whole city is also essential to capture the project's overall impact, which is often beyond the specific project site.

4.3 Case Study 1: The City of Cadillac

In this section, the sustainability of the City of Cadillac is analyzed thoroughly. The assessment is conducted in three subsections to obtain a comprehensive understanding of the city’s sustainability.

In subsection 4.2.1, the sustainability of the whole city is measured using the audit tool. In subsection 4.2.2, the recommendations provided by the SBEI program are assessed with the audit tool to identify how these recommendations align with the audit tool metrics based on the city’s performance. Subsection 4.2.3 will assess the ‘Cadillac Heritage Plaza Placeplan Project’ by

identifying the implemented portions of the project and measuring how it performs on a sustainability scale.

4.3.1 Assessment of the City of Cadillac

Livability: In the 'Livability' category, Cadillac obtains the rating of 'High' sustainability class with a 73% score measured in the sustainability audit tool. As shown in Table 5, the city receives 5 points in 23% of the metrics and 4 points in 47% of the metrics under this category. This indicates that 70% of the sustainability metrics are either fully or partially met. The remaining 30% of metrics receiving 3,2, or 1 point as they are not implemented yet and are still in the planning phase.

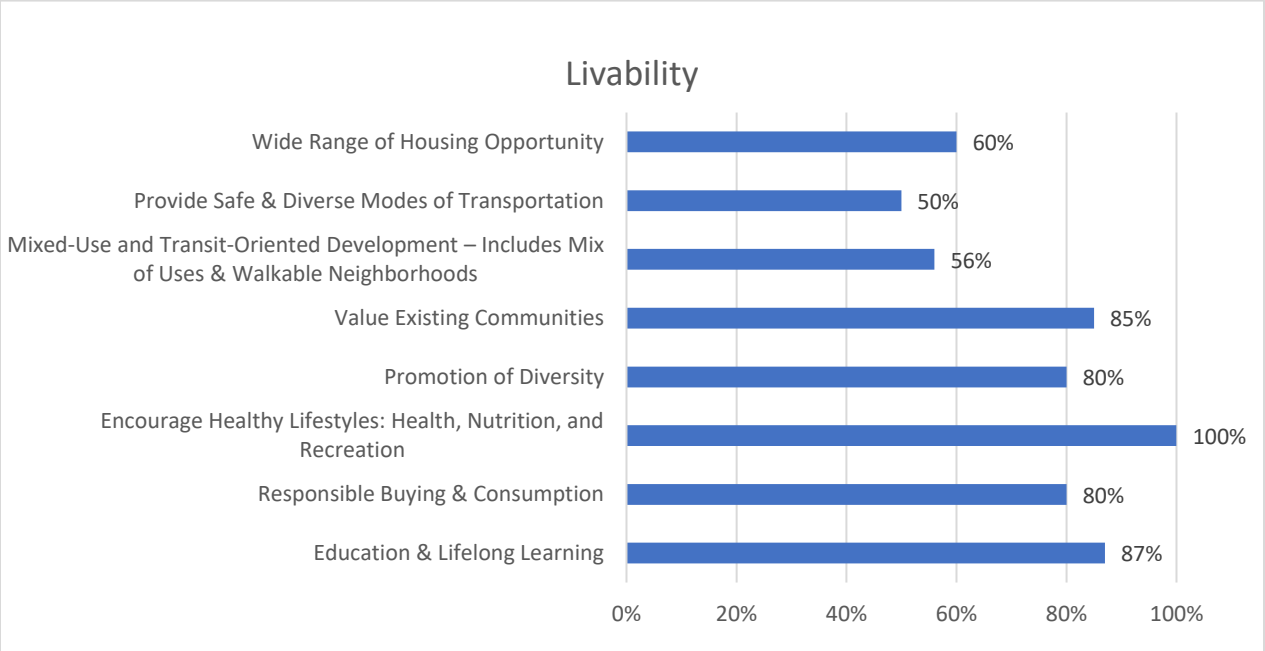
Figure 4.7 shows that the city achieved the highest score in the 'Encouraging a healthy lifestyle: health, nutrition, and recreation' indicator where the local food system (*Cadillac Rotary Supports Local Food Pantry*, n.d.) and the activity of the farmer's market (*Cadillac Farmers Market – Fresh from the Farm to Your Plate!*, n.d.) are assessed and found to have a robust service in the area. The new Farmer's market at Cadillac Commons is established as a complementing element of the SBEI Plaza project at Cadillac Downtown. Cadillac also has a high score in education and lifelong learning since the city has multiple elementary schools, high schools, college (*Cadillac, Michigan College Campus*, n.d.), library (*Cadillac Wexford Public Library*, n.d.), and training center (*Career Technical Center*, 2016). Figure 4.7 shows that the city has significant scope for improvement in providing safe and diverse modes of transportation. Cadillac has no public transportation system with a specific or designated route. The Cadillac/Wexford Transit Authority (CWTA), located on Casa Road in Haring Charter Township north of Cadillac, operates a demand response public transit system providing door-to-door service throughout the county and portions of nearby Missaukee County (*City of Cadillac Master Plan*, 2015). Cadillac features good access to non-motorized transportation amenities. In addition to overall walkability, the city anchors the northern end of the White Pine Trail, which runs 92 miles to Grand Rapids (*City of Cadillac Master Plan*, 2015). Moreover, the city is relatively compact, and about 40% of downtown area employees commute less than 10 miles. The downtown Cadillac area is highly walkable due to its traditional street grid and mix of destinations. Walkability in the downtown area near lake Cadillac has improved significantly after the implementation of the SBEI project. WalkScore proclaims Cadillac a "Walker's Paradise" with a score of 95 out of 100 (*Cadillac*

PlacePlan | Placemaking, n.d.). However, it is worth noting that WalkScore focuses on routes to destinations without addressing the quality of those routes.

Table 5: The distribution of scores of Cadillac city in 17 metrics under the livability category

Received scores	Percentage
5 point	23%
4 point	47%
3 point	11%
2 point	7%
1 point	12%

Figure 4.7 A bar graph showing the percentage of scores of Cadillac city under 8 indicators under the livability category



Governance: Cadillac obtains a 'High' sustainability score in the 'Governance' category, obtaining 71%, accumulating multiple metrics. The city gets 5 points in 10% of the metrics and 4 points in another 45% which means that 55% of metrics under this category are fully or partially met. The remaining 45% of the metrics has further scope for improvement (Table 6).

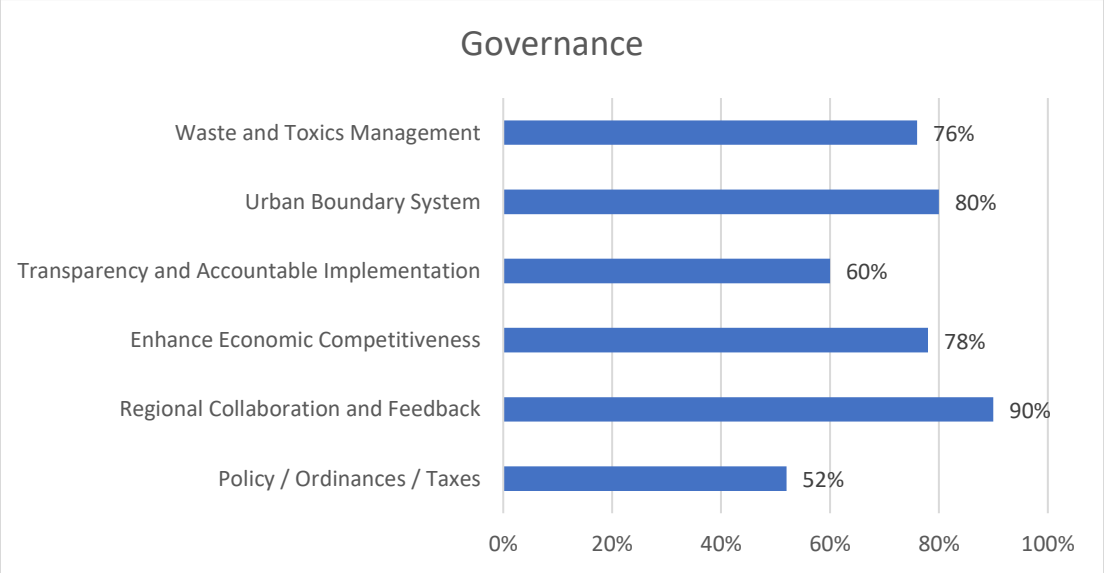
Figure 4.8 shows that the city obtains the highest score (90%) in 'Regional collaboration and feedback' by utilizing public-private partnerships to implement potential projects (*Community Revitalization Projects in Cadillac, Lansing Win National Recognition | Michigan Business*, n.d.).

The development of Cadillac Commons SBEI heritage plaza in Downtown Cadillac has been a milestone for the city that has stimulated the flow of action in the city. This project has also strengthened the vision of community residents to work for the betterment of the community. The next highest score (80%) goes to the urban boundary system that measures if the community is directing development toward areas with existing infrastructure (*Mini TOC: Chapter 46 - ZONING | Code of Ordinances | Cadillac, MI | Municode Library*, n.d.). According to the audit tool assessment, Cadillac has a large scope for improvement in the policy/ordinances/taxes section.

Table 6: The distribution of scores of Cadillac city in 9 metrics under the governance category

Received scores	Percentage
5 point	10%
4 point	45%
3 point	15%
2 point	20%
1 point	10%

Figure 4.8 A bar graph showing the percentage of scores of Cadillac city under 6 indicators under the governance category



Environment: In the 'Environment' category, the City of Cadillac receives a 'Medium' sustainability score (68%). While the city receives 5 points in 33% of the metrics, it gets 4 points

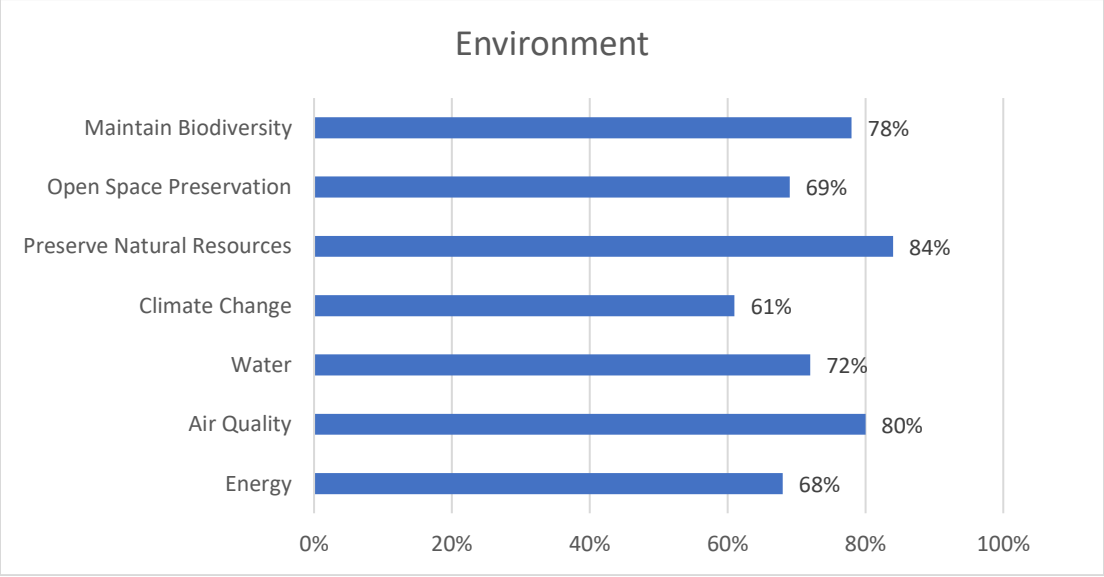
in only 9%. Less than half of the metrics (42%) are fully or partially met, and the remaining 58% of the metrics are not met at all or they are still in the planning phase (Table 7).

This breakdown of indicators (figure 4.9) shows that the city obtains the highest score in the 'Preservation of natural resources' indicator. The city of Cadillac has policies and regulations in place to preserve the natural resources though they are not entirely in practice (Sherry Blaszak Missaukee Conservation District, n.d.). SBEI also provided policy recommendations for this city to preserve and promote natural resources that are primarily focused on Lake Cadillac and the City Park. The lowest score (61%) in this section goes to the 'Climate change' indicator, where the community's approach toward short-term and long-term hazard mitigation plans, greenhouse gas emission reduction, and flood plain analysis are taken into account.

Table 7: The distribution of scores of Cadillac city in 24 metrics under the environment category

Received scores	Percentage
5 point	33%
4 point	9%
3 point	46%
2 point	4%
1 point	8%

Figure 4.9 A bar graph showing the percentage of scores of Cadillac city under 7 indicators under the environment category.



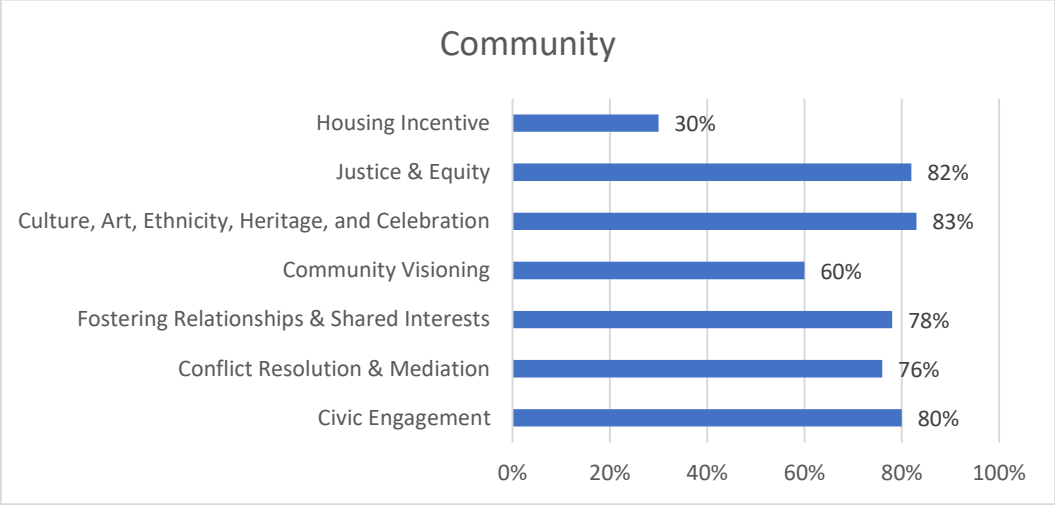
Community: In the 'Community' category, the city of Cadillac scores 75%, attaining a 'High' class in community sustainability. The city achieves 5 points in 25% of the metrics and 4 points in 33% of the metrics. The combined 55% score shows that more than half of the metrics are fully or partially met (Table 8).

According to figure 4.10, the city obtains the highest score (83%) in the 'Culture, art, ethnicity, heritage, and celebration' indicator, with an 83% score. The indicator measures the city's effort to promote art in public places, actively engage students in the arts (e.g., music, painting, theatre), and to identify and preserve historic assets in the community. The downtown plaza is the heart of the city center, where various year-round art and cultural shows go on ("Cadillac Festival of the Arts," n.d.). The place remains active and vibrant year-round, with frequent public exhibitions and community events. Also, in the schools, the kids can explore their passion and work on their skills in various extracurricular activities, including art, music, dance, guitar, painting, etc. (*Arts / Department Overview*, n.d.). The next highest score (82%) goes to justice and equity, where the housing facilities for different income levels have been assessed. The city has multiple housing options for low-income people within the area (*Low-Income Apartments in Cadillac, Michigan*, n.d.). The current zoning ordinance focuses on different housing options to ensure housing facilities are within the affordable limit of the community residents. New housing options have been created for the students of Baker college close to Cadillac Commons after the SBEI project took place there.

Table 8: The distribution of scores of Cadillac city in 12 metrics under the community category

Received scores	Percentage
5 point	25%
4 point	33%
3 point	18%
2 point	17%
1 point	7%

Figure 4.10 A bar graph showing the percentage of scores of Cadillac city under 7 indicators under the community category



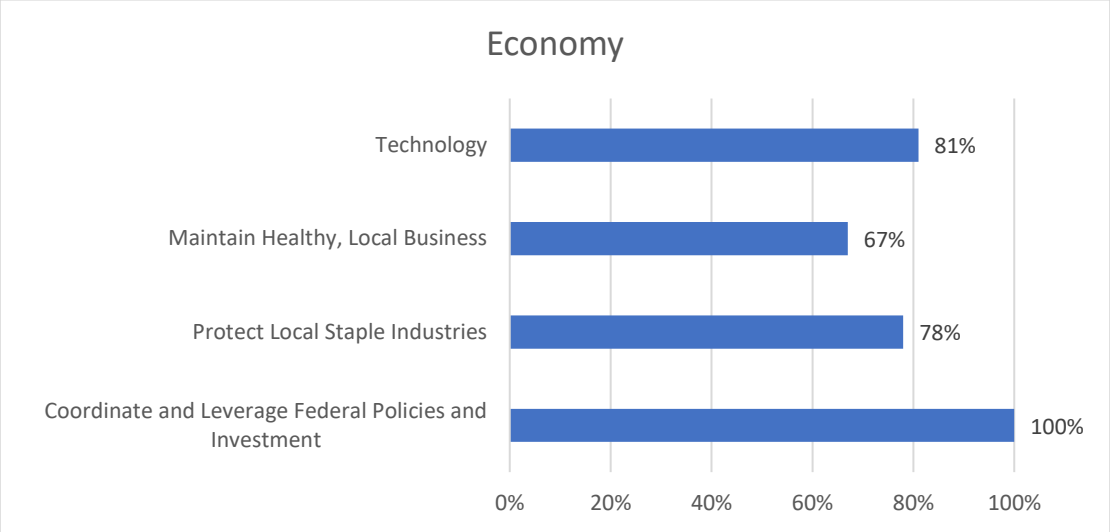
Economy: The City of Cadillac obtains 'High' rating with a 77% score in the 'Economy' category of sustainability audit tool. Table 9 shows that the city receives 5 points in 21% of metrics and 4 points in another 33% meaning 54% of metrics are implemented fully or partially, while 44% are yet to be implemented.

Figure 4.11 shows that the city secures the highest score in the 'Coordinate and leverage federal policies and investment' indicator with a 100% score. Under this indicator, the community's effort to stay aware of and pursue federal and state funding that supports city/community/regional goals is measured. Cadillac extensively pursued federal and state funding for implementing community development projects. The plaza project is a shining example for that. However, the city received a lower score in maintaining a healthy, local business.

Table 9: The distribution of scores of Cadillac city in 9 metrics under the economy category

Received scores	Percentage
5 point	22%
4 point	33%
3 point	24%
2 point	21%
1 point	0%

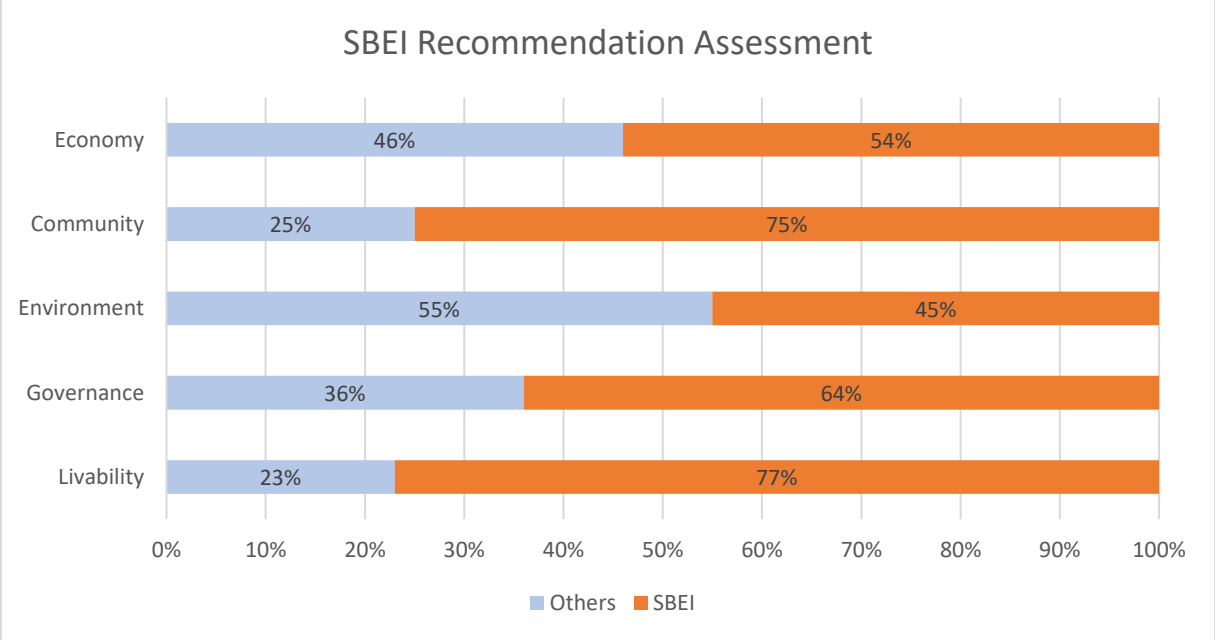
Figure 4.11 A bar graph showing the percentage of scores of Cadillac city under 4 indicators under the economy category



4.3.2 Assessment of SBEI Recommendations for Cadillac

In the final report prepared by the SBEI team, 38 separate recommendations were provided under 8 broad goals to be implemented in the City of Cadillac. Some of the recommendations involved physical planning, while others were policy-oriented. Major recommendations focused on improved access and connectivity among Mitchell Street, City Park and Lake of Cadillac, unified branding for Cadillac's community assets, attracting and retaining small and startup businesses, etc. This section investigates the percentage of city's sustainability activity that may be attributed to the SBEI recommendations. The scores also reveal how many of the SBEI recommendations address the metrics in the sustainable audit tool. Figure 4.12 shows that SBEI recommendations have addressed 54% of sustainability metrics under the economy category, 75% in the community category, 45% in the environment category, 64% in the governance category, and 77% in the livability category. The scores also imply the percentage of city's performance that may occur as an output of the SBEI project recommendation. Therefore, the SBEI recommendations for the City of Cadillac are most aligned with the 'Livability' category metrics and least with the 'Environment' category metrics. The 'others' in the graph shows the percentage of current sustainability practices in the city where SBEI project could not contribute at any level.

Figure 4.12 Assessment of SBEI recommendations for the City of Cadillac



4.3.3 Assessment of the SBEI Project Implementation at Cadillac

Cadillac's downtown turned out to be monotonous when the US-131 bypass opened and big-box retailers were built near its junction at Boon Road. Cadillac Commons is a game-changing component for downtown Cadillac. Cadillac Commons includes the entire lakefront, including the Rotary Performing Arts Pavilion, City Park, The Plaza, Trailhead, and the farmer's Market. Michigan Municipal League (MML) sponsored an SBEI placemaking study that recommended The Plaza as the third of five phases to create this place. The SBEI project provided a vision for the whole Cadillac Commons area focusing specifically on the plaza (Figure 4.13).

The Plaza: The Plaza features an improved parking area, a mixed, multi-season space for public events and gatherings, a splash pad, an outdoor gas fireplace, misting post, drinking fountains, benches, a sound system, and a synthetic ice skating rink. The Plaza is now a vibrant hub that connects downtown businesses to Lake Cadillac. The Cadillac Commons draws visitors and residents year-round with seasonal events and attractive amenities. The Plaza added increased safety in downtown for visitors. The parking design is now more user-friendly while the total area becomes more walkable for pedestrians. Added sidewalks promoted accessibility and better connection. Enclosed garbage bins, added illumination, and upgraded and buried utilities made the place sophisticated, increasing overall visibility day and night.

The Market: The Market at Cadillac Commons is an open-air, covered market structure between the Cadillac 5 Theatre and After 26 Depot. The Market houses vendors, artists, events, and more.

The City Park: A gem of the downtown, the City Park has been an integral part of the community for several generations. The park is the home of the Shay Locomotive, a permanent display of Cadillac's rich logging history, and the beautiful memorial fountain.

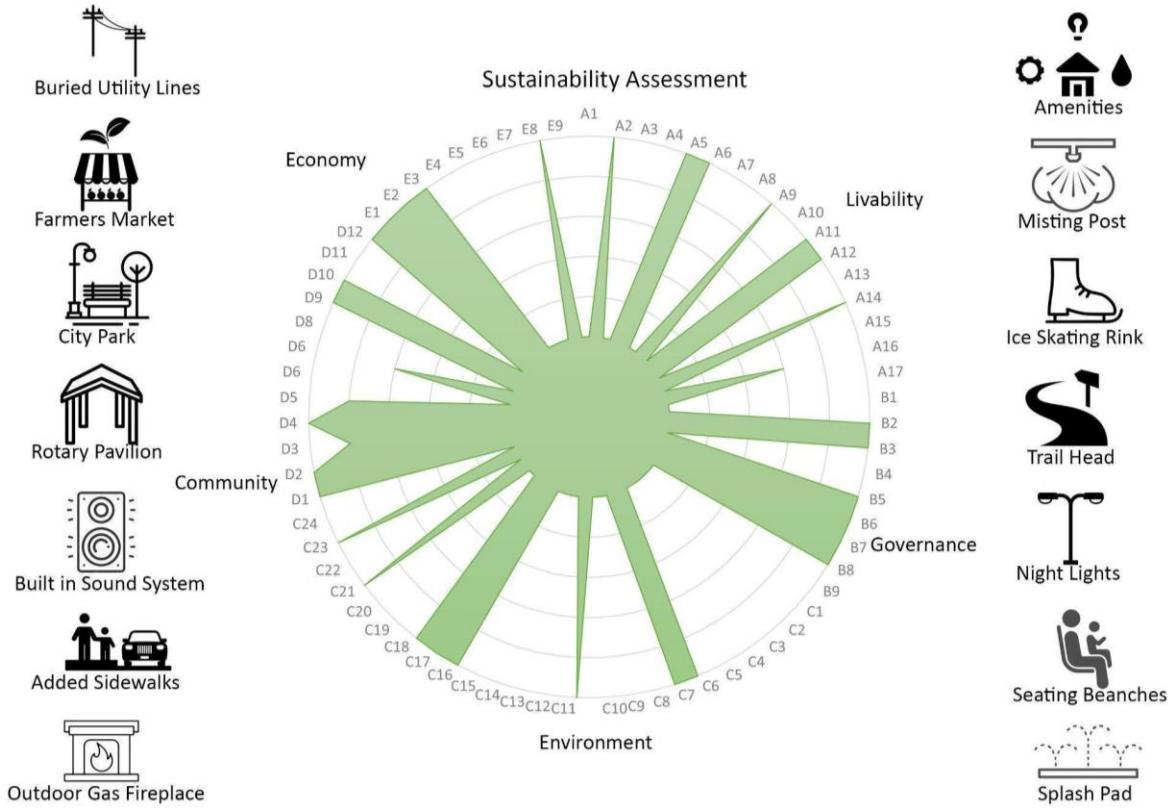
The Rotary Pavilion: The Cadillac Rotary Performing Arts Pavilion has been a focal point on the lake shore for over 25 years. After a hugely successful community crowdfunding campaign, the newly renovated space now boasts a state-of-the-art sound system, accommodations for performers, and a beautiful green seating area.

Figure 4.13(a) A bird's eye view of the whole plaza. (b) An image of the new Splash pad. (c) Inviting archway to the city park. (d) Open gas fireplace. (e) Splash pad with surrounding view (f) farmers' market

Figure 4.13 (cont'd)

Figure 4.14 shows the sustainability of the 'Cadillac Heritage Plaza Placeplan Project' under five sustainability categories. 71 sustainability metrics of the sustainability audit tool are illustrated on a scale of 1 to 5 based on their level of performance.

Figure 4.14 Assessment of implemented SBEI project at the City of Cadillac



Livability: The heritage plaza became the downtown's heart with other surrounding facilities. The plaza became a multi-use, multi-seasonal, flexible space for community events, festivals, and public gatherings. Surrounding the central core is a plethora of seating and gathering areas for small groups and individuals, accompanied by a small children's playscape, public art, and shaded green space. As a solution to an often-debated topic, vehicular access to Lake Street remains, but also incorporates a Complete Streets approach for pedestrians and bicyclists, with the addition of controlled barrier features at each end, allowing for the street to be shut off for pedestrian use only. Prominently marked crosswalks across Lake St. ensure a strong physical connection from the plaza to Lake Cadillac and the pavilion. A wooden boardwalk behind the pavilion connects both docks to the fishing pier, allowing anglers and boats to have their own space to enjoy their favorite summertime hobbies. To ensure the safety of all visitors, indirect lighting along pathways and central gathering spaces encourage visitors to confidently use the plaza during evening hours without suppressing the mood of the night sky.

Governance: To execute the plan, funding sources such as Michigan Economic Development Cooperation, a donation from the Rotary club, and a significant contribution from DDA show a blend of public-private partnerships. City property tax revenues are also used in different phases of the plaza plan. The details are provided under the 'Economy' category below. The current masterplan of Cadillac emphasizes revitalizing the downtown and taking necessary steps to implement the required actions. The DDA states that different phases of development are being conducted based on the availability of the fund. In the first phase, the plaza and the pedestrian connection are established, later the trailhead, and the market are constructed. Cadillac Commons, with all its amenities, is drawing more downtown investments promoting the city's smart growth.

Environment: Sustainability and environmentally sensible design was fundamental principle of the project, as expressed by everyone involved in the design process. Much of the existing mature trees and the Memorial Fountain remain preserved, while additional plantings introduced to the site are all native and low-maintenance species. The proximity of Lake Cadillac is vital to the undeniable sense of place in downtown Cadillac. An additional dock allows for a better connection for boaters to downtown. The parking lot is reconfigured to remove the one-way lanes that run north and south. This change is intended to make the parking lot more pedestrian friendly.

Community: Incorporating the community residents in the process of future visioning and implementing different elements of the design development according to their feedback contributed to the overall improvement of community engagement at Cadillac. Nearby businesses are consulted to ensure everyone is happy with the final arrangement. A new splash pad, outdoor fireplace, and an attractive metal arch added an inviting touch to the new Plaza gathering space in the heart of downtown Cadillac. As overhead utilities like electricity are vital to downtown spaces but often unsightly, Prein&Newhof worked with Cadillac to coordinate utility burial in an adjacent alley. Prein&Newhof's landscape architect and structural engineer designed the plaza's planting plan, dumpster enclosures, and an archway. The design configured the splash pad with the outdoor fireplace and coordinated other details for the pedestrian plaza and parking lots, like lighting, signage, pavement markings, ADA ramps, and stormwater management. All these elements improvise the social life of the residents and create the sense of place for the community residents.

Economy: The Cadillac Downtown Development Authority has been very involved in implementing the SBEI project. Total project costs are estimated to be $550,000, with $200,000 of that amount funded through a Michigan Economic Development Cooperation grant. The remaining $350,000 is paid for by the DDA which contributes $250,000, and city property tax revenues cover $100,000.

The total cost of the rotary performing arts pavilion is $300,000, with $80,000 of that cost covered by a donation from Rotary. The remaining $220,000 is paid through donations, grant money, and a contribution from the city. The community has observed significant new private investment since the construction of Cadillac Commons, especially The Plaza. After seeing the public investment, new facades on downtown storefronts and developers' acquisition of nearly two city blocks are identified. As stated by the local leaders, the developers are in the process of bringing several new commercial businesses into the core downtown area.

4.4 Case Study 2: The Village of Cassopolis

In this section, a thorough analysis is carried out to measure the sustainability of the Village of Cassopolis. The assessment is done in three sub-sections to generate a comprehensive understanding of the villages' sustainability.

In subsection 4.3.1, the sustainability of the whole village is measured using the audit tool. In subsection 4.3.2, the recommendations provided by the SBEI program are analyzed to identify how they align with the audit tool metrics. This exercise also reveals how much of the

city's sustainability activity can be attributed to the SBEI recommendations. In subsection 4.3.3, only the 'Broadway Corridor Vision Project' will be assessed identifying the project's implemented portions and measuring how it performs on a sustainability scale.

4.4.1 Assessment of the Village of Cassopolis

Livability: The village of Cassopolis obtains 'Medium' rating with a 64% score in the 'Livability' category. Under this category, there are 17 metrics. From Table 10, the village of Cassopolis receives 5 and 4 points in 12% and 35% of the total 17 metrics respectively. It shows that 47% of the metrics under the livability category are fully or mostly met. The rest 53% of the metrics are either not met or are still in the policy recommendation phase and have not been implemented yet.

Figure 4.15 shows the breakdown of the indicators. The village of Cassopolis obtains the highest score in the community's food sourcing. Cassopolis receives 80% in the 'Encourage Healthy Lifestyle' indicator assessing the local fresh produce shops. The community has very active and engaging farmers' markets that provide homegrown foods, handmade crafts, and unique items from around the area. The Cassopolis Farmer's Market, Dussel's Farm Market & Greenhouse, and Jake's Country Meat are serving broadly in the community. The Village of Cassopolis secures the next highest score (75%) in 'Responsible buying and consumption' indicator. The village collects the domestic wastes either from curbside or backyard collection service to each residential premise one time per week. Global aluminum company Hydro breaks ground on its state-of-the-art aluminum recycling plant in Cassopolis, MI that will take recycling at an industrial scale in the community. From figure 4.15 below, Cassopolis has a comparatively lower score in the promotion of diversity. From the master plan of Cassopolis, it is found that one-third of the community residents are black. Though the community residents receive equal treatment everywhere irrespective of race, color, and ethnicity, there is not much evidence of community activities/events that celebrate cultural diversity.

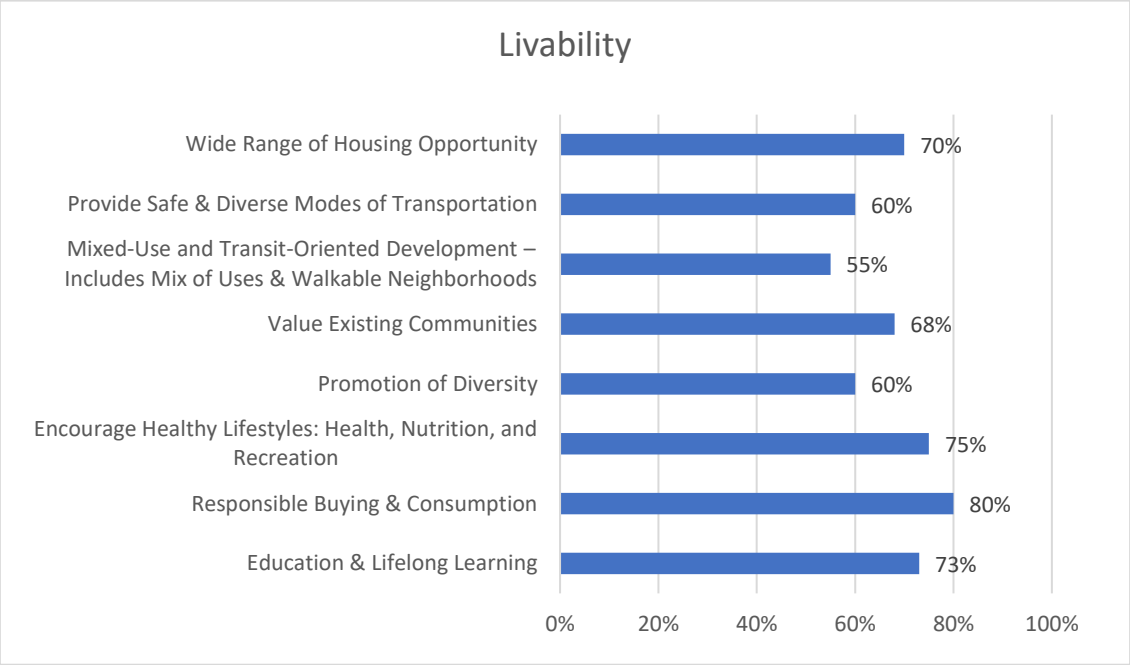
Table 10: The distribution of scores of Cassopolis in 17 metrics under the livability category

Received scores	Percentage
5 point	12%
4 point	35%
3 point	36%

Table 10 (cont'd)

2 point	6%
1 point	11%

Figure 4.15 A bar graph showing the percentage of scores of Cassopolis in 8 indicators under the livability category



Governance: With a 74% score, the village of Cassopolis obtains 'High' rating of sustainability in the 'Governance' category. Assessing 9 metrics under this category, Table 11 shows that Cassopolis receives 5 points in 33% of the metrics and 4 points in another 32% of metrics, meaning 65% of the metrics are entirely or mostly met. The rest 35% of the metrics are either not met or they are still making policy-level suggestions for those.

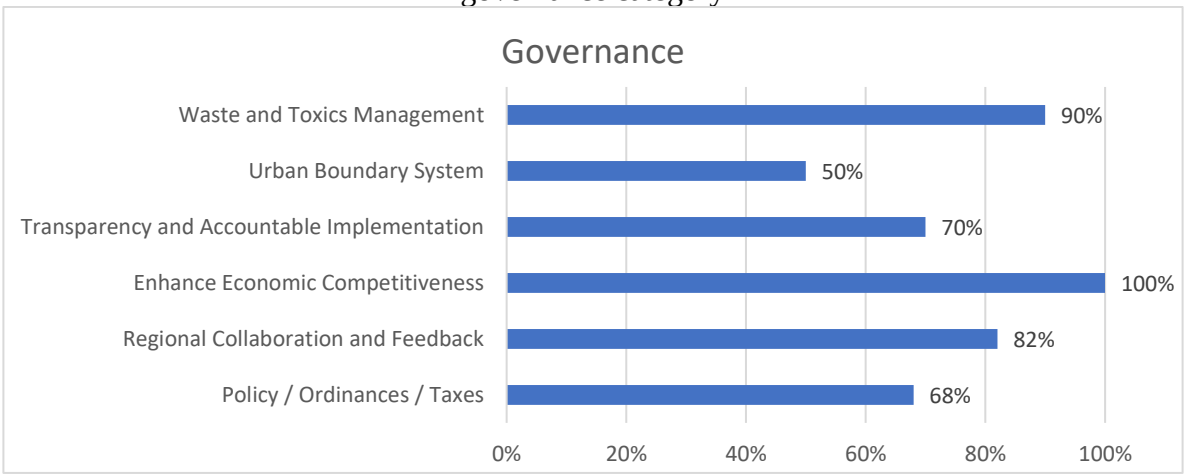
Figure 4.16 shows that the village of Cassopolis obtains the highest score in the 'Enhance economic competitiveness' indicator. Cassopolis is currently attracting new businesses and securing state and federal grants to make the county more economically resilient. After the SBEI project execution, improved downtown streetscape of Cassopolis has influenced to attract new businesses and public-private investment in this area. The Department's Economic Development Administration (EDA) has awarded a $6 million grant to construct the needed road, sewer, and water infrastructure to support the 234-acre Southwest Michigan Advanced Research and Technology Park (SMART Park). This EDA grant, to be matched with $6 million in local funds,

is expected to create 248 jobs and generate 14 million dollars in private investment. This investment leverages Cass County's assets, a high-skilled workforce, and access to major rail and fiber broadband to attract new businesses and build regional economic resiliency. While the Village is making progress in the economic sector, it is at the same time crossing or expanding the earlier urban boundary. Former farmlands are being occupied to establish the new industrial parks. Additional infrastructural development is needed to serve the newly built structures. People who will be employed in the newly created job sectors will travel to their workspace from home. Considering this issue, the Village is assessed with a comparatively lower score in the 'Urban Boundary System'.

Table 11: The distribution of scores of Cassopolis in 9 metrics under the governance category

Received scores	Percentage
5 point	33%
4 point	32%
3 point	14%
2 point	10%
1 point	11%

Figure 4.16 A bar graph showing the percentage of scores of Cassopolis in 6 indicators under the governance category



Environment: The village of Cassopolis obtains 'Medium' rating with a 61% score in the 'Environment' sustainability category. Under this category, there are 24 metrics to assess the environmental aspects of the community. Cassopolis acquired 5 points in 12% of the metrics and

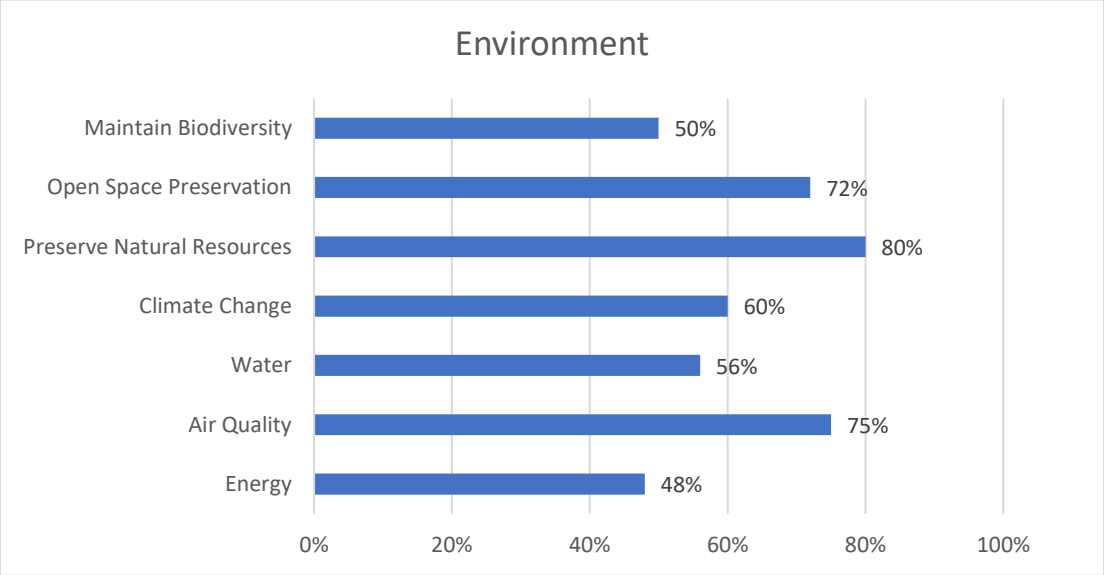
4 points in 26% of the metrics, which means 38% of all the metrics under this category are entirely or partially met (Table 12). Table 12 shows that 62% of the metrics are not met or are still in the planning phase.

Figure 4.17 shows that the village obtains the highest score in the 'Preserve Natural Resource' indicator. Cassopolis is preserving its natural resources and making proper utilization of them at the same time. The village operates five parks including stone lake beach. These places are maintained according to the Michigan Department of Natural Resources Guidelines for the Development of Community Park, Recreation, Open Space, and Greenway Plans. Additionally, in the last couple of years, notable lakeside improvement took place which also ensures no degradation to lake water quality. Since 2017, a nuisance plant control program has been proceeding on Stone Lake. The primary objective of the program is to prevent the spread of invasive aquatic plants while preserving beneficial plant species. The program is financed through a special assessment of lake residents in accordance with Michigan's Natural Resources and Environmental Protection Act. Cassopolis has a remarkable scope for improvement in the renewable energy sector. Though Spartan Solar Array operates at Cassopolis with 2484 solar panels and 0.8 megawatts of total capacity, there is not much promotion of renewable energy use in the current Masterplan and zoning ordinances. Being a small community, the village primarily focuses on ensuring a quality lifestyle with recreation and employment opportunities. Hence, sustainability issues are not at the forefront of every initiative, according to the village manager.

Table 12: The distribution of scores of Cassopolis in 24 metrics under the environment category

Received scores	Percentage
5 point	12%
4 point	26%
3 point	29%
2 point	17%
1 point	16%

Figure 4.17 A bar graph showing the percentage of scores of Cassopolis in 7 indicators under the environment category



Community: The village of Cassopolis secured a 'High' score (72%) in sustainability under the Community category. This category has 12 metrics to assess the community's sustainability. Table 13 shows that the village obtains 5 pints in 25% of the metrics and 4 points in 41% of the metrics, which means 66% of the metrics are fully or partially met. The remaining 34% are yet to be implemented or are still in the policy phase. The details of these metrics are shown in figure 4.18.

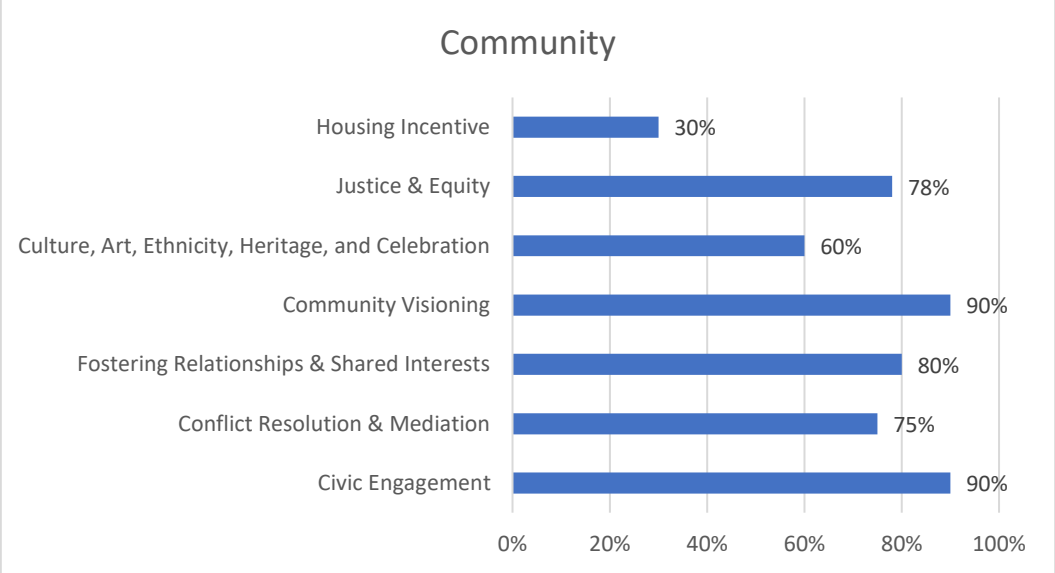
Cassopolis has remarkably engaged the community residents in their planning process. That aspect is measured under the 'Civic engagement' indicator where the village obtains 90% score. The current master plan is initiated with the "Imagine Cass" public engagement meeting held by Michigan State University planning students. A large turnout from the community assisted the students with planning the main road through downtown Cassopolis, all the way to the former courthouse building. Through holding separate focused meetings, residents and business owners who live, and work in these areas of Cassopolis were able to share their experiences, thoughts, and visions for the future which are later incorporated into the current masterplan through SBEI. Looking into other indexes, Cassopolis has the opportunity to further improve the 'Culture, Art, Ethnicity, Heritage, and Celebration' indicator. While the Cassopolis Public Art program is a robust scheme to bring the creative spirit of the village out into the forefront of the community and make its unique identity known to residents and visitors alike, there is a lack of active engagement

from public school students. The schools are less focused on public art, music, painting, and theatre alike activities which are reflected in the score.

Table 13: The distribution of scores of Cassopolis in 12 metrics under the community category

Received scores	Percentage
5 point	25%
4 point	41%
3 point	10%
2 point	16%
1 point	8%

Figure 4.18 A bar graph showing the percentage of scores of Cassopolis in 7 indicators under the community category



Economy: Under the 'Economy' category, the village of Cassopolis obtains 'High' rating of sustainability with a 75% score. It receives 5 points in 23% of metrics and 4 points in 22% of metrics, which means in total 66% of the metrics are fully or partially met in this category. The rest of the metrics (44%) are either not met or are still at the planning level (Table 14).

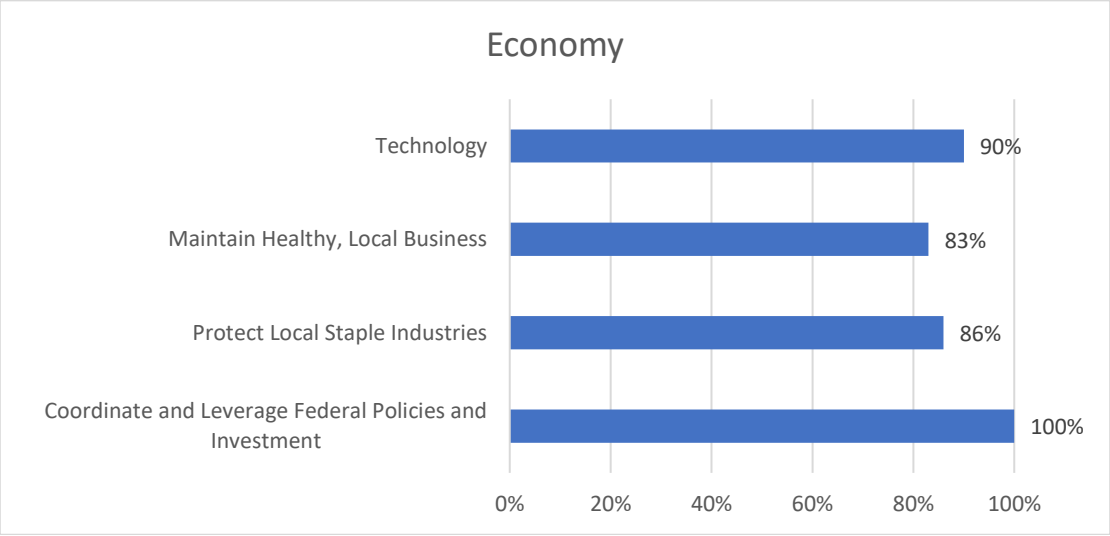
Figure 4.19 provides a more detailed breakdown of the assessment indicators. The village obtains the highest score (100%) in the 'Coordinate and Leverage Federal Policies and Investment' indicator since the community has immensely pursued federal and state funding that supports city/community/regional goals. The Village of Cassopolis has received $2.8 million in Community

Development Block Grant funding for public improvements for their 'Imagine Cass Streetscape Transformation' project by SBEI. Furthermore, $15 million worth of improvements are taking place in the Stone Lake area. For their efforts in establishing a solid foundation to attract private investment and further build on municipality assets, the village of Cassopolis has been awarded the Redevelopment Ready Communities (RRC) certification. Cassopolis is a high-performance area in terms of economic development since the village is very proactive in attracting new investors, businesses, and industries creating new jobs, and making the place a desirable location for living.

Table 14: The distribution of scores of Cassopolis in 9 metrics under the economy category

Received scores	Percentage
5 point	23%
4 point	22%
3 point	44%
2 point	11%
1 point	0%

Figure 4.19 A bar graph showing the percentage of scores of Cassopolis in 4 indicators under the economy category

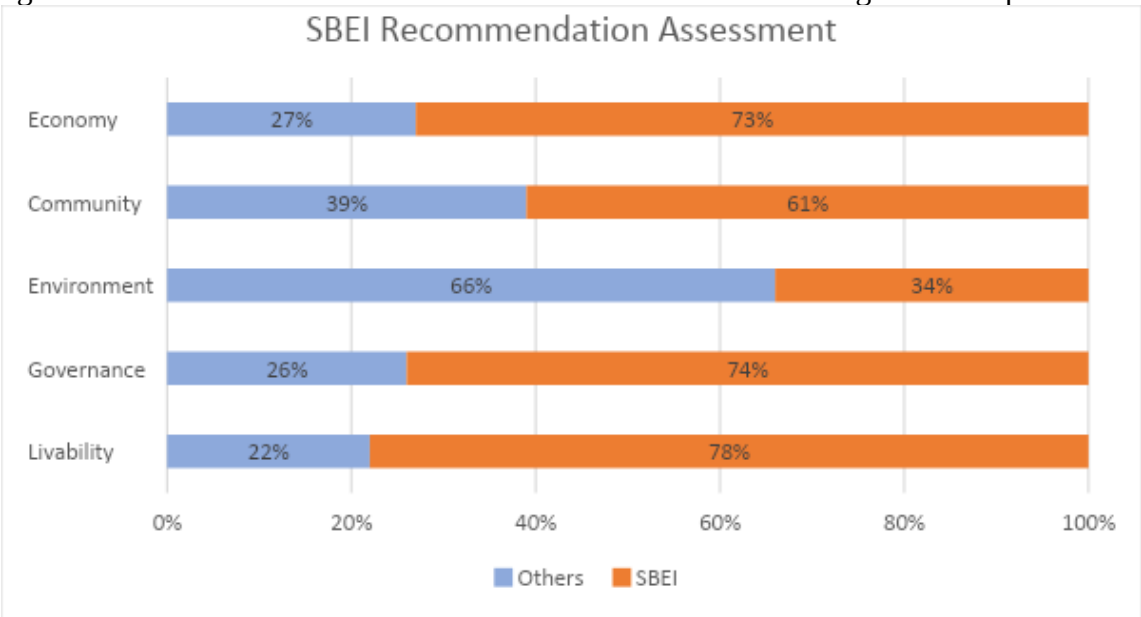


4.4.2 Assessment of SBEI Recommendations for Cassopolis

For the Village of Cassopolis 25 recommendations and 34 action steps are provided by the SBEI program for the community to implement. This section analyzes the recommendations to

identify how they align with the metrics in the sustainable audit tool and how much the city's sustainability activities can be attributed to these recommendations. The SBEI recommendations incorporate improvement in both physical environment and policy adaptation. A couple of notable recommendations for the Village of Cassopolis include the creation of a sense of arrival for downtown Cassopolis, improvement of building facades and sidewalks and repurpose empty spaces and buildings. Analyzing the recommendations, it is found that the recommendations have addressed the sustainability metrics in varying levels for different categories based on the city's performance: 73% in the 'Economy' category, 61% in 'Community' category, 34% in the 'Environment' category, 74% in the 'Governance' category, and 78% in the 'Livability' category. According to figure 4.20, SBEI recommendations are most aligned with the metrics under the 'Livability' and 'Economy' category and least aligned with the metrics of 'Environment' category.

Figure 4.20 Assessment of the SBEI recommendations for the Village of Cassopolis



4.4.3 Assessment of the SBEI Project Implementation at Cassopolis

The Village of Cassopolis conducted the monumental and courageous task of generating a new identity for Downtown Cassopolis based on the SBEI project. The 'Imagine Cass' Project aims to transform the entire community and stop the decline the community had been going through for a long time. Under the core ideas of community vision, collaboration, cost-effectiveness, and citizen-led change, the Village attempted to create a new theme as a marketing brand for the area. The transformation included the improvement of the downtown streetscape,

encompassing light poles emitting free wi-fi and a built-in music system, a new beach including a 230'pier, an outdoor amphitheater, a lakeside boardwalk to connect public spaces, a new municipal complex and the creation of the Southwest Michigan Advanced Research and Technology Park (Figure 4.21).

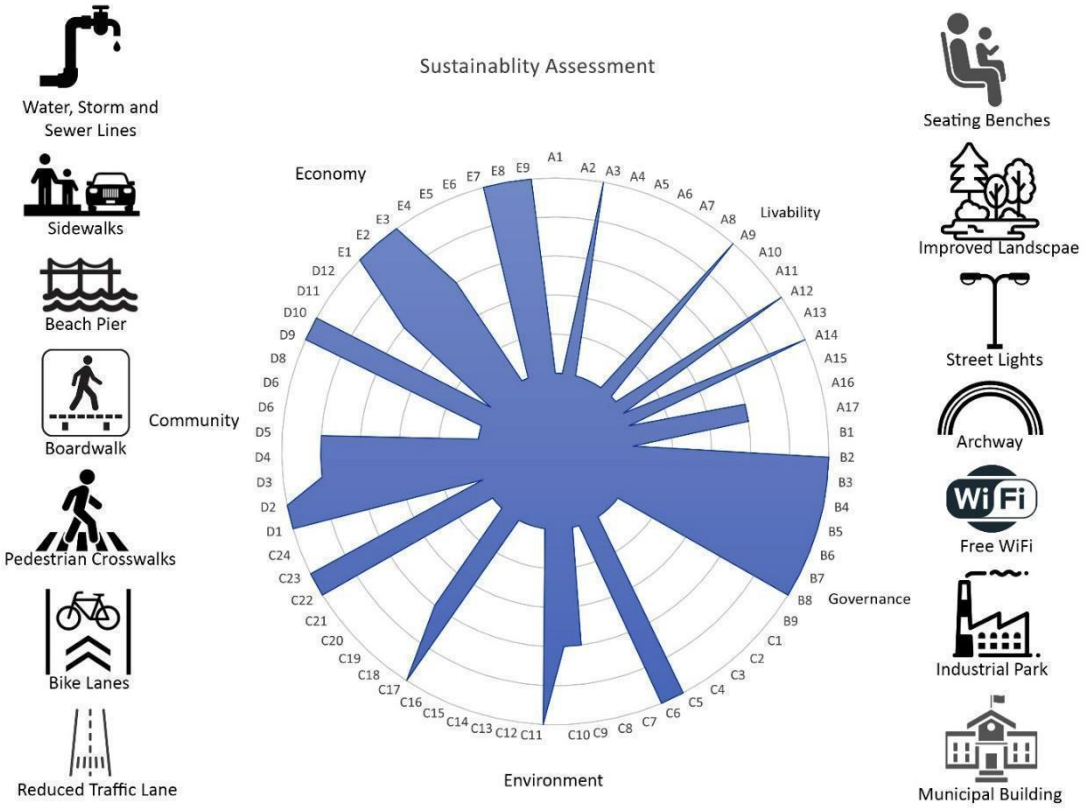
The Village of Cassopolis was described at the first SBEI community event in 2018 as "dying, tired, run-down, ugly, sleepy, dull, drab, trashy, and disgusting." In the same meeting, the community imagined their future community as vibrant, beautiful, quaint, alive, charming, inviting, connected, and thriving. The community worked to bring creative elements and projects into the community after the SBEI project that balanced their need for economic growth and prosperity with what the community imagined. The overall well-being of the residents is ensured through capitalizing on the natural assets of the village. Some of the design components of the transformation sourced from the Michigan Municipal League website are:

- 76 color-changing led street lights that emit Wi-Fi, play music, and have internal irrigation
- 18 digital led banners
- 25,000 square feet of pavers including a custom Compass
- 230' long ADA-accessible pier which includes fishing areas, transient boat slips, and an open end to go jump into the lake from
- Custom fabricated architectural archway with quotes creating a memorable gateway into the beach
- ADA Boardwalk connecting the downtown that can be used by walkers and bikers including fishing platforms and lookout areas
- Free monthly community events including Beach Bash and Rock the Block concerts at the beach throughout the summer, Stone Lake Ice Fishing Tournament, and Christmas in Cassopolis Community Celebration
- Playground area designed by the elementary school students
- Benches created with recycled aluminum with QR codes to the story of their origin (Norway) in partnership with the newest recycled aluminum business
- Southwest Michigan Advanced Research and Technology Park (SMART) which will provide access to robust electric, fiber, rail and solar allowing companies to work towards lowering their carbon footprint.

Figure 4.21 (a) New municipality building. (b) Improved streetscape. (c)New beach pier. (d)Archways to the lake

Figure 4.22 shows a visual representation of the sustainability assessment for Cassopolis. Under the five categories of sustainability, the village has shown significant impact based on the improvement in Broadway Street, Stone Lake, and the surrounding area which are reflected in 71 metrics on a scale of 1 to 5.

Figure 4.22 Assessment of the SBEI project at the Village of Cassopolis



Livability: The Village has an improved livability standard after the transformation of the downtown. Recognizing the need to provide a more pedestrian-friendly community, the Village instituted a streetscape design that reduced traffic lanes, created traffic calming throughout town, added bike lanes, and a boardwalk that takes the visitors past the lake. Creating a public beach area comprising the pier, public amphitheater, and pedestrian plaza turned out to be a central gathering hub and sense of belonging for residents and visitors within the Village. This area provides kayaks and paddleboats to be active out on the lake. It also includes areas for fishing, church services, enjoying live music, weddings, and community-wide events.

Governance: The Village of Cassopolis is determined to accomplish change without raising taxes, and they have accomplished that. Their core principle, "If we invest in ourselves, others will invest in us," has led the Village to unparalleled growth. The Village invested millions of dollars and took out bonds to cover the costs of the projects, and in turn, they have more than

doubled their general fund income, and project it to triple within the next years, creating a financially healthy, stable, and resilient community for the first time in decades.

The former Village offices and Police departments were located on the second floor of an old downtown building which was not suitable for police dispatch and difficult for community members to find. The new Municipal Complex is constructed to combine all departments into one facility, resulting in 5,500 square feet of an office building and 11,700 square feet of a pre-engineered metal building warehouse. The design of the building required to convey the significance of a municipal complex and house a large equipment warehouse. The new complex satisfies the needs of Village officials and staff, police, and DPW employees, and most importantly, the citizens it serves.

Community: The voice of the community residents is incorporated in the current Cassopolis masterplan through the SBEI project. Cassopolis residents feel valued and engaged to the overall village improvement. Two new custom murals were placed in the community, including a Welcome to Cassopolis mural and a salute to the Veterans mural. The community residents and visitors feel welcomed upon arriving these places which adds to the unique theme of the downtown. The Village added downtown light poles that play music, have digital banners and emit WiFi. The community continue old cultures and has started new traditions like Beach Bash, the Ice Fishing Bowl, Rock the Block summer concert series, and Christmas in Cassopolis, which along with the new Farmers Market, jointly continue to enhance the social fabric in the community.

Environment: The Village has updated all the water, storm, and sewer lines within the project area's streetscape and beach. Storm separators are installed near Stone Lake to protect it from the effects of road runoff and pollution. Increases in water/sewer users due to the new investment have allowed the Village to keep the community water rates constant for the first time in more than a decade. The village authority has projections to keep those rates stable over a minimum of the next five years while continuing its aggressive capital improvement plan. Stabilizing rates for residents continue to build trust with the community members that they are making acute investments into the infrastructure, maximizing their public health benefits.

Having a lake in the middle of downtown becomes a public asset for the village. Creating a harmonious relationship between Stone Lake and the creation of a public asset (the beach/fishing pier) to secure the long-term sustainability of both needs the Village to continuously work in close

connection with the DNR, EGLE, SESC, environmentalists, concerned citizens, fisherman, and aquatic biologists.

Economy: The Village of Cassopolis received $2.8 million in Community Development Block Grant funding for public improvements for their Imagine Cass Streetscape Transformation project which is built on the Village's comprehensive "Imagine Cass" master plan. The plan emphasizes on four main themes by implementing physical improvements that impact more than 400,000 square feet of outdoor space in downtown Cassopolis and the surrounding corridors. Those improvements have increased the community's aesthetics and infrastructure, while also enhancing connectivity and access of low- and moderate-income community residents to local businesses and services, boosting private investment and ensuring safety for pedestrians and bicyclists. Specific actions include new striped bike lanes, traffic lane reductions to help slow traffic to a safe speed, pedestrian crosswalks, improved landscaping, public seating, lighting, free WiFi and updating existing water main infrastructure. The total cost of the project is estimated to be $5.95 million. The Village of Cassopolis itself has contributed $3.15 million toward the project.

Further Impact

New businesses in Downtown: Recent investment of 15 million dollars is expected to bring new life to empty storefronts of downtown. 75 percent of the downtown buildings now have new owners, according to the village authority. There have been façade and space improvements. One of the restaurants has expanded by building a 1,400-square-foot outdoor deck that overlooks the beach. The Village has raised about $6 million in state and federal grants to execute the project. Efforts are being made for private investors to get permits needed to bring a new water park to Stone Lake.

Research and Technology Park: Cassopolis Plans for an $18 million investment in Cassopolis that would convert nearly 400 acres of land into an industrial park. Midwest Energy and Communications hope to turn their remaining land an industrial park named 'the Southwest Michigan Advanced Research and Technology Park'. The new aluminum recycling plant in Cassopolis will produce 120,000 metric tons (265 million pounds) of aluminum extrusion ingot per year and create 70 local job opportunities. When completed, it will support automotive innovation and reduce waste going to landfills. The plant will produce 120,000 metric tons (265 million pounds) of aluminum extrusion ingot per year. Recycling aluminum scrap requires

minimum energy (only 5 % of the energy used to produce primary aluminum) and it reduces greenhouse gas emissions along with promoting a more circular economy.

4.5 Case Study 3: The City of Marquette

In this section, the sustainability of the City of Marquette is analyzed thoroughly using the sustainability audit tool. The assessment is done in three sub-sections to generate a comprehensive understanding of the city's sustainability.

In subsection 4.4.1, the sustainability of the whole city is measured using the audit tool. In subsection 4.4.2, the recommendations provided by the SBEI program are analyzed with the audit tool to identify how they align with the sustainability audit tool metrics and what percentage of the city's sustainability can be attributed to the SBEI recommendations. In subsection 4.4.3, only the 'Marquette Baraga Avenue Placeplan' is analyzed to identify the implemented portions of the project and measure how it is performing on a sustainability scale.

4.5.1 Assessment of The City of Marquette

Livability: According to the audit tool, Marquette obtains 'High' rating in the 'Livability' category of sustainability with an 81% score. Table 15 shows that Marquette receives 5 points in 47% of the metrics and 4 points in another 47% metrics. Combining them, it covers 94% of the metrics where Marquette has either fully achieved or partly achieved sustainability. Only 6% of metrics receives 3 points while no metric with 1 or 2 points is found. This clearly shows that Marquette has fully, and partially addressed most of the metrics.

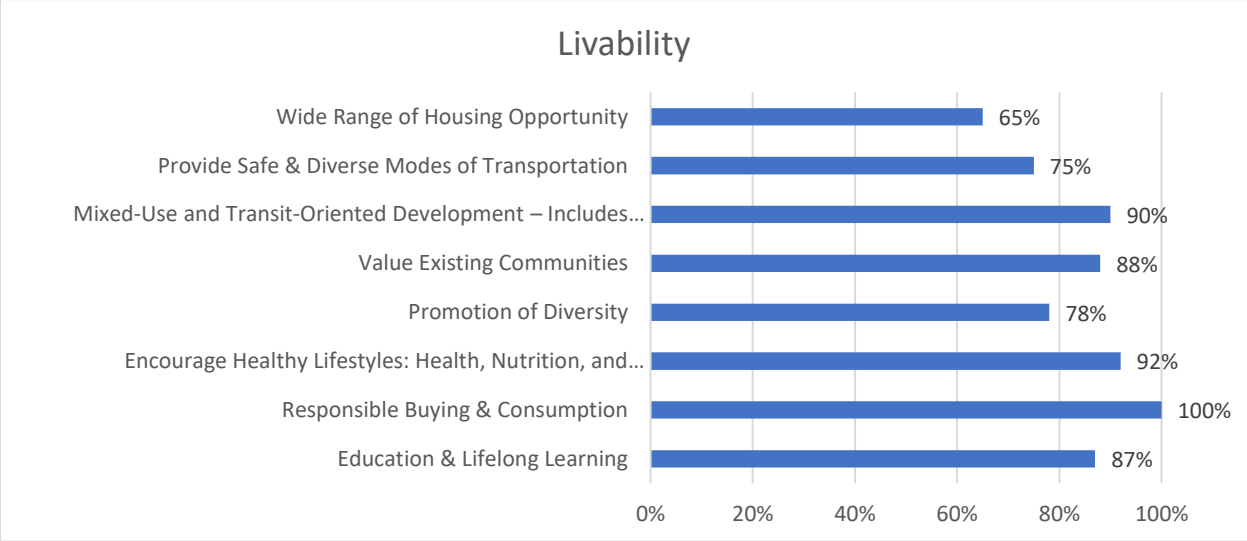
Going into detail in figure 4.23, Marquette achieves the highest score (100%) in the 'Responsible buying and consumption' indicator. Marquette was selected to receive the recycling project grant because of their longstanding dedication to advancing recycling in the community. The city has provided a map showing the spots for recyclable material collection. The next high score (92%) under livability category goes for 'Encourage healthy lifestyle: Health, Nutrition, and Recreation'. The Downtown Marquette Farmers Market serves as a local food source that the Marquette Downtown Development Authority sponsors. It operates twice a week at the Marquette Commons. The goal of this market is to support local farmers, growers, and artisans; to make available quality food and goods, and to offer a festive marketplace environment that benefits the Marquette Community. The city of Marquette has a wide range of housing options including middle- and low-income housing. However, the current data shows that there is still room for improvement in this area since the population in Marquette is increasing rapidly. The city is trying

to increase the overall social carrying capacity of the city emphasizing housing, infrastructure, and amenities.

Table 15: The distribution of scores of Marquette City in 17 metrics under the livability category

Received scores	Percentage
5 point	47%
4 point	47%
3 point	6%
2 point	0%
1 point	0%

Figure 4.23 A bar graph showing the percentage of scores of Marquette in 8 indicators under the livability category



Governance: The city of Marquette obtains a 'High' rating of sustainability under the 'Governance' category with a 88% average score. Table 16 shows that Marquette receives 5 points in 33% of metrics and 4 points in another 44%. 77% of metrics in total show that most of the sustainability metrics are fully or partially met under this category.

Figure 4.24 illustrates the finding in detail. Assessing 9 metrics within this category it is found that the city secures the highest score in 'Regional Collaboration and feedback' indicator. This metric measures if a Private-public partnership has been used to implement potential projects. Marquette is a fast-progressing city where dozens of projects are running throughout the year.

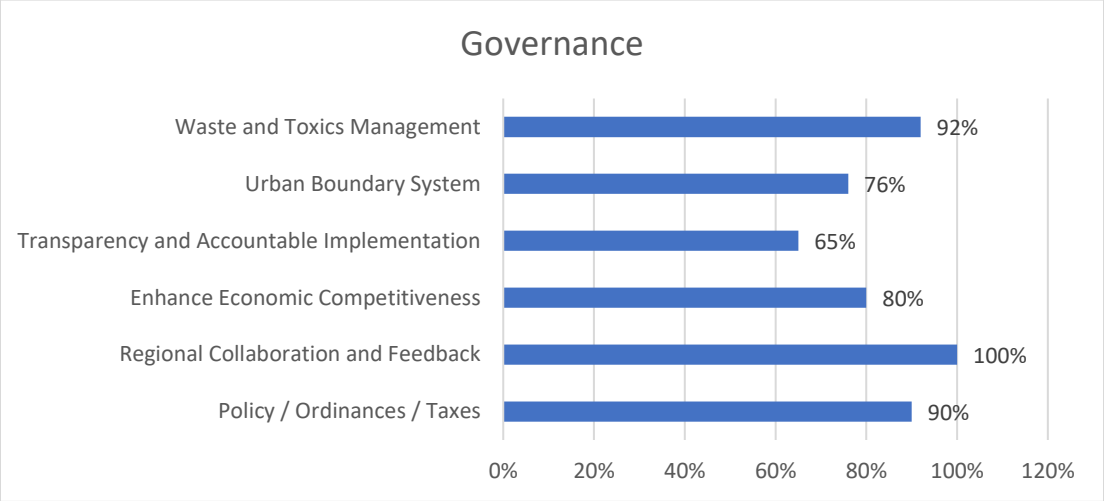
Different projects are securing funding from different sources. A few notable upcoming projects are NMU's New Health and Wellness center, Inn & Suites Marquette, and One Marquette Place.

The city obtains the next high score in the 'Waste and Toxic Management' indicator. The Marquette County 'Solid Waste Management Authority' and its constituent municipalities work collaboratively and advocate partnerships with. The Landfill provides many wastes disposal and recycling services to Marquette County residents, including drop-off recycling, household hazardous waste collections, and a drug take-back program. The Authority aims to extend the life of the Marquette County Landfill utilizing a balanced sustainable-economic approach. Figure 4.24 shows that, the City of Marquette could target a higher score in the 'Transparency and Accountable Implementation' segment. Under this indicator, timeframes for review, revision, or completion associated with action items in community plans are measured. Also, it assesses if the community tracks progress and adjusts strategies on an ongoing basis. The city has a masterplan, a downtown plan, and a capital improvement plan. While the downtown plan has been updated in 2020, the master plan has not been updated since 2015. They are currently working on their new masterplan.

Table 16: The distribution of scores of Marquette City in 9 metrics under the governance category

Received scores	Percentage
5 point	33%
4 point	44%
3 point	23%
2 point	0%
1 point	0%

Figure 4.24 A bar graph showing the percentage of scores of Marquette in 6 indicators under the governance category



Environment: The city of Marquette obtains a 'High' rating of sustainability with a 78% score in the 'Environment' category. According to Table 17, Marquette receives 5 points in 25% of metrics and 4 points in 42% of metrics. This data indicates that the city has fully or partially implemented 67% of the metrics under the environment category. Unlike other categories discussed above, Marquette got 1 and 2 points in 4% and 8% of the metrics which means a total of 12% of the metrics are either not addressed at all or are still in the planning phase.

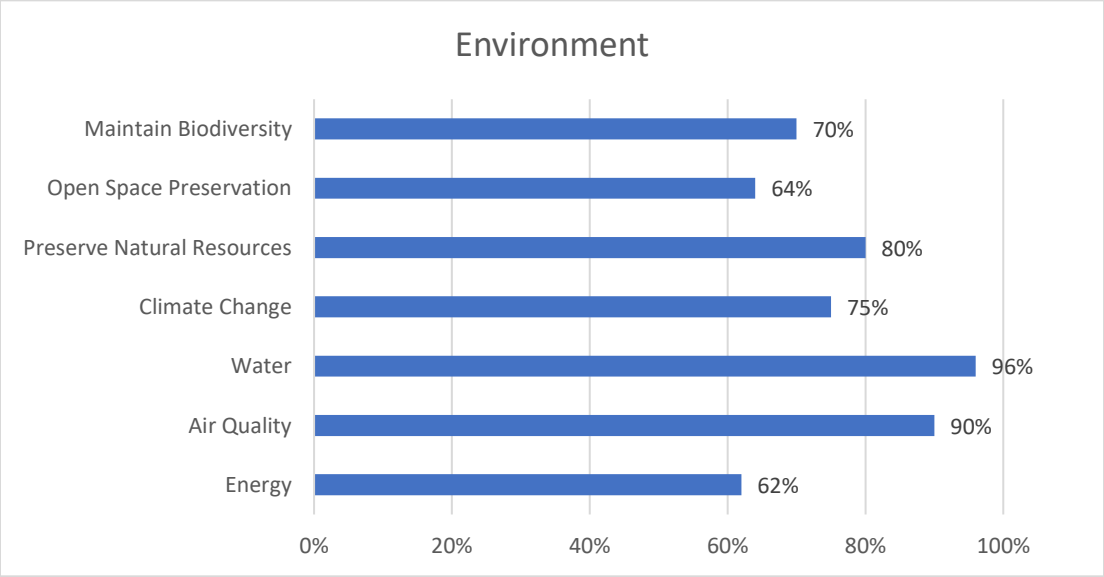
Figure 4.25 shows the breakdown of the indicators. Marquette receives the highest point in the 'water' indicator with a 96% score. Marquette is located on the shore of the great Lake Superior and the city is very aware of protecting the quality of lake water. There are organizations such as 'Superior Watershed Partnership and Land Conservation' that are working on different aspects of water quality control and shoreline protection. Some of the initiatives include a stormwater management plan, low-impact development to manage water runoff, use of permeable materials, and installation of rain gardens. The Lake Superior Rain Garden Challenge offers the installation of rain gardens as a way to protect the Great Lakes in the City of Marquette. The Project is committed to provide $2,000 each for three residential rain gardens and $3,000 each for two commercial or institutional rain gardens from 2020. Despite minor delays due to COVID-19, the Great Lakes Conservation Corp installed four rain gardens in summer 2020: two at residences, one at a McDonald & Wolf LLP law office adjacent to the multi-use path at Mattson Lower Harbor Park, and another one at educational rain garden at Bothwell Middle School. The city has detailed wastewater and stormwater management plans in place as well.

Marquette has the scope of improvement in the environment category by promoting the use of clean and green energy. While there is a community solar garden in Marquette and the land development code permits using solar panels and wind turbines for residential and commercial use, there is no incentive from the city to promote the use.

Table 17: The distribution of scores of Marquette City in 24 metrics under the environment category

Received scores	Percentage
5 point	25%
4 point	42%
3 point	21%
2 point	8%
1 point	4%

Figure 4.25 A bar graph showing the percentage of scores of Marquette in 7 indicators under the environment category



Community: The City of Marquette obtains 'Medium' rating of sustainability under the 'Community' category. Table 18 shows that Marquette receives 5 points in 17% of the metrics while it receives 4 points in 33% of the metrics. This indicates that the city has fully or partially implemented 50% of the sustainability metrics. The other 50% of the metrics containing 3, 2, or 1 points indicate that those are not implemented and are still in the planning phase.

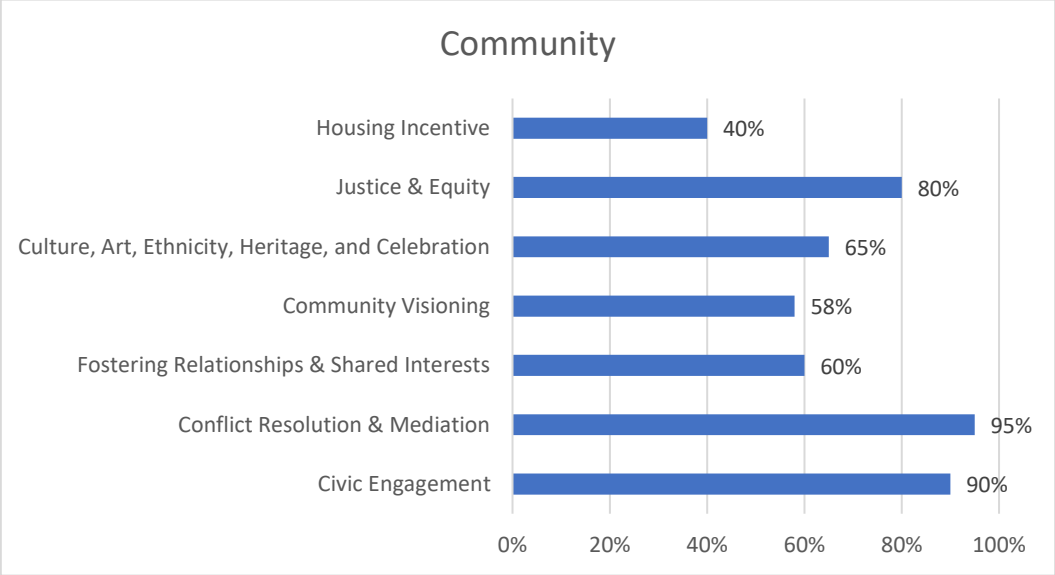
Figure 4.26 provides the breakdown of the indicators. Marquette obtains the highest score (95%) in the 'Conflict Resolution and Mediation' indicator. The city provides multiple methods for public comment when addressing community issues/disputes (e.g. public meetings, informal discussion, mediation, rules of conduct, and online comment). The city has a public participation plan adopted in 2019 which discusses the goal, objectives, and the process of public engagement. The City of Marquette supports and encourages participation by making information available in a timely manner, allowing the citizens/public to take part in important decisions at various stages of the review and approval processes. Public information and involvement methods are continually evolving. The municipality is committed to seeking new and innovative ways to engage and keep the public involved throughout the process.

The city has a comparatively lower score in 'Culture, Art, Ethnicity, Heritage, and Celebration'. Under this indicator historic assets, public spaces, and incorporation of public arts are assessed. While the schools are very promising in highlighting sports, there is less focus on promoting art and music in the schools, that is reflected in the score.

Table 18: The distribution of scores of Marquette City in 12 metrics under the community category

Received scores	Percentage
5 point	17%
4 point	33%
3 point	34%
2 point	8%
1 point	8%

Figure 4.26 A bar graph showing the percentage of scores of Marquette in 7 indicators under the community category



Economy: The city of Marquette obtains a 'High' rating of sustainability under the 'Economy' category. Table 19 shows that 22% of metrics under this category receive 5 points and 44% receives 4 points. This shows that 66% of the metrics for economic sustainability are either fully or partially implemented. The remaining 34% with a 3,2 or 1 point are not implemented yet and some of them are still in the planning phase.

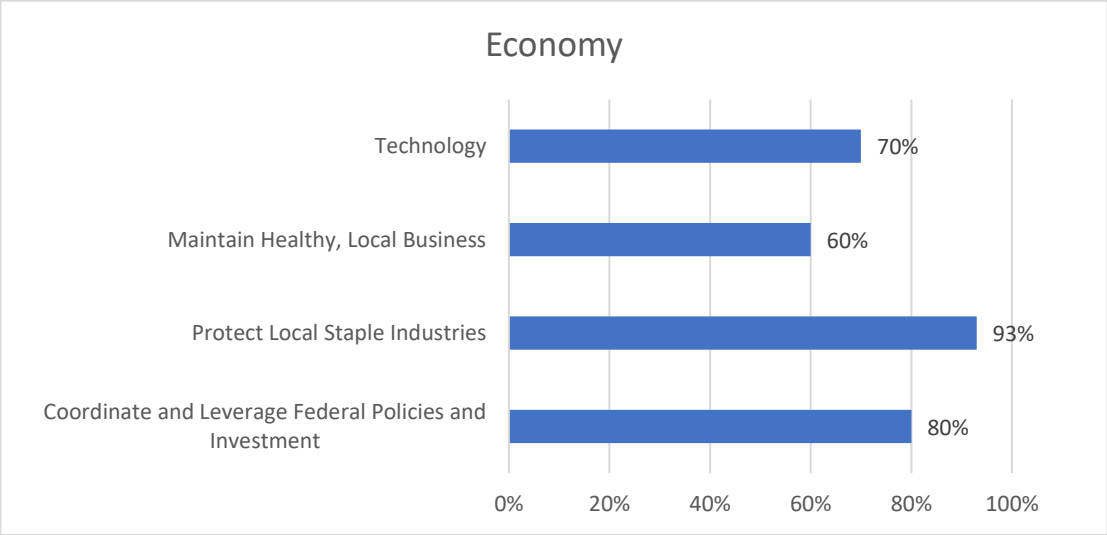
Figure 4.27 shows the indicators and associated scores in details. From figure 4.26(b), the city receives the highest score(93%) in the 'Protect Local Staple Industries' indicator. This indicator assesses if local economic assets specific/special to the community & region have been capitalized on. Marquette has a Visitors guide (outlines park system), a Chamber of Commerce, a Strong, and well-developed parks system, Lake Superior, monthly business meetings with businesses, and Farmer's market. The city has regulations in place to protect and properly utilize all the local assets. Also, the city has a diversified industry that is beneficial for a sustainable economy. The most common employment sectors for those who live in Marquette, are Health Care & Social Assistance (1,928 people), Retail Trade (1,898 people), and Accommodation & Food Services (1,769 people). Marquette has a lower score in 'Maintain Healthy Local Businesses' though it has a business association. Through teamwork and collaboration, the association developed a strong relationship with the Township Planning Commission & Board of Trustees. However, the indicator assesses if incentives are available to support small local businesses.

Currently, Marquette is providing incentives to businesses only if the business is within the infill development area.

Table 19: The distribution of scores of Marquette City in 9 metrics under the economy category

Received scores	Percentage
5 point	22%
4 point	44%
3 point	22%
2 point	11%
1 point	0%

Figure 4.27 A bar graph showing the percentage of scores of Marquette in 4 indicators under the economy category

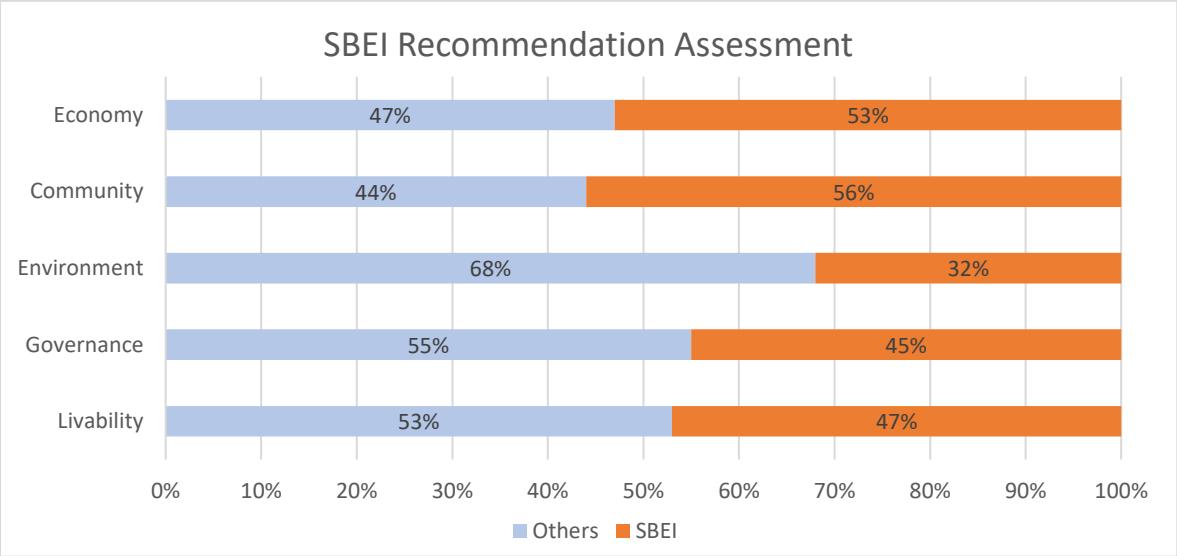


4.5.2 Assessment of SBEI Recommendations at Marquette

In the final report, the SBEI team provided 26 separate recommendations under 8 broad goals to implement to the City of Marquette. Some of the recommendations involve physical planning, while others are more policy-oriented. Notable high priority recommendations for the city include increase pedestrian safety, enhancement of recycling, and improvement of recreation facility at Baraga Avenue as an arrival destination to downtown Marquette. In this section, the recommendations are analyzed to see how they align with the metrics in the sustainable audit tool. Figure 4.28 shows that SBEI recommendations have addressed 54% of sustainability metrics under the economy category, 75% in the community category, 45% in the environment category, 64% in

the governance category, and 77% in the livability category based on the city's current performance. The scores also imply the percentage of city's performance that may occur as an output of the SBEI project recommendation. These scores indicate that the SBEI recommendations are most aligned with the 'Community' category and least aligned with the 'Environment' category.

Figure 4.28 Assessment of SBEI recommendations for the City of Marquette



4.5.3 Assessment of the SBEI Project Implementation at Marquette

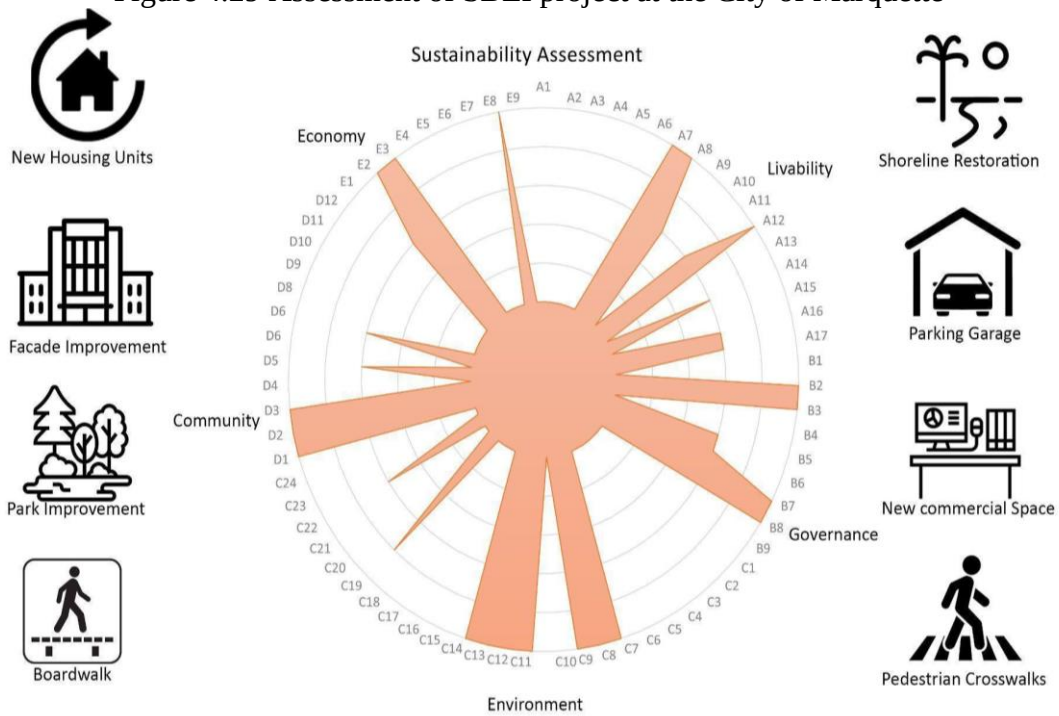
The Baraga Avenue plan has been implemented partially at discrete parts of Baraga Avenue. Major interventions according to the project include the renovation of some old buildings and the establishment of a few new ones through private investment. Examples include two prominent establishments named 'Customs House' and 'One Marquette Place'. The 'Customs House' building was built in the late '80s. In 1991, it was purchased by the Baker family, and ownership has remained with them since then. New condos are built there, keeping the historic look intact. Another new mixed-use building on the south side of the road is built named 'One Marquette Place.' The building has a parking garage and commercial space at ground level and apartments on the upper floors. The place offers a fantastic selection of studio, 1-, 2- and 3-bedroom apartments with the abundant community and apartment amenities located on the shores of Lake Superior. After the project, new businesses and retail shops came to the place, along with a new coffee shop. New crosswalks on Baraga Avenue are incorporated, while the older ones are repainted and improved. According to the plan, there are improvements to the parks on the street

to incorporate community residents gathering. The building facades are improved and currently, there are no vacant storefronts.

Different parts of the project are still in ongoing phases. A new mixed-use building is going to be built on the lakeside with a public boardwalk. Further improvement to the parks will take place shortly. There is a huge parking lot on the north side of the street, and it is expected to turn into a mixed-use building, incorporating parking on the ground floor and housing on top of that. The streetscape improvement of Baraga Avenue could not be fully implemented primarily due to shortage of funding. Upon securing a fund, the sidewalks will be widened, and new street amenities such as streetlights, planter boxes, and benches will be installed. The utility lines will be buried to make the street aesthetically pleasing. This SBEI plan will work as the basis for the design improvement when the city takes the initiative to pursue a suitable fund for the streetscape improvement. Since Capital Improvement Plan (CIP) has a limited budget each year, it needs to be prioritized to implement the streetscape improvements.

Figure 4.29 shows a visual representation of the sustainability assessment for Marquette 'Baraga Avenue Placeplan project'. Under the five categories of sustainability, the city has shown significant impact based on the improvement in Baraga Avenue and Great Lake shoreline area which are reflected in 71 metrics on a scale of 1 to 5.

Figure 4.29 Assessment of SBEI project at the City of Marquette



Livability: The SBEI plan promoted a mix-used development not only at Baraga Avenue but also in other parts of Marquette. After the project, the planning commission amended the land development code to increase the permissible building height. The increased height is beneficial to establish mixed-used development and to expand the housing stock necessary for the Marquette community. Based on the plan, the community has become more walkable and bikeable, and more trail planning has been done.

An example of adaptive reuse is seen within Baraga Avenue. The Customs House, built in 1880, is now operating as residential apartments with high-end amenities. The historical look is kept unchanged while changing the interior from a storehouse to a livable place. The place offers all the comforts of city life since it is within walking distance of the downtown. In addition, mixed use development with affordable housing is seen in 'One Marquette Place' built at Baraga Avenue. The structure contains a parking garage and commercial space at a lower level. The primary and upper floors house an in-house fitness area, office and maintenance spaces, and several luxury apartments. Along with new apartments and people, new businesses were introduced in the area, providing community residents with places to sit and gather. The location of parks in this area also adds to the increased livability along the road and surrounding area.

Governance: Baraga Avenue is within very close proximity to Marquette downtown. Therefore, improvement in this area is beneficial to smart growth. Marquette has an active planning commission to make amendments to adopt necessary changes to enhance smart growth. Though the streetscape is not fully implemented yet, the plan is still on the radar of government planning organizations. Reducing the lane width to increase space for sidewalks and other street facilities and burying the utility lines are expensive tasks to perform. The DDA is still planning to secure a grant through which these changes can be made. Keeping the old plans on track while monitoring the current progress is a very significant part of sustainability assessment. The City of Marquette attempts to capitalize on local and natural resources which are observed in the Baraga Avenue plan as well.

Environment: Coastal resiliency is given the highest priority in the City of Marquette in terms of sustainability. The National Fish and Wildlife Foundation (NFWF) has awarded a $2.5 million coastal resiliency grant to the Superior Watershed Partnership (SWP) to assist the City of Marquette in restoring almost a mile of severely eroding Lake Superior shoreline within the city limits. The Lake Superior Coastal Resiliency Project includes approximately 4,200 feet of

shoreline adjacent to Lakeshore Boulevard and will create approximately 28 acres of public green space. Project activities will control coastal erosion and restore or enhance numerous natural features, including but not limited to the coastal floodplain, sand beach, dune and swale, coastal wetlands, and a variety of terrestrial wildlife and bird habitats. During the three-year project implementation timeline, the City of Marquette will also coordinate the reconstruction of Lakeshore Boulevard, moving the road approximately 300 feet inland. The completed project will include an extensive hiking-biking trail system with parking and ADA public access. The project also includes innovative design features developed by the City of Marquette Engineering Department including green infrastructure practices to ensure cleaner stormwater runoff from the roadway and parking areas. Though the project itself is not a part of the 'Baraga Avenue Placeplan', local leaders consider the SBEI program to influence the sustainability measures taken within the community for other projects.

Due to more frequent and intense storm events and the risk to public safety, the City of Marquette has been forced to close a large portion of Lakeshore Boulevard for extended periods. Recent extreme weather has included record-setting rain events, recurring road flooding, wave and storm surge impacts, and threats to public safety. During a storm in October of 2017 buoys documented record 28-foot waves offshore from Marquette. Reducing the risk of flooding and preparing for long-term and short-term efforts to mitigate climate change is another issue addressed by the SBEI plan.

Community: The SBEI project process itself played a big role in this category of sustainability assessment. A variety of engagement strategies such as online discussion, public meetings, targeted group sessions, topic-specific committees, and charrettes were utilized to get community feedback for the process. The process was extensively interactive with visualizations that created meaningful conversation among the stakeholders. The final report portrayed what was heard at the meetings and workshops with the community residents.

Economy: The city stays aware to pursuing federal and state funding to support community goals. A handful of projects are going on in different parts of the city. Community Development Block Grants from MEDC, DNR trust fund, and other federal sources such as the National Fish and Wildlife Foundation (NFWF) provide grant money to implement some of the development projects. The city received 1.2 million dollars of funds from only private donations.

Baraga Avenue is located at a prime location in the city which is also a center of attraction for residents and visitors. Being a unique destination place for tourism, seasonal tourism and associated businesses bring money to the community. The city is hopeful to secure a grant to improve Baraga's streetscape further.

4.6 Sustainability Comparison among the Communities

Table 20 shows the synopsis of the data and discussion presented in subsections 4.3, 4.4, and 4.5. All three communities have obtained the 'High' ranking for most sustainability audit tool categories. A few categories are ranked as sustainable to a 'Medium' degree such as the 'Environment' category in Cadillac and Cassopolis and the 'Community' category in Marquette. The 'High' rank in most categories indicates that the communities are adopting sustainable practices and implementing features to promote sustainability within the community.

It is observed that for the 3 communities, there is significant variation in the sustainability of the SBEI recommendations in each category. For example, under livability category, SBEI recommendations can be attributed for 77% of Cadillac's sustainable features as a city, 78% of the Cassopolis's sustainable features as a village and only 46% of Marquette's sustainable features as a city. There is a noticeable difference between the sustainability scores of the city/village and the sustainability scores of the SBEI recommendations made for them. This is primarily because in this study the SBEI projects in the 3 communities focus on specific parts of the city/village, not the entire area, though the planning and design recommendations are replicable for other parts of the city as well. Another reason is that some of the metrics are applicable for the entire city/village only, and not applicable for the SBEI project site. For example, under the environment category, one metric measures if the city has short term/long term hazard mitigation plan in place. All the 3 communities got the score since they have some sort of hazard mitigation plan in place. However, the SBEI project sites are not given any score for that since it is out of scope of the project. It may seem inequitable to compare the city and the SBEI project since their scope of work are not exactly similar. However, the purpose of this study is to assess the contribution of the SBEI project toward sustainability of the whole city, not making a comparison of them. Lastly, it must be noted that sustainability is a broad concept which is difficult to be accommodated within a single development initiative such as the SBEI.

Table 20: Sustainability assessment comparison among the three communities analyzed in subsections 4.2, 4.3, and 4.4. The sustainability of the SBEI recommendations is noted in parenthesis under each category beside the ranks (High, Medium, or Low)

	Sustainability of Cadillac/ (SBEI recommendations)	Sustainability of Cassopolis/ (SBEI recommendations)	Sustainability of Marquette/ (SBEI recommendations)
Livability	High (77%)	High (78%)	High (46%)
Governance	High (64%)	High (74%)	Medium (45%)
Environment	Medium (45%)	Medium (34%)	High (32%)
Community	High (75%)	High (61%)	High (56%)
Economy	High (54%)	Medium (73%)	High (53%)

The 3 radar graphs in Figure 4.30 below are showing the sustainability comparison between the SBEI project and the overall city/village using the audit tool. Orange color is showing the sustainability of the whole area and blue color is showing the sustainability of the SBEI project site addressing the 71 metrics of sustainability audit tool. The overlap between orange and blue colors show the direct contribution of SBEI project in city's sustainability. The portion where the blue color has surpassed orange represents when the sustainability measure is only taken at the SBEI site, not other parts of the city.

Figure 4.30 The contribution of SBEI project toward the city's overall sustainability

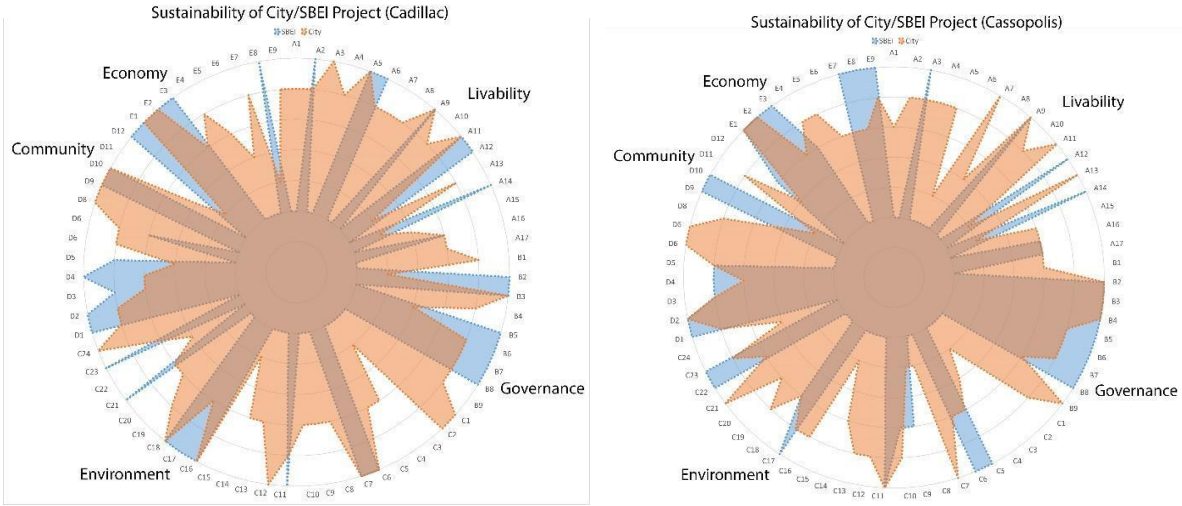
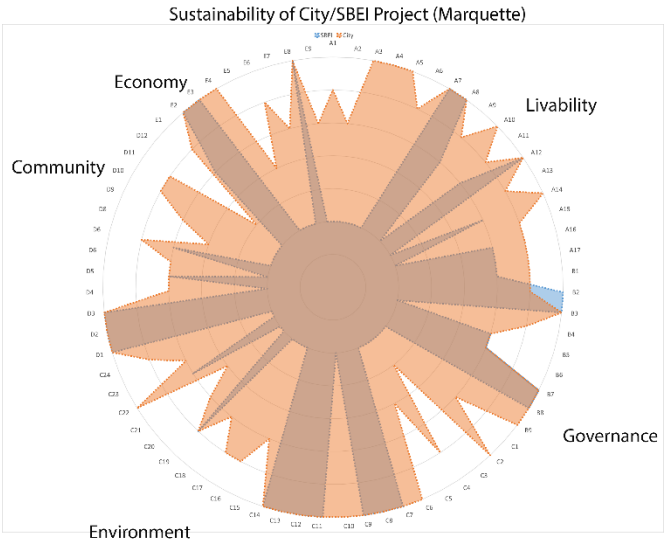


Figure 4.30 (cont'd)



4.7 Comparison among Three Implemented Case Studies

Table 21 shows a comparative analysis of the three case studies, project descriptions, objectives, a summary of actors of public-private partnerships that took place because of the SBEI projects and an assessment of the explained implemented projects. With this discussion, it is concluded that the set objectives are achieved at different scales in the case studies. While Cadillac and Cassopolis could implement the whole project and could bring significant change to the community, most part of the 'Marquette Baraga Avenue Project' in Marquette is yet to be executed upon securing a grant. However, considering the current stage of the three projects, it is found that all the projects have contributes towards the overall communities' sustainability in livability, governance, community, environment, and economy categories that are reflected in the radar diagrams in 4.30.

Table 21: Comparison of sustainability assessment highlights among three communities

Project Area	**Project Description**	**Objectives**	**Actors Of Public-Private Partnership**	**Assessment**
	Provide a framework for future development while protecting the area's enviro-nmental and aesthetic	-Promote mixed-use development and placemaking -Enhance physical design and walkability -Emphasize environmental sustainability	-Michigan Economic Development Cooperation -DDA -City property tax revenues -Rotary Club	Livability: -Created a multi-use, multi-seasonal, flexible space for community events, festivals, and public gatherings. -Incorporated a Complete Streets approach for pedestrians and bicyclists

Table 21 (cont'd)

Cadillac	qualities, foster downtown placemaking, and serve as a blueprint for guiding the planning and development of locations immediately adjacent to the project area	-Assist cultural and economic development -Stimulate entrepreneurship and multiculturalism -Allow businesses and residents to attract each other -Make efficient use of public resources	-Private donations	-Improved accessibility: strong physical connection from the plaza to Lake Cadillac and the pavilion Governance: - a blend of public-private partnerships to implement the projects -Different phases are determined to implement the whole thing Environment - Air quality improvement: the existing mature trees remain preserved, while additional plantings are introduced - Pedestrian-friendly parking lot Community - A variety of engagement strategies utilized -Promotion of social equity Economy - New private investment since the construction of Cadillac Commons - New residential units -Economic activity enhancement through the new Farmer's market
Cassopolis	Develop a vibrant downtown for the area focusing on the Broadway Street corridor. The project is intended to vision a lively and thriving streetscape and harbor amenities in public spaces that will make the downtown	-Enhance the aesthetic of the streetscape -Create better access and connectivity making Stone Lake a focal point of the city -Emphasize expanding culture and tourism -Promote adaptive reuse throughout the community -Encourage smart growth and	-Community Development Block Grant funding for public improvements - The village of Cassopolis - Midwest Energy and Communications - Economic Development Administration (EDA)	Livability: - traffic calming throughout town - created a central gathering hub and sense of belonging for residents within the village Governance: -The Village financed millions of dollars to cover the costs of the projects, and in turn, they have more than doubled their general fund income -Created a financially healthy, stable, and resilient community for the first time in Decades

Table 21 (cont'd)

	a place to live, work and play.	mixed-use development		Environment: -Updated all the water, storm, and sewer lines within the streetscape -Reduce water runoff and prevent lake water pollution -Created a more pedestrian-friendly community
				Community: -Prime example of community voice being heard. Community feedback is directly reflected in the current Masterplan through the SBEI project recommendations
				Economy: - Access of low- and moderate-income community members to local businesses and services -Encouraged private investment
Marquette	Enhance beautification of current facades, green space, and streetscapes, and ensure accessibility to all to create a unique identity that will attract opportunities for more entertainment, housing, shopping, eating, and recreation year-round	-Mixing daytime employment uses with evening shopping and entertainment uses - Promote a walkable mixed-use district to provide amenities that attract new residents - Foster a built-in customer base that can support new businesses, creating a virtuous cycle of activity and investment - Reduce household transportation and energy costs	- National Fish and Wildlife Foundation (NFWF) -Private investment -City of Marquette	Livability: -Promoted mixed-use development -Exemplary evidence of adaptive reuse
				Governance: -Promote smart growth -Old plans are monitored and progress is tracked to adjust strategies
				Environment: - Restoring almost a mile of severely eroding Lake Superior shoreline -Control coastal erosion and enhance numerous natural features including the coastal floodplain, sand beach, dune and swale, coastal wetlands, and a variety of terrestrial wildlife and bird habitats
				Community: - Extensively workshops and meeting sessions with interactive visualizations to create meaningful

Table 21 (cont'd)

				conversation among the stakeholders
				Economy: - New businesses were introduced - Analysis over time within the community to understand challenges and opportunities within the local economy

CHAPTER 5: CONCLUSION

This thesis presents a detailed analysis of the Sustainable Built Environment Initiative (SBEI) projects carried out by the Michigan State University Extension (MSUE) and the School of Planning, Design, and Construction (SPDC), from the perspective of sustainable revitalization. SBEI projects aimed to assist communities in cities and small towns in the state of Michigan to revitalize their significant spaces by providing them with planning, design, and land use recommendations. 25 communities participated in this joint effort, involving local residents and authorities as well. This study evaluates the impact of 14 SBEI projects in 13 of those communities, specifically focusing on 3 communities to examine whether the executed projects have met the expectations of the researchers and the community residents in terms of sustainability. Interviews with the planners/city managers/associated entities are conducted and a systematic sustainability assessment on three specific communities is performed.

5.1 On the assessment of SBEI projects in 13 communities

Marquette, Monroe, Saginaw, Boyne, Flat Rock, Ishpeming, Gladstone, Charlevoix, Manistee, Edwardsburg, Cassopolis, St. Ignace, and Cadillac were chosen for this assessment. Data for the assessment were sourced from these communities' masterplans, zoning ordinances, Capital Improvement Plan (CIP), and extensively interviewing the local leaders.

Acquired data and analysis show that SBEI programs have helped these communities to better align their actions with sustainable goals. Leaders of 11 out of the 13 communities expressed their belief that this program has been highly beneficial in creating community awareness about sustainability and has prepared a platform to brainstorm how to make the community a vibrant place for its residents and visitors in a sustainable manner. The examples of installing low-impact development, rain gardens, safe and active pedestrian facilities, waste management, solid waste recycling, mixed-use development, improved streetscape aesthetics, and infrastructure portray the conscious effort of the communities to inject a sustainable built environment. The program worked as a visioning session that motivated the communities to pursue state and federal grants, implement the design and planning recommendations and bring a wind of change in the community.

In addition to commending the positive impacts of the SBEI projects, several communities recommended potential improvements for projects similar to SBEI. It has been found that a cost estimation of the project's implementation, which was not provided to the communities by SBEI, would be helpful for them to secure funding and implement the recommendations.

5.2 On the assessment of 3 specific communities with sustainability audit tool

Cadillac, Cassopolis, and Marquette are taken as case studies to perform an extensive evaluation of sustainable practices in these communities using a sustainable audit tool. The audit tool is used twice for each community - firstly, to assess sustainability for the whole community, and secondly, to assess sustainability for the specific SBEI project on a certain portion of the community. The purpose of running the same tool twice is to analyze how the entire community is incorporating sustainability measures at its different parts as well as how the project itself is performing on a sustainability scale. This twofold application of the sustainability audit tool is important because although the design and planning recommendations provided by the SBEI programs to a particular city or town are site-specific, they are generally replicable in other sites of the city or town as well if the respective community chooses to do so.

Analyzing the three communities it is found that although they all have achieved a 'High' rank in the audit tool, each of them derived unique benefits from the projects. Implementing the 'Cadillac Heritage Plaza Placeplan Project' according to the SBEI recommendations, the community at Cadillac significantly improved the general appeal of its downtown area. The village of Cassopolis on the other hand has incorporated most parts of the SBEI recommendations in their current masterplan. Improvement in the streetscape, adding pedestrian facilities and building the 230 feet long beach pier has strengthened the village both functionally and aesthetically, drawing millions of dollars of federal grants and bringing new businesses and private investments.

While Cadillac and Cassopolis both have implemented most of their respective SBEI projects, the City of Marquette fell behind in the execution of the SBEI recommendations due to a lack of funding, a high cost of materials and labor, and the difficulty to maintain the projects' continuity upon changing local administrative bodies. Nonetheless, several discrete parts of the project area have been improved, such as road crossings, roadside parks, and access to the new boardwalk. Apart from these improvements at the SBEI project area, the city has also installed several rain gardens, retention areas to reduce stormwater runoff, extensive shoreline restoration, CO_2 emission mitigation for industries, coastal resiliency, and improved walking and biking trails. Therefore, when the city, as a whole, is assessed with the sustainability audit tool, it is found to be at the forefront of sustainable revitalization. The local leaders from Marquette opine that many of the abovementioned efforts are directly or indirectly influenced by the SBEI program that shaped their approach toward urban space revitalization.

5.3 Concluding Remarks

This study reveals that communities are unique, and they adopt planning differently. The three communities subject to our intensive assessment have been impacted by the SBEI program at different scales and in different paces and manners. Documentation of the assets and challenges of the communities through a sustainability lens, as has been done in this thesis, provides a base to discuss the future scope of work for identical communities. Furthermore, this study offers feedback on SBEI and similar current revitalization planning efforts in communities which would be helpful in planning for more robust approaches in the future. The findings from this study will guide communities to adopt sustainability goals and provide their residents with vibrant city life.

One of the limitations of this study is that the assessment of the communities using the sustainability audit tool is solely done by the author based on the input from local leaders, available resources such as local ordinances (masterplan, zoning ordinance, Community Improvement Plan, Community Strategic Action Plan), news articles and government official websites. Sustainability scores under each category of the audit tool for the three communities may vary due to interpretation of statements from the interviews. Another limitation of this study is that the primary data was sourced from local leaders such as city managers, development directors, and city planners. However, the local residents could also be a significant source of data. A future survey focusing on their perspective on the planning approaches as well as their perception of the changes brought about to their communities by these projects might be valuable.

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APPENDIX A: SUSTAINABILITY AUDIT TOOL

Section 1: Livability

Definition: Livable communities are coordinated, collaborative environments that address their citizens' vision and needs by providing mixed-use neighborhoods and diverse housing options. These communities provide multimodal transportation options.[1]

Sustainable Livability Indicator	Metric	Rating				
		1	2	3	4	5
Education & Lifelong Learning	Is there a presence of and access to lifelong educational services for the community (e.g., libraries, higher education, and job training programs)?[2]					
	Is there a transparent and active relationship between local government, community organizations, and school systems?[3]					
	Is there a presence of functioning cultural facilities (i.e. libraries, cultural events, museums, etc.)?[4]					
Responsible Buying & Consumption	Is there evidence of recycling and reuse programs throughout the community?[5]					
Encourage Healthy Lifestyles: Health, Nutrition, and Recreation	Is there an active local food system in the community, including farmer's markets and/or organic markets?[6]					
Promotion of Diversity	Are there community activities/events that celebrate cultural diversity?[7]					

[1] *HUD/DOT/EPA Interagency Partnership*

[2] ICLEI 2010, p.18, APA Smart Growth 2012, p.2, HUD-DOT-EPA 2010, p.11

[3] MSU SPDC 2012

[4] STAR 2014, p.74

[5] Duany et al. 2010, p. 13.11

[6] APA Food Planning 2007, p. 4 & p. 7

[7] Sustainable Communities Online, *Culture, Art, Ethnicity, Heritage and Celebrations*, 2014

Sustainable Livability Indicator	Metric	Rating				
		1	2	3	4	5
Value Existing Communities	Have redevelopment sites been identified and prioritized within the community?[8]					
	Is there evidence in the community of buildings that have been adaptively reused[viii]?[9]					
	Have steps been taken to create a unique identity or brand for local neighborhoods and/or the wider community?[10]					
	Is volunteerism and grassroots organization evident in the community?[11]					
Mixed-Use and Transit-Oriented Development – Includes Mix of Uses & Walkable Neighborhoods	Does the master plan (if applicable) encourage mixed-use development in downtown and commercial core areas?[12]					
	Are density bonuses or other incentives offered to improve residential access to services and amenities?[13]					
	Are key places of the community such as urban corridors, downtowns, and neighborhood centers walkable including sidewalks, crosswalks, and pedestrian features (e.g., benches)?[14]					
	Do transportation nodes provide access to multiple modes (e.g., bus stations with access to rail transit and/or bike racks)?[15]					

[8] RRC 2014, p. 17-18

[9] LEED ND, 2009, p. 94

[10] STAR 2014, p. 74

[11] STAR 2014, p. 76

[12] Duany et al. 2010, p. 5.1

[13] Duany et al. 2010, p. 5.10

[14] Duany et al. 2010, p. 8.1

[15] Duany et al. 2010, p.3.2

Sustainable Livability Indicator	Metric	Rating				
		1	2	3	4	5
Provide Safe & Diverse Modes of Transportation	Does the community provide a variety of transportation options (e.g., dial-a-ride, buses, rail, non-motorized paths)?[16]					
	Are important places such as recreation centers, schools, and downtown centers accessible by multiple transportation modes?[17]					
Wide Range of Housing Opportunity	Is affordable housing available in close proximity to critical services, including grocery, pharmacy, and public transportation?[18]					
Total						

Assessment: Sustainable Livability Metrics

[16] Duany et al. 2010, p. 3.2

[17] Duany et al. 2010, p. 3.4

[18] LPI 2007

Section 2: Governance

Definition: Sustainable governance encourages citizen participation with the goal of effectively and efficiently engaging community members and cooperating to solve common problems.[19]

Sustainable Governance Indicator	Metric	Rating				
		1	2	3	4	5
Policy / Ordinances / Taxes	Is there evidence within the community of cooperation between jurisdictions (e.g., regional transit, natural asset management, public safety)?[20]					
	Does your community actively work to remove ordinance barriers that can hinder smart growth[ii] or add ordinance language that encourages smart growth?[21]					
Regional Collaboration and Feedback	Have public-private partnerships been utilized as a strategy to implement potential projects?[22]					
Enhance Economic Competitiveness	Has the community formed plans and partnerships for the regional coordination of economic growth?[23]					
Transparency and Accountable Implementation	Are timeframes for review, revision, or completion associated with action items in community plans?[24]					
	Do community plans track progress and adjust strategies on an ongoing basis?[25]					

[19] Sustainable Communities Online, *Government and Sustainability*, 2014

[20] APA Sustaining Places 2011, p. 10

[21] LPI 2007

[22] APA Smart Growth E.7 2011, p. 3

[23] APA Sustaining Places 2011, p. 10

[24] APA Sustaining Places 2011, p. 11

[25] APA Sustaining Places 2011, p. 11

Sustainable Governance Indicator	Metric	Rating				
		1	2	3	4	5
Urban Boundary System	Do goals and strategies in community plans strive for the appropriate development of rural resources?[26]					
	Is there evidence of the community directing development toward areas with existing infrastructure?[27]					
Waste and Toxics Management	Is solid waste management addressed within community plans/ordinances?[28]					
Total						

Assessment: Sustainable Governance Metrics

[26] Sustainable Communities Online, *Land, Forests, and Ecosystems*, 2014

[27] HUD-DOT-EPA 2010, p. 11

[28] Sustainable Communities Online, *Growing a Sustainable Economy*, 2014

Section 3: Environment

Definition: Preserving and enhancing the natural environment is essential for maintaining community sustainability. Healthy ecosystems balance current economic needs while also assuring there will be adequate resources to meet future needs.[29]

Sustainable Environment Indicator	Metric	Rating				
		1	2	3	4	5
Energy	Is there evidence of clean and renewable energy[iv] within the community?[30]					
	Do development regulations allow for clean or renewable energy (e.g., solar panels)?[31]					
	Do decisions about residential/commercial development incentivize the use of clean or renewable energy?[32]					
	Is there evidence of public assets being used as examples for clean and renewable energy (e.g., energy efficiency, solar panels, wind turbines, etc.)?[33]					
	Do decisions about transportation systems consider the reduction of Vehicle Miles Traveled (VMT)?[34]					
Air Quality	Does the region take measurements of air quality to compare to baseline levels?[35]					
Water	Is the main source of community drinking water able to support community growth?[36]					

[29] Sustainable Communities Online, *Energy*, 2014

[30] LEED ND, 2009, p. 102

[31] LEED ND, 2009, p. 102

[32] LEED ND, 2009, p. 1

[33] LEED ND, 2009, p. 102

[34] LEED ND, 2009, p. 30-31

[35] EPA, *Air Quality Planning and Standards*, 2014

[36] LGAM 2008

Sustainable Environment Indicator	Metric	Rating				
		1	2	3	4	5
	Has the community implemented "green" stormwater management techniques (e.g., permeable pavement[v], waterfront buffers, retention ponds, and rain gardens)?[37]					
	Is the community actively planning for storm water management (e.g., adopting a storm water management plan)?[38]					
	Is the community actively planning for wastewater management (e.g., adopting a wastewater management plan)?[39]					
	Are local water bodies safe for recreation?[40]					
Climate Change	Is the community actively planning for short-term extreme climate events (e.g., adapting a Hazard Mitigation Plan or Emergency Preparedness Plan)?[41]					
	Is the community actively planning for long-term climate change (e.g., adapting a Climate Change Readiness or Adaptation Plan)?[42]					
	Are critical community facilities and assets located appropriately relative to the 100-year flood plain (e.g., police stations, fire stations, hospitals, communication centers, significant roadways, sewage treatment plants, etc.)?[43]					
	Are local businesses in the community encouraged and/or					

[37] STAR 2014, p.78

[38] ICLEI 2010, p. 13

[39] ICLEI 2010, p. 13

[40] EPA, *Water – Recreation*, 2014

[41] NACO, 2014

[42] APA PAS 558 2010

[43] APA PAS 558 2010

Sustainable Environment Indicator	Metric	Rating				
		1	2	3	4	5
	incentivized to reduce greenhouse gas emissions?[44]					
Preserve Natural Resources	Does the community have a natural resource management plan that addresses the preservation of natural resources?[45]					
	Does your community utilize best practices when addressing natural resource management? These may include, visioning and goal setting, plan making, standards, policies, incentives, development work, public investment, conservation easements, and soil-based zoning.[46]					
Open Space Preservation	Are brownfield sites[vi] in the community identified, inventoried, and prioritized for rehabilitation?[47]					
	Have local groups, committees, or programs been established to preserve open space, farmland, and/or critical environmental areas?[48]					
	Are controlled density standards addressed in the zoning ordinance (e.g., density bonuses, lot size, flexible parking or setback requirements, etc.)?[49]					
	Has a build-out analysis[vii] been performed to ensure the zoning ordinance directs density to areas with necessary infrastructure?[50]					
	Are site plans reviewed prior to development for the ramifications					

[44] ICLEI 2010, p.15

[45] APA PAS 558 2010, p. 133

[46] APA PAS 558 2010, p. 133

[47] RRC 2014, p. 17-18

[48] Duany et al. 2010, p. 1.3

[49] MITOD 2014

[50] Smart Growth Online, 2014

Sustainable Environment Indicator	Metric	Rating				
		1	2	3	4	5
	such development will have on the natural environment?[51]					
Maintain Biodiversity	Are policies in place to control introduction of invasive species into the community?[52]					
	Does the community take an active approach toward the preservation of wildlife species and habitats?[53]					
Total						

Assessment: Sustainable Environment Metrics

[51] RRC 2014, p. 11

[52] ICLEI 2010, p. 13

[53] Sustainable Communities Online, *Land, Forests, and Ecosystems*, 2014

Section 4: Community

Definition: Sustainable communities develop clear visions for future strategies by partnering with different sectors, identifying their resources, and engaging citizens to address common issues and creating mutually beneficial solutions.[54]

Sustainable Community Indicator	Metric	Rating				
		1	2	3	4	5
Civic Engagement	Are a variety of engagement strategies utilized (e.g., online discussion, public meetings, targeted group sessions, charrettes[iii], etc.)? [55]					
	Are the voices of all populations sought, considered, and incorporated into community plans?[56]					
Conflict Resolution & Mediation	Are multiple methods for public comment provided when addressing community issues/disputes (e.g., public meetings, informal discussion, mediation, rules of conduct, online comment)?[57]					
Fostering Relationships & Shared Interests	Does the comprehensive plan address the values of social equity[iii]?[58]					
Community Visioning	Are under-represented / marginalized members of the community (e.g., minority groups, disabled persons, low-moderate income, etc.) given opportunities to be engaged in the community?					
	Is the comprehensive plan, if applicable, regularly reviewed and updated at least every five years?[59]					

[54] Sustainable Communities Online, *Building Sustainable Communities – LISC*, 2014

[55] RRC 2014, p.7

[56] RRC 2014, p.7

[57] STAR 2014, p.78

[58] LPI 2007

[59] LPI 2012

Sustainable Community Indicator	Metric	Rating				
		1	2	3	4	5
Culture, Art, Ethnicity, Heritage, and Celebration	Are public spaces proactively being retrofitted so that they are accessible for all persons (e.g., physically disabled persons)?[60]					
	Does the community incorporate art into public spaces/events?[61]					
	Are historic assets within the community identified and preserved?[62]					
	Does public education actively engage students in the arts (e.g., music, painting, theatre)?[63]					
Justice & Equity	Are adequate housing options provided for all income levels (e.g., single-family, two-family, multiple-family, subsidized housing, senior housing)?[64]					
Wide Range of Housing Opportunity	Does zoning incentivize affordable housing within market rate developments?[65]					
Total						

Assessment: Sustainable Community Metrics

[60] ICLEI 2010, p.14

[61] Sustainable Communities Online, *Creative Placemaking*, 2014

[62] Synthesis of (LPI 2007)& (ICLEI 2010, p.14)

[63] Sustainable Communities Online, *Power of Art in Schools,*2014

[64] LPI 2007

[65] STAR 2014, p.74

Section 5: Economy

Definition: Economically sustainable communities establish local economies that are economically viable, environmentally sound, and socially responsible.[66]

Sustainable Economy Indicator	Metric	Rating				
		1	2	3	4	5
Coordinate and Leverage Federal Policies and Investment	Does the community actively stay aware of and pursue federal and state funding that supports city/community/regional goals?[67]					
Protect Local Staple Industries	Are there local economic assets specific/special to the community and region that have been capitalized on (e.g., tourism, unique agriculture)?[68]					
	Are there policies/programs in place to protect and enhance the community's unique local economic assets?[69]					
	Is the local economy diversified between many industries and companies (compared to being dependent on a single industry)?[70]					
Maintain Healthy, Local Business	Is there evidence of a strong and welcoming local business community?[71]					
	Are incentives available that support small local businesses?[72]					
	Has a committee or workgroup been formed to promote partnerships between government and local and regional businesses?[73]					
Technology	Is data collected and analyzed over time within the community to understand challenges and					

[66] Sustainable Communities Online, *Capacity Building for Sustainable Communities Funding*, 2014

[67] Sustainable Communities Online, *Growing a Sustainable Economy*, 2014

[68] Sustainable Communities Online, *Economics and Finance*, 2014

[69] RUPRI 2012, p. 28

[70] RUPRI 2012, p. 4

[71] Sustainable Communities Online, *Small Business*, 2014

[72] Sustainable Communities Online, *Economics and Finance*, 2014

[73] NACO 2014, p. 24

Sustainable Economy Indicator	Metric	Rating				
		1	2	3	4	5
	opportunities within the local economy?[74]					
	Has action been taken to incorporate communication infrastructure into the community's economic development strategies?[75]					
Total						

Assessment: Sustainable Economy Metrics

[74] STAR 2014, p. 74

[75] Sustainable Communities Online, *How Tech will be Critical to Corporate Sustainability in 2011*, 2014

APPENDIX B: INTERVIEW QUESTIONS

1. How would you describe your role in this community?
2. Are you familiar with the MSU Sustainable Built Environment Initiative (SBEI) and its' previous work in your community?
    - What was your involvement in the process? /
    - What is your understanding of the project?
3. What is your community focusing on currently for community development? Why?
4. What are some of the opportunities for your community now?
5. What are some of the challenges for your community now?
6. What are some of the development projects that have been taken place within your community after the SBEI collaboration?
7. What are some of the policy changes, regulations or ordinances adopted since the SBEI project?
8. What are the top three barriers your community or organization is facing to implement your community's preferred development?
9. What are the top three enablers your community or organization is facing to implement your community's preferred development?
10. What are some of the priorities set out for the current masterplan or other community development documents (DDA plan, capital improvement plan (CIP), economic development plan)?
    - When is the last time it was updated?
11. Have you pursued any grants or funding opportunities since the SBEI project?
12. How important is sustainability within your community?
13. Can you provide any example where sustainability has been integrated within the community?
14. Do you think the SBEI project has enhanced the community's future approach towards sustainable development?
    - If yes, how?
15. Overall, what are your impressions of the SBEI process?
    - What could be improved?
    - What was most beneficial?