

Ridesharing service at a remote community in Japan, a case of Nakatonbetsu

Hidetada HIGASHI^a, Soichiro MINAMI^b, Tetsuo Akiyama^c, Kentaro Kiritoshi^d

^a*Faculty of Business, Yamanashi Gakuin University, Yamanashi, 400-8575, Japan*

^a*E-mail: h-higashi@ygu.ac.jp*

^b*Policy Research Institute for Land, Infrastructure, Transport and Tourism, Tokyo, 160-0004, Japan*

^b*E-mail: minami-s2rk@mlit.go.jp*

^c*Research and Development Initiative, Chuo University, Tokyo, 112-8551, Japan*

^c*E-mail: aki@k08.itscom.net*

^d*Hokkaido Intellectual Tank, Hokkaido, 060-0004, Japan*

^d*E-mail: kiritoshi@hit-north.or.jp*

Abstract: This study examines the significance and potential of using ridesharing as a means of securing mobility in areas of Japan that are isolated from intercity transportation, based on the case of "Nakatonbetsu Rideshare" in Nakatonbetsu Town, Esashi County, Hokkaido. Nakatonbetsu Rideshare started in 2016 as free transportation by volunteer drivers and has been charging actual fees since 2017. This was done to reduce the burden on the volunteer drivers as well as because many passengers were willing to pay a certain amount of money to the drivers.

A field study conducted in February 2018 found that volunteer-based ridesharing is less sustainable in areas with weak intercity transit connections and declining intra-regional economies. To overcome this situation, it is necessary to increase the demand for intra-regional transportation and strengthen intercity transportation by stimulating the intra-regional economy in addition to paying for ridesharing.

Keywords: Mobility Chance, Remote Community, Ridesharing Service, Demand Stimulation, Regional Economic Circulation

1. INTRODUCTION

This study examines the significance and potential of ridesharing as a means of securing mobility in areas of Japan that are isolated from intercity transportation, based on the case of the "Nakatonbetsu Rideshare" in Nakatonbetsu Town, Esashi County, Hokkaido. The decline of public transportation caused by the progress of motorization has deprived residents of areas with declining populations of mobility opportunities due to the aging of the population.

Elderly people without or have surrendered their driver's licenses have no choice but to rely on public transportation for their mobility, but we are no longer able to supply enough mobility services to meet their demands. Ridesharing services are expected to be the solution to this problem. In Japan, there are many regulatory barriers to the flexible operation of ridesharing services, but "Nakatonbetsu Ridesharing" was realized by taking advantage of the fact that free transportation by volunteer drivers is not subject to regulations. The authors participated in the launch of Nakatonbetsu Rideshare, conducted a field survey on the actual operation and usage of the service and examined the sustainability of the service.

In this paper, we first give an overview of the situation in Nakatonbetsu from the

perspective of public transportation and mobility, and then describe how "Nakatonbetsu Rideshare" is perceived in the community through a questionnaire survey. Then, the sustainability of the volunteer-based ridesharing service will be examined based on the actual management system, interviews with volunteer drivers, and a survey of the current state of public transportation in the area.

To preempt our conclusions, the sustainability of ridesharing services will be lower in municipalities that are isolated from cities and have been declining economies. To solve this problem, the provision of ridesharing services should be linked to the payment of fees and the revitalization of the local economy.

1.1 Local characteristics of Nakatonbetsu town

Nakatonbetsu town locates about 100 km south from Wakkanai, which is the north end city of Hokkaido. Nakatonbetsu Town (2017) shows that the population is 1,777 at the end of February 2017, 38.3 percent of population is elderly. The past population was 7,375 in 1960, 5,395 in 1970, and 3,056 in 1990. An estimation implies that the population of the town will decline to 818 by 2040. The main industries of Nakatonbetsu are forestry, agriculture and dairy farming. However, both industries are declining, causing population decline. Especially, jobs lost due to the closure of a major dairy factory in 1988.

Nakatonbetsu town experienced two crises of local public transportation. The first is to close railroad line. By Japanese National Railways Reconstruction Law enacted in 1980, Japan National Railways (JR groups after privatization in 1987) had to abolish local rail lines with few passengers as specified by law. Local government had to choose to change bus service or to establish new local railroad company. Forty-five lines (amount 1,846.5 km) were converted to Bus, and 38 lines (amount 1,310.7 km) were inherited by new local railway company.

Tempoku line (148.9 km from Otoineppu station to Minami-Wakkanai station, via Nakatonbetsu, Hamatonbetsu and Sarufutsu) was the main line on which Express (InterCity trains) run but was eventually converted to a bus in 1989. Soya bus company has been operating the alternative bus line since 1989. In 1994, Subsidy category of Bus changed from "JNR Specified Local Line Transfer Subsidy" to "Local Bus Subsidy." The former is fully supported by the State during only 5 years. In the latter menu, municipalities must pay cost.

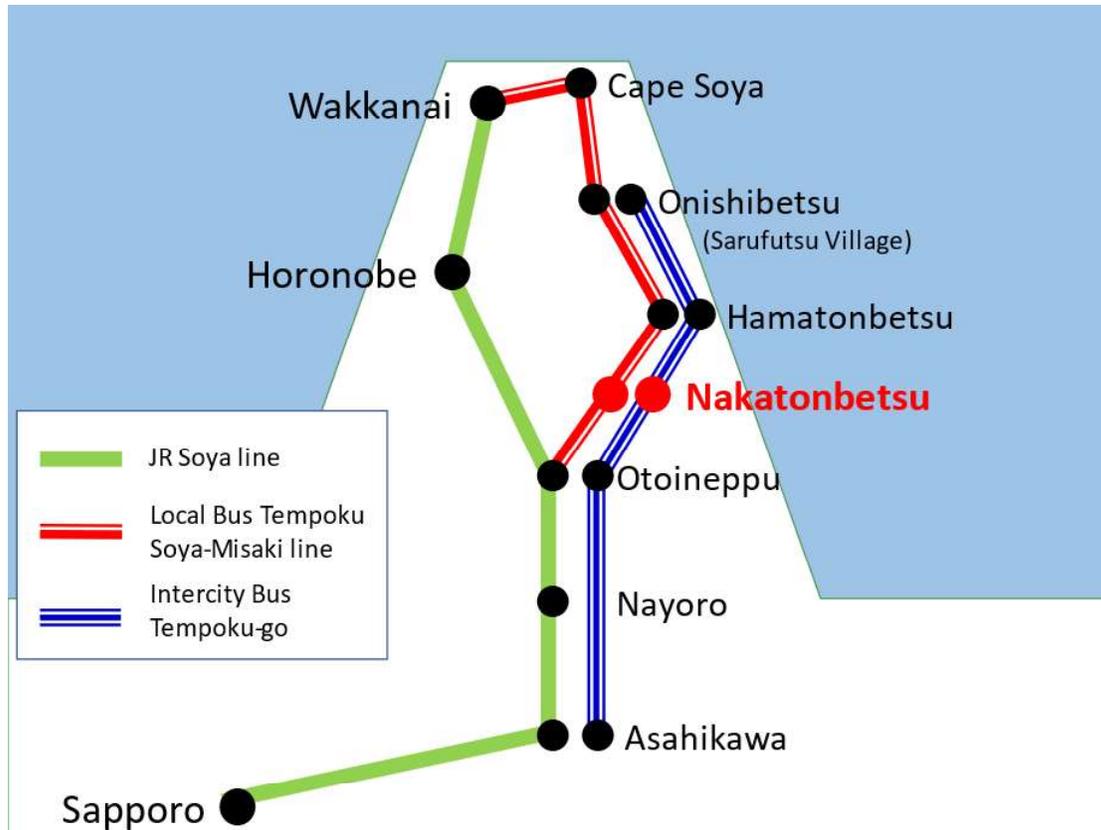


Figure 1. An outline map of Northern Hokkaido, including railroad and bus lines.

Second is the crisis of alternative bus service. In the 2010s, regional municipalities discussed abolishing bus service between Ootoinappu and Nakatonbetsu and to convert to DRT system. However, DRT system was estimated to be more expensive than the bus. So regional municipalities decided to sustain bus service. Nevertheless, the number of passengers continued to decline. In October 2019, this bus line was removed from the national designation of “Local Bus Subsidy.” The bus operates only three times per day (only two times between Ootoinappu and Nakatonbetsu, connect to JR Intercity train service to Sapporo and Asahikawa). That bus service is very long line and inter-regional service. The schedule of bus is inconvenient for internal traffic. In addition, Soya bus offers an express bus service 1 time per day (from Asahikawa via Nakatonbetsu, Hamatonbetsu to Sarufutsu).

People without cars or driving licenses must depend on taxi service, but there are only 2 taxi vehicles in Nakatonbetsu Town. Moreover, the taxi price is high (Table 1). As distance charge becomes high because of the isolation from neighboring towns and cities, most residents cannot use taxis for long-distance frequently. The average annual income in Nakatonbetsu is the about 2.66 million yen. The situation of Nakatonbetsu is just Loss of Mobility-Chance.

	Initial Fare	Distance Charge (per 310 m)	Time Charge (per 115 seconds)
Fare	JPY550	JPY80	JPY80
Distance	Estimated Price	Example of trip (One way)	
2.9km	JPY950	Town Hall - Driving School	
15km	JPY4070	Town Hall - Pinneshiri Hot Springs Hotel	
40km	JPY10870	Town Hall - Otoineppu Station	

Table 1. Taxi fare in Nakatonbetsu town and estimate travel cost

1.2 Ridesharing as a solution for the region with losing Mobility-Chance

Ridesharing has the potential to be a solution in areas where mobility opportunities are lost in three ways.

- 1) Exploiting the idle time of private owned cars
- 2) Cooperation of residents to support each other with social capital
- 3) New scheme of transportation service with ICT and smartphone

First, Even though there are more than 60 million cars owned in Japan, the occupancy rate is just 4.5 percent. Therefore, there are more than 58 million idle cars. These idle social assets should be exploited to supply MC for reduced mobility people.

Second, The transportation business is less profitable in less condensed popularity zone and the supply of taxi and bus is insufficient to fulfill demands. Simultaneously, the price is high for frequent use. Therefore, the cooperation of residents with social capital should fulfill MC with cheaper price.

Third, ICT and smartphone enable new transportation service through matching the demand and supply with geographical information. At the same time, smartphone becomes a secured global payment platform that eases the payment.

In May 2018, some ridesharing service operates in Japan, such as Uber and Notteco tried to launch their ridesharing service. However, the Japanese regulation of public transportation becomes the obstacle against the realization of such business and just limited operation is authorized. Uber operates in some metropolitan city as a taxi dispatcher, in Kyotango town, Kyoto as a fare-paying service for Nursing-care, and Nakatonbetsu town, Hokkaido as a volunteer-based service.

Notteco is one of the biggest inter-regional ridesharing platforms in Japan, which provides the long-range carpooling opportunity such as inter-urban transportation. Teshio town, Hokkaido jointly operates the ridesharing service for residents with Notteco between Teshio town and Wakkanai city, which is the core city in the region.

2. RIDESHARING SOCIAL EXPERIMENT IN NAKATONBETSU TOWN AND ITS OUTCOME

2.1 Needs and demands of new mobility service

Members of Authors conducted a questionnaire survey at the Nakatonbetsu town to elucidate the necessity of new transportation services alternating bus and taxi. 1,340, as much as 75 per cent of residents answered the survey. 77.1 percent of questionee agreed that the necessity of

alternative transportation. Thirty-five per cent of questionee strongly agreed on the necessity of ridesharing service (Fig.2). 27.7 percent of residents without driving license currently face difficulty in mobility (Fig.3). More than 20 per cent of the elderly face difficulty of mobility (Fig.4). Therefore, no small number of residents have difficulty of mobility and demand ridesharing.

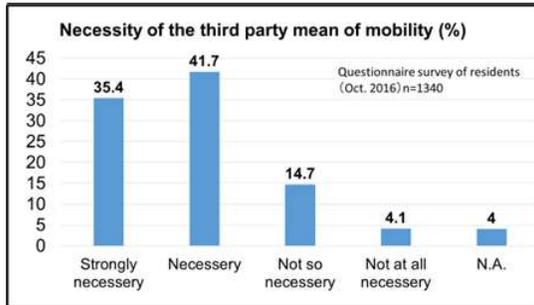


Figure 2. The necessity for the third party means of mobility

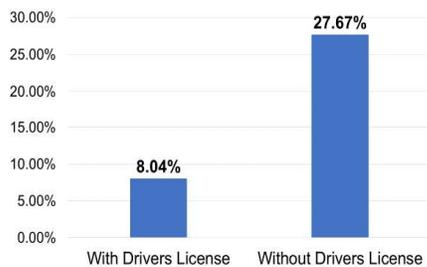


Figure 3. Percent of People who experienced mobility problems: comparison whether owning drivers' license or not.

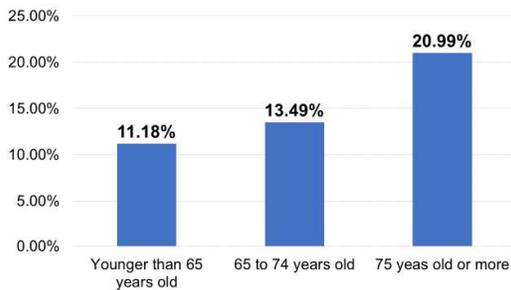


Figure 4. Percent of People who experienced mobility problems: comparison by age.

2.2 Outline of the social experimentation

The mission of the social experiment is introducing and realizing sharing economy, especially ridesharing into less condensed popularity zone in Japan. Through this experiment, Nakatonbetsu town expects the growth of inbound visitor, betterment of life satisfaction and rejuvenation of human capital and social capital. At the same time, authors expect to establish the model scheme of inter-policy coordination by introducing new mobility solutions.

Nakatonbetsu town conclude a cooperation agreement with Uber Japan to introduce “Nakatonbetsu ridesharing social experiment,” voluntary ridesharing service that does not violate the current Japanese regulations.

At the beginning, the municipality distributed flyers to introduce the launch of the ridesharing service and to call volunteer drivers for the ridesharing service. After that, authors, municipality, Uber Japan and volunteer drivers organized a committee named “Nakatonbetsu Local Transportation Group.” The committee monthly held a meeting to prepare and coordinate the ridesharing service. The committee conducted a seminar of safety driving, created a safety map of Nakatonbetsu town, and advertising to increase users and drivers.

2.3 The Outcome of the Social Experiment

During the seven months of social experiment, 206 rides were done, and the accumulated mileage was 2,396km. More than half of the rides were longer than 3 km. Around 30 per cent of rides took longer than 10 km and the average distance was 12.95 km. The median of the travel distance was 2.26 km.

The purpose of the ride was varied, such as commuting to hospital, shopping, dining out, visiting hot springs, visiting the town hall, visiting relatives or friends, and sightseeing (Fig.5).

The means to call and reserve ride were smartphone app, call to the town hall, and the agent such as shop clerk. 51 per cent of rides called by phone call. 36 per cent of the ride called by the application (Fig.6). Since elderly people use this service, smartphone has not yet been diffused among them.

A questionnaire survey done after one year from the launch revealed that 69 per cent of riders were willing to pay the actual cost or more. This implies that the riders feel uncomfortable with riding for free and willing to show their gratitude to drivers (Fig.7).

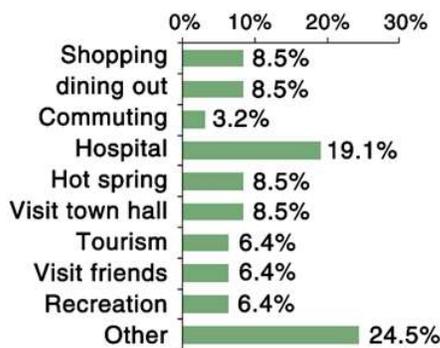


Figure 5. The purpose of using the Rideshare

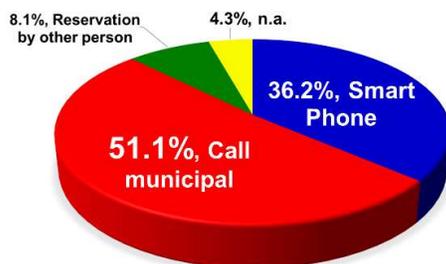


Figure 6. Means of calling the ridesharing service.



Figure 7. Willingness to pay for their ride.

3. FIELD SURVEY IN FEBRUARY 2018

3.1 Overview of the research trip

Two of the authors, Hidetada Higashi and Soichiro Minami stayed in Nakatonbetsu Town from February 8 to February 10, 2018 to conduct research on the local weather, economic and social, and mobility conditions.

To get to Nakatonbetsu from Tokyo, we first flew to New Chitose Airport on the previous day, February 7, stayed overnight in Sapporo, and then took the express train Soya departing 7:30 a.m. the next morning, arriving at Otoineppu at 10:41 a.m. We then transited the Soya bus Tempoku Soya-misaki Line departing from Otoineppu at 11:21 a.m. and arrived at Nakatonbetsu Bus Terminal at 12:13 p.m. In the afternoon of February 8, we conducted an interview survey at the Nakatonbetsu Town Hall, and after the survey, we used "Nakatonbetsu Rideshare" to go to Pinneshiri Hot Spring Hotel, where we stayed.

On February 9, we took the Soya Bus to Wakkanai Station on the Tempoku Soya-misaki Line to survey the usage of the line, then took the Sarobetsu 4 express train departing from Wakkanai Station at 1:01 p.m., arriving at Otoineppu at 3:03 p.m. After surveying the area around Otoineppu Station, I took the Tempoku Soya-misaki Sen Line departing from Otoineppu at 4:05 p.m., arriving at the Pinneshiri Hot Spring Station at 4:39 p.m. After surveying the "Roadside Station Pinneshiri," we stayed at the Pinneshiri Hot Spring.

On our way home on February 10, we took the intercity bus Tempoku-go, which departed from the Pinneshiri Onsen-mae bus stop at 7:26 a.m., arrived at Asahikawa at 11:10 a.m., and then went to Asahikawa Airport to fly back to Tokyo.

3.2 Interview at the Nakatonbetsu Town Hall on February 8

During the interview at the Nakatonbetsu Town Hall, authors discussed with Mr. Nagao and Mr. Sasahara of the town hall about the current state of the town's economy, industry, education, and medical care, as well as the background of the establishment of Nakatonbetsu Rideshare and its relationship with the local government.

3.2.1 Current situation of local industry in Nakatonbetsu

The current main industries of Nakatonbetsu are agriculture and forestry, both of which are in decline; there were 100 farming households in 1986, but due to the aging of the population and other factors, the number has decreased to 30 by 2018. In the past, several companies and offices were in the area, but they were closed and jobs were lost. The forestry

station and the Morinaga Dairy factory were two of the major sources of employment, but the Morinaga Dairy factory was closed in March 1988. In addition, the forestry station was also downsized and merged with the Hamatonbetsu Forest Office to form the Forest Management Center in 1998, resulting in the loss of jobs. In addition to these, there were two lumber companies and two limestone companies, but all of them have gone bankrupt or withdrawn. One limestone company has withdrawn from the market and one has gone out of business due to exhaustion of resources.

The Morinaga Dairy factory was completed in 1956, and since then, agriculture in Nakatonbetsu has shifted to dairy farming. However, since the plant is no longer there, farmers who are still dairy farmers have joined together to keep small scale of operation and to create a brand called "Nakaton Milk."

In 1989, an auto campground, roadside station, and hot spring hotel were built on the site of the former Pinneshiri Station on the JR Tempoku Line to create a tourist base. This is the current Pinneshiri Hot Spring Hotel and Roadside Station Pinneshiri. The above-mentioned withdrawal and closure of large and small businesses is the main cause of the population decline, and the abolition of JR Tempoku Line in 1989 coincided with this decline, leading to extreme depopulation and decline that we see today.

3.2.2 Current situation of healthcare in Nakatonbetsu

In Nakatonbetsu, there is a town hospital with internal medicine and surgery. It has 50 beds, but the use rate is about 20%-30%, which is currently too large. There is one other clinic, but it does not have a resident doctor. A doctor from the former town hospital, who has strong support from the residents, currently comes from another town about once a week to provide medical services. When more advanced medical care is needed, they go to a hospital in Nayoro or elsewhere. Some of the private hospitals in Nayoro offer free transportation services. The intercity bus Tempoku-go is also used as hospital transportation. Some stoplights set in front of hospitals.

3.2.3 Current situation of shopping place for Nakatonbetsu residents

According to Mr. A, a volunteer driver, he usually goes to Hamatonbetsu town for shopping. Hamatonbetsu has a good store operated by agricultural cooperative, or JA. For larger purchases, he goes to Nayoro City. This purchasing attitude is common among Nakatonbetsu residents who own cars. The Intercity bus Tempoku-go can be transferred to the Sapporo-bound Esashi-go at Otoineppu, but many passengers were heading for Sapporo. It is difficult to make a day trip to Sapporo, but the fact that there are more passengers than those going to Asahikawa, the nearest core city, indicates that the need to travel to the capital of Hokkaido is relatively large.

3.2.4 Current situation of education in Nakatonbetsu

There is no high school in Nakatonbetsu Town. Most of the high school students go to Hamatonbetsu High School in the town of Hamatonbetsu. High school students from neighboring towns and villages gather there. There is also a village high school in Otoineppu Village, but it is a boarding school for arts and crafts, and attracts students from all over Japan rather than local students.

The town of Nakatonbetsu has a public driving school. The public driving schools are rare even in Japan. This driving school is also used for volunteer driver training for Nakatonbetsu Rideshare.

3.2.5 Background story of the launch of Nakatonbetsu Rideshare.

There are two reasons why Nakatonbetsu town launched the ridesharing program. The first was the issue of the discontinuation of the Tempoku Soya-misaki Sen Line by the Soya Bus, and the imminent need to secure a means of transportation for residents. As we mentioned before, there are only two taxi vehicles operating in Nakatonbetsu town. This is insufficient to cover all transportation needs of residents. Therefore, the town need to establish a new and sustainable mobility service for the residents.

The cab company operating in Nakatonbetsu Town was in danger of closing before. At that time, in order to continue the business, the local government provided a vehicle and distributed cab vouchers to elderly residents. Therefore, it can be said that the taxi business is practically a public-private partnership enterprise. In fact, most of the fare income comes from the cab coupons. Many residents use the cab vouchers for long-distance travel.

Second, the town of Nakatonbetsu had included a policy to promote the sharing economy in its 7th comprehensive plan. The mayor was involved in the formulation of this 7th comprehensive plan when he was an employee of the town office, and the town's current policies are based on this 7th plan. He was introduced to the Uber-platform and adopted it when he started ridesharing.

3.3 Using the Nakatonbetsu Rideshare on February 8

After the interview at the Nakatonbetsu Town Hall, Higashi and Minami used a rideshare from the town hall to the Pinneshiri Hot Spring Hotel at around 16:40. Although the riders can use the Uber-app on their own smartphone to call for a ride, Nakatonbetsu Town has installed tablets at the town hall and other locations so that residents without smartphones can use the service. In addition, residents without a smartphone or tablet can call to request a ride dispatch from home.

This time, the authors tried using that tablet to dispatch vehicles. However, we were unable to find any available vehicles, so the town office staff requested volunteer drivers via SNS to use the service. If they could not find a vehicle using only their own app or tablet, they would have to give up using the service. If no vehicle was found after making a request for dispatch over the phone, a town hall employee would make the request.

It took us about 20 min to get to the Pinneshiri Hot Spring and we paid the actual cost of 750 yen, including 100 yen of system usage fee paying to Uber Japan.

3.4 Interview with volunteer driver A at the time of using Nakatonbetsu Rideshare

On the way from the Nakatonbetsu Town Hall to the Pinneshiri Hot Spring, we interviewed Mr. A, a volunteer driver who had transported us. He worked as a volunteer driver three times that day, including transporting us, the first and second times to take an elderly woman to the hospital. Three times in one day are a lot. It was snowing that day, and on such days, the number of requests for a short-distance ride within the town increases. Nakatonbetsu Town distributes cab vouchers to elderly residents, but many people who have used up their vouchers or want to keep them for long-distance travel use ridesharing for intra-city trip.

He said, *"I am not engaged in my work as a volunteer driver all day long. I cannot work as a driver if I go shopping with my family, so I stay offline. I always stay offline in the evening so that I can have a drink in the evening. However, some of the volunteer drivers do not drink alcohol, so these people are sometimes on call at night. On New Year's Day, I was on standby, thinking that young people returning home might use rideshare, but in the end, I was not called. I do not know if there was no demand or if someone else moved in."*

3.5 Survey on the usage of the Tempoku Soya-misaki Sen Line on February 9

At that time, there was a morning service departing from Otoineppu Station at 6:45 a.m., and Higashi and Minami took this service from the Pinneshiri Onsen-mae bus stop to Cape Soya. The bus departed from Pinneshiri Onsen-mae at 7:19 and arrived at Nakatonbetsu Bus Terminal at 7:38, where it waited for passengers and departed at 7:45. When we boarded the bus, there were no passengers, but about 20 high school students from the Nakatonbetsu Bus Terminal and other bus stops in the center of the town boarded the bus. The high school students got off at the Hamatonbetsu High School bus stop.

The trip to Cape Soya took about three hours, arriving at 10:17. There were 6 passengers, except for the high school students, including myself. One passenger took the train from Nakatonbetsu to Hamatonbetsu, one passenger took the train in Hamatonbetsu Town, one passenger took the train in Sarufutsu Village, and one passenger took the train around Cape Soya. Cape Soya is a sightseeing spot, and there were three passengers returning to Wakkanai. We got off at Cape Soya and boarded the next 11:56 to Wakkanai Station.

On the way, the bus took a 10-minute break at the Onishibetsu terminal. At this time, the authors talked to the bus driver. The Tempoku Soya-misaki Sen Line is one of the longest bus routes in Japan that takes about 5 h and 30 min to travel from Otoineppu to Wakkanai. For this reason, he said that his work pattern is to board the last bus that departs Wakkanai Station Terminal at 3:20 p.m. and arrives at Otoineppu Station at 8:44 p.m., stay overnight at Otoineppu, and drive the 6:45 a.m. bus the next morning, arriving at Wakkanai Station at 11:11 a.m. to finish his shift. As of 2021, the number of buses that go directly from Otoineppu to Wakkanai has been reduced to one round trip per day and the work pattern will have been changed.

As mentioned earlier, after arriving in Wakkanai, we took the Sarobetsu 4 express train back to Otoineppu, and then took the Tempoku Soya-misaki Sen Line bus back to Pinneshiri Onsen. Because of the long wait time in Otoineppu, we tried using Nakatonbetsu Rideshare, but no vehicles were available. It would have been possible to call the town hall to request a ride, but 40 km of the distance between Otoineppu and the center of Nakatonbetsu town made us refrain calling for a ride, imagining the burden on the driver.

4. DISCUSSION: SUSTAINABILITY OF RIDESHARING IN REMOTE COMMUNITY

As of the 2019 schedule revision, the number of buses to and from Otoineppu Station on the Soya Main Line, the nearest JR limited express station, has been reduced to two round trips. With this schedule revision, the number of buses to and from Otoineppu Station, the nearest JR limited express station for Nakatonbetsu, has been reduced to two round trips per day, plus one round trip per day on the intercity bus connecting to Asahikawa, and one round trip every other Tuesday to and from the hospital in the Nayoro city.

For this reason, the ridesharing service in Nakatonbetsu includes Otoineppu Station in its service area. However, the center of Nakatonbetsu Town and Otoineppu Station are about 40 km apart, and the journey time is more than 40 min. Almost all of the demand for travel from Nakatonbetsu to Otoineppu Station is for travel on the Soya Main Line to further destinations. In addition, if there are no passengers heading to Nakatonbetsu at Otoineppu Station, the driver will have to return to the town with an empty car. This round trip would take the driver about two hours, with a small amount of actual cost covering. Therefore, the burden on drivers is high when using rideshare between Otoineppu Station and Nakatonbetsu.

Furthermore, the number of volunteer drivers actually in operation is only a few per day, which discourages short-distance use within the town when trying to use the service to and from Otoineppu. These facts are thought to have become the reason for withholding long-distance use.

One of the ways to overcome this problem is to charge a fee, but even if monetization is implemented, it will be difficult to make an independent profit because the total amount of travel demand in Nakatonbetsu is small, due to the small number of residents.

In other words, in a municipality that is isolated from the urban area and has a narrow intercity transportation, the following points must be addressed to maintain the sustainability of ridesharing services.

- 1) Stimulate demand for short-distance travel within the region.
- 2) Securing modes for intercity transportation.
- 3) Producing other sources of income for implementing rideshare drivers as a side business.

In order to realize these goals, it is necessary to revitalize the local economic cycle. This is because when the local economy is in a state of decline, residents' expenditures flow out of the municipality, and at this time, travel demand is also mainly outbound to urban areas.

Simultaneously, a weak local economy will also reduce incoming traffic. In other words, the balance between the outbound traffic and inbound traffic will be upset. This places a heavy burden on local ridesharing services.

In addition, in a "Remote" municipality like Nakatonbetsu, the absolute number of transportation demands is limited. For this reason, it is difficult to make a living as a full-time driver even if the service is paid. For this reason, the influx of the working population cannot be expected unless rideshare drivers can earn a living by working as a side job and combining it with another job.

5. CONCLUSION: LINKING MOBILITY TO REGIONAL ECONOMIC REVITALIZATION

The case of "Nakatonbetsu Ridesharing " in Nakatonbetsu Town suggests that in a municipality isolated from the urban area, it is difficult to ensure the sustainability of the service simply by securing mobility opportunities for residents. It is necessary to stimulate economic activities in the central area of the municipality to stimulate the intra-regional mobility needs of residents as well as to stimulate demand for visits from outside the region. If the demand for visits from outside the region can be sufficiently stimulated, it will be relatively easy to secure modes for inter-regional transportation, and for example, an increase in the number of express buses can be expected. In addition, the use rate of ridesharing services can be expected to increase by increasing demand for short-distance travel through the revitalization of economic activities in the region.

In fact, in Nakatonbetsu, new confectionary stores and restaurants are gradually opening. This revitalization of the regional economic cycle can be expected to affect replacing the demand for outbound traffic with the demand for inbound traffic with some extent. Furthermore, it expects to make the speed of depopulation slower by attracting younger people to move to Nakatonbetsu.

In other words, the sustainable operation of local transportation services in low-density areas is linked to the revitalization of the local economy.

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