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# A Study on Governance for Cooperative Road Facilities Management

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**ABSTRACT:** In Japan, much of road facilities have been built during 60s and 70s and the major maintenance should be carried out for these facilities in the near future. For this, Asset Management System is becoming very important nowadays. However, not many municipalities have implemented the Asset Management system because of the budget and human resource constraints. In order to keep important road facilities with the adequate maintenance level, it is impossible for local municipalities to maintain all facilities by themselves. For relatively less important facilities, it may be efficient to encourage residents to support maintenance works such as cleaning and daily monitoring. Based on above, this study proposes a “cooperative road facility management” where road facilities are maintained by various stakeholders such as local municipalities, private companies, road users and residents through taking part in the maintenance works. In other words, we propose the governance of the road facilities by cooperation of the stakeholders. To construct the framework of the cooperative road facility management, we review the advanced schemes which have been put in practice. The practices are summarized from four perspectives; “cooperation among municipalities”, “private-sector participation”, “residents participation” and “educating supporters”. As a result, the prospect of the cooperative road facilities management is shown with the role of the stakeholders and the cooperation among them. We also point out that intermediary organization is important to smoothly realize the cooperation among stakeholders. The organization should be composed of residents, private sectors and municipalities. We also clarify the framework of the organization.

**KEYWORDS:** Governance, Cooperative road facilities management, intermediary organization

## 1. INTRODUCTION

In Japan, the major maintenance should be carried out for road facilities in the near future. Because, much of road facilities have been built during 60s and 70s. Therefore, the road bridges for more than 50 years after construction are 8 percent, and these shift to the 53 percent in 20 years. Furthermore, it has been reported that there are many road bridges of national road need to take emergency measure. In particular, the bridges have been threatened by the risk such as natural disaster and accidents. For this, Asset Management System is becoming very impor-

tant nowadays. However, not many municipalities have implemented the Asset Management system because of the budget and human resource constraints. In order to keep important road facilities with the adequate maintenance level, it is impossible for local municipalities to maintain all facilities by themselves. In order to maintain the road facilities, it is necessary to reconsider the existing schemes. Based on above, this study proposes a “cooperative road facility management” where road facilities are maintained by various stakeholders such as local municipalities, private companies, road users and residents through taking part in the maintenance

works. In other words, this study proposes the governance of the road facilities by cooperation of the stakeholders.

## **2. VISION OF ROAD FACILITY MANAGEMENT**

This study considers about the road management facilities schemes. For relatively less important road facilities, it may be efficient to encourage residents to support maintenance works.

In this study, road facilities in social capital improvement are subject of studies. In this chapter, therefore, the conditions of road facilities are explained. Also, it is described vision of road facilities management and the definition of governance for cooperative.

### **2.1 Condition of Road Facility**

The Social capital improvement is many definitions. For example, "Transport refers to the entire facility to provide public services indispensable to the lives of public utilities(water, gas, electricity), energy, telecommunications, waste disposal, recreation parks, and sports, such as housing. In the breakdown of social capital improvement, road facilities accounts for 30 percent. And, road facilities were built in large quantities in the 1970s from the 1960s, reached the aging; update maintenance has become an issue. The pavement extension is managed by the municipalities for 80 percent and the road bridge is managed for 50 percent. In addition, in the period from 2008 to 2010, the road bridges that closed and regulated traffic have been increasing. More than 90 percent in these bridges have been managed by government-designated cities and municipalities. In this way, the large amount of road facility has been maintenance by the municipalities. In particular, many road facilities have been managed by municipalities which lack skill or experts. Accordingly, proper countermeasures may not be

taken. As a result, the following may be concerned. These are that serious damage leading to accident such as collapse (risk of human life), traffic regulation by damage (social loss), and occurrence of large-scale repair (enormous costs).

### **2.2 Vision of Road Facility Management**

As a way of maintaining and managing the future, Ministry of Land, infrastructure and Transport and Tourism put together its proposals. The following is these proposals. "Construct to comprehensive management systems by introducing Asset Management", "Establishment of design and construction to consider the life cycle cost", "Construction of monitoring systems that contribute to the overall management structure", "Construction of a new management system", "Technology development and training of technical experts", "Institutional support measures and development", "information Providing and residents participation". For road facilities management, maintenance elements of the technology have been accumulated, also that have been established and institutional support measure. From now on, governance is needed to expand these continue to operate, such as "Construction of a new management system", "Institutional support measures and development", "Information providing and residents participation". On the other hand, that the Cabinet Office, Government of Japan shows the view of social capital management. They have proposed that it is important to construct a new relationship between industry, government, academia and residents. Thus, in the way of road maintenance facility, the various stakeholders such as local municipalities, private companies, road users and residents involved are required. It is necessary to consider the governance for that.

### **2.3 Definition of Governance for Cooperative**

As mentioned in the previous section, in order

to ensure the maintenance of social capital, it is necessary to consider how public and private sectors and companies to cooperate. By clarifying the role of the stakeholders and the cooperation among them, it is be appropriate operational maintenance. Therefore, in this study, governance for cooperative is defined the state that various stakeholder cooperate to be carried out public services required by the region. Specifically, stakeholders are assumed prefectural governments, municipalities, private companies such as construction companies and construction consultant, academe, NPO and residents. And, in this study, the role of the stakeholders and the cooperation among them is considered.

## **2.4 Research Methods**

To construct the framework of the cooperative road facility management, we review the advanced schemes which have been put in practice. Specifically, it is clarified the governance through literature survey and interviews. As a result, the prospect of the cooperative road facility management is shown with the role of the stakeholders and the cooperation among them. We also point out that intermediary organization is important to smoothly realize the cooperation among stakeholders.

## **3. REVIEW THE ADVANCED SCHEMES**

This chapter reviews the advanced schemes that would be helpful upon aim to constructing the cooperative road facility management. From these information, it is clarified how to manage these schemes. For organizing advanced schemes, the points of view are configured as the “stakeholder” and “roles”. On the other hand, it is necessary to consider the relationship of the stakeholder to construct the scheme reconsider the existing framework. The points of

view, that is, are configured as the “cooperation method”. In addition, they are collected in the keywords “cooperation among municipalities”, “private-sector participation”, “resident participation” Also, from that in order to operate the schemes, it is necessary to human resource. So, they are collected in the keyword “educating supporters”. Table 1 shows the results of the interviews and literature survey of advanced schemes. Table 2 shows the coverage of the advanced schemes. Also, Table 3 shows the result of the educating supporters. In the next section, it is analyzed these schemes according to the keywords.

### **3.1 Cooperation among Municipalities**

In this case, it is picked up as an example the “transfer of rights about road facilities to local governments” and “cross-regional federation”. They are the schemes to reconsider the existing structure that managed by the administrators corresponds to the type of road facilities. The road facilities are decentralized. By reconsidering the schemes, it is able to be managed in the integrated regional road facilities. Therefore, efficient management becomes possible. The transfer of rights is the schemes that municipalities manage prefectural road. So, the role of local government becomes clear. Additionally, by the municipalities; familiar to residents, manage in the integrated regional roads, it becomes rooted in the community management. In the municipalities that not have enough budget and human resource constraints, cross-regional federation is useful, because it is able to share their expertise.

### **3.2 Private-Sector Participation**

In this case, it is picked up as an example “order of comprehensive” and “performance-based contracts”. To take advantage of the vitality of the private sector, it is necessary to ensure a lot of order to some extent, to assure the interests of enterprise. To

Table 1 Summary of advanced schemes

scheme	stakeholder	Role of stakeholder	Method of cooperation	Advantage(○) or Disadvantage(△)
transfer of rights (Hiroshima Prefecture)	Prefecture	To transfer rights of the road facilities to the municipalities	◇By the application of road law, it is transferred the management of prefectural road to the municipalities.	○Municipal road and prefectural road can be managed collectively. △It must be set to the control level of prefectural road.
	Municipality	Management of prefectural road received the rights.	◇Control level of Prefectural road is to be applied.	
cross-regional federation (Kamiina cross-regional federation in Nagano Prefecture)	cross-regional federation	Staffing Support of municipalities	◇Federation that comprises the municipalities, have a support of the works.	○It is able to share their expertise. △To organize the federation needs time and cost. △The distance between residents and municipalities to worsen by organizing federation.
	Municipality	Entrusted the works to the federation.	◇The project cost bear the municipalities.	
order of comprehensive (Aomori Prefecture)	Municipality	Maintenance work is ordered in the simplicity proposal.	◇To order the private sector by comprising the monitoring and repair.	○Separation of monitoring and repair is to be review, work order can be omitted. △The amount of work does not change. So, contractor is reduced.
	Private sector	Contractor performs the monitoring, and maintenance.	◇Large-scale repair will be ordered separately.	
performance-based contracts (Virginia)	Municipality	Defining the control level	◇Constructor proposes the management method under the control level that municipalities definition.	○Opportunities for private sector are increased, so the municipalities would reduce maintenance costs. △Private sector has high risk.
	Private sector	To propose the management method under the control level	◇Costs of accidents and disasters is included in the contract .	
adopt program (Tokushima Prefecture)	Resident	Residents adopt the road facilities as foster parents.	◇Residents adopt the road facilities as foster parents. Municipalities support that activity.	○Residents can get a social assessment to take advantage of leisure time. △To assist the residents, there is concern that municipalities to increase works.
	Municipality	Support resident activities.		
MICHI BUSHIN (Kakinosawa area in Nagano Prefecture)	Resident	building and managing road facilities by residents	◇building and managing road facilities by residents	○For relatively less important facilities, it is efficient to encourage residents to support maintenance works. △It is needed to construct the system to acquire residents participants.

Table 2 Coverage of the advanced schemes

scheme	stakeholder	monitoring	planning	maintenance
transfer of rights	municipality			
cross-regional federation	municipality			
order of comprehensive	private sector municipality			
performance-based contracts	private sector municipality			
adopt program	resident municipality			
MICHI BUSHIN	resident			

Table 3 Summary of educating supporters

scheme	system	target	qualification	Aim level
Maintenance expert (ME)	Center for Infrastructure Asset Management Technology and Research (CIAM) in Gifu University, educate supporters. This aim is to improve the technical capabilities of both municipal and private sector in the same program.	Municipality  Private sector	ME	Long-term maintenance of social capital improvement
Maintenance Supporter (MS)	MS is an effort in Gifu Prefecture. Residents apply for qualification in Gifu Prefecture. The role of resident is to report the result of monitoring or matters that require emergency response.	Resident	MS	To report the result of monitoring or matters that requires emergency response.
MICHI MORI	Infrastructures life-time-extending maintenance research center in Nagasaki University (ILEM), also, educate supporters for managing the road facilities in the regions. It has some lecture course, depending on the level.	Municipality	MICHI MORI	a consultant engineer
		Private sector	Specified MICHI MORI	Management Consultant
			Associate MICHI MORI	Engineering work execution process supervisors
		Resident	MICHI MORI assistant	notice a trivial change

do so, it is desirable to order comprehensive monitoring and operations as a whole to some extent the region. To take advantage of the vitality of the private sectors more, it is desirable that the monitoring (or operation) is entrusted to the discretion to private sectors. To reconsider of public work are required.

That all rights entrusted to the private sector is impossible, because the road facilities management is in the range of public. Also, it is necessary to clarify the risk of private sector. To be managed by the clarification of the risk, it is utilizing the technical capabilities of the private sector. By be clarified of the

risk, it is possible to utilize the technical capabilities of the private sector.

### **3.3 Resident Participation**

In this case, it is picked up as an example “adopt program” and “MICHI BUSHIN (building and managing road facilities by residents). As a method resident participation, it is important that residents are positioned as supporters of the road facilities management. It is gained the cooperation of the residents who have contributed to community activities, as in the adopt program. Also, it is valuable to make the regional road management as the activities of community, as in the MICHI BUSHIN. When municipalities to support the activities of residents, it is necessary the device that to be able to act a familiar for residents. In addition, in order to spread and sustainability the resident participation, support of municipalities and intermediary organization is important.

### **3.4 Educating Supporters**

#### **3.4.1 Education for the Experts**

By analyzing the advanced schemes, it is clarified that renewed capabilities for the stakeholders are required. The capabilities are, for example, municipalities are needed long-term management capacities, private sectors are needed to propose their technology to the government. In other words, in order to operate the schemes, it is necessary as educating supporters, to grant the capacity to contribute to the role of stakeholders. It is necessary to practice the capacities that take advantage of endeavor. Also, it is necessary the capabilities are able to use at affairs.

In this case, it is picked up as an example “Maintenance expert (we call them ME)” and “MICHI MORI”. Center for Infrastructure Asset Management Technology and Research (CIAM) in Gifu University, educate supporters for municipal and

private sectors and so on. This aim is to improve the technical capabilities of both municipal and private sector in the same program. Infrastructures life-time-extending maintenance research center in Nagasaki University (ILEM), also, educate supporters for managing the road facilities in the regions. The aim is to contribute to road facilities management for tourism resources, to support human resource development for new technologies and industrial development. It has some lecture course, depending on the level. By setting the course, it is possible to be given the capabilities that each expert needed.

As stated above, two examples are taken up and described its schemes. In the private sector, because public qualifications are important at the time of order, it is necessary to provide the merit for sectors not only expert by educating. In the municipal, it is necessary to obtain the capabilities for making long-term management using information from private sector and residents. In addition, not only obtain the capabilities to individually, it is necessary to obtain the capabilities for cooperating by utilizing to educate. It is the key point of education, to create the environment for communicating between expert and residents.

#### **3.4.2 To Create the Activities of the Residents**

The resident who act for the region such as adopt program, are spending their leisure time from their attachment to the region. It is important to support such residents. In this paragraph, two education schemes for resident participation are shown. Gifu Prefecture has educated road facilities maintenance supporters to the residents (we call them MS). The aim of the MS are to notice a trivial change of road facilities from a resident's standpoint. Incidentally, by cooperation of ME (as mentioned before) and MS, it is possible to construct a maintenance management system including residents. As mentioned before, ILEM has been educated road

facilities maintenance assistant to the residents (we call them MICHIMORI assistant). Their activities are monitoring and the report to the professional about the condition of road facilities. They are intended to increase the amount of information. In the present circumstances, high-quality information has led to the collection, because they get the knowledge for the activities. What is important for resident participation is that to give interest in the maintenance of the road facilities. And it is important to give knowledge for residents. For an example, mowing is valuable for long life of road facilities. As a result, the municipalities hope that residents act on their initiative. By learning the knowledge, resident who have attachment of region, are expected to play a part as a leader in the maintenance of road facilities in the region.

#### 4. ROLE OF STAKEHOLDERS AND THE COOPERATIVE ROAD FACILITIES MANAGEMENT

As a result of analyzing the advanced schemes, Figure 1 shows image of the cooperative road facilities management. In this chapter, it is explained the role of stakeholders and cooperation among them.

##### 4.1 Municipality

The routine work of municipality changes, because of transferring of rights. In the prefecture, routine work would be reduced. Prefecture makes long-term management using information from private sector and residents and so on. In municipalities, it is desirable to management of whole region by receiving the transfer from the prefecture. In doing so, management becomes more efficient. Also, it would be rooted in the region. In addition, the residents' support is important role of municipalities, because of encouraging resident participation.

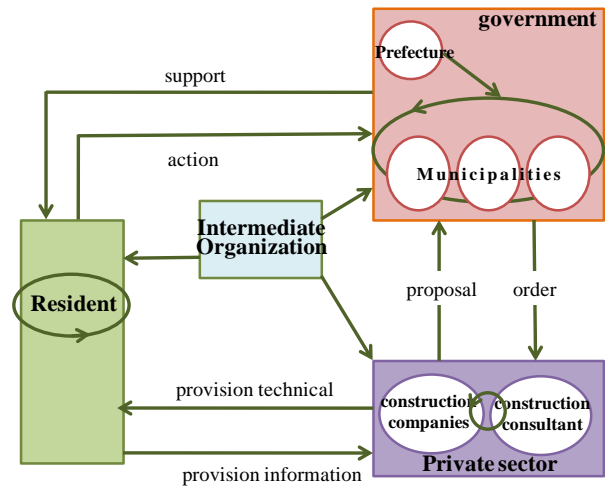


Figure 1 Image of the cooperative road facilities management

##### 4.2 Private Sector

Usually, the role of the private sector does the maintenance according to the control level of governments. In contrast, private sector proposes their technologies and maintains the control level at their discretion in the cooperative road facilities management. When the private sector proposes technical, it is important to aim preventive maintenance that delayed the degradation. The comprehensive monitoring and operations is the key point of efficiency. It should also consider that private sector share expertise and information with other one for carrying out the work.

##### 4.3 Resident

Residents' role is that cleaning and daily monitoring, also report to the expert. If the damage is trivial, it is desirable to do maintenance into the hands of residents. Otherwise, monitoring results are reported to the administrator. Private sector does maintenance. By resident who has knowledge, useful information is able to be obtained. Based on the risk, it should be determined, whether residents would carry out the monitoring and maintenance of the extent. For an example, cleaning is the main role of residents. It is conceivable to ask a fever the management to existing organizations such as neighbor-



hood associations. Also, it is valuable to utilize the voluntary organizations for cooperation.

## **5. PROPOSAL OF INTERMEDIATE ORGANIZATION IN THE ROAD FACILITIES MANAGEMENT**

### **5.1 Issues about the Schemes of Cooperative**

If it is possible to put sufficient financial resource, existing schemes function smoothly as usual. At the present, however, the lack of financial resource and expert for maintain the region is remarkable. Therefore, it is necessary to consider the new, advanced schemes of maintenance. In other words, this study proposes the governance of the road facilities by cooperation of the stakeholders. Based on above analysis, in order to maintain the road facilities, it is clarified that cooperation has been devised among stakeholders. Their schemes are more efficient. On the other hand, advanced schemes have been discussed for only some regions. That effect can be expected by reconsider the schemes to introduce. However, schemes have disadvantages. Due to this, more cost may be required for changing the schemes. The issues of advanced schemes are as follows:

- (1) If the transfer of rights mottled, it becomes rather inefficient.
- (2) If the small municipalities receive the transfer, level of control cannot be secured.
- (3) To organize the federation needs time and cost.
- (4) The distance between residents and municipalities to worsen by organizing federation.
- (5) Contact system is not yet functional
- (6) The data is not enough.
- (7) Retention of risk is ambiguous.
- (8) Range of activities is limited.
- (9) Activities of the residents are volunteers, sustainability cannot be expected

Also, this study considers of solution about these issues. Figure 2 shows the relationship between advanced schemes, issues and idea of solutions.

### **5.2 Necessity for Intermediary Organization**

Based on above issue, it is essential to share the same information about the road facilities management, not only giving the information. As a result, by communication, it is the ideal to consider among some stakeholders how to maintain the region. At present, this mechanism is insufficient. Therefore, some advanced schemes have not been introduced in many regions. Then, this study proposes the function of intermediary organization that contains the place to share information and the function to communicate between experts and residents. Intermediary organization is important to smoothly realize the cooperation among stakeholders. In other words, it is possible to be formed PDCA-cycle by the various stakeholder in the region. Furthermore, the intermediary organization, also, works in education. Namely, the role of this organization is the education for stakeholder and support to make the cooperation of them.

### **5.3 Framework of Intermediary Organization**

In the scheme of the present, University and governments have a role of education and connection between stakeholders. In this system, to ensure the financial resources for providing the program is the key issue. There is a need to find a way of sustainable. One way may be the obligation of beneficiary. Another way is desirable to bear the expenses by municipalities, because they are the administrator of the road. For the municipalities that lack of resource, burden would increase. It would be concerned also that the management system rather worse. If the routine works was transferred to the municipalities of the prefecture such as the transfer of rights, it is possible that the prefecture may have

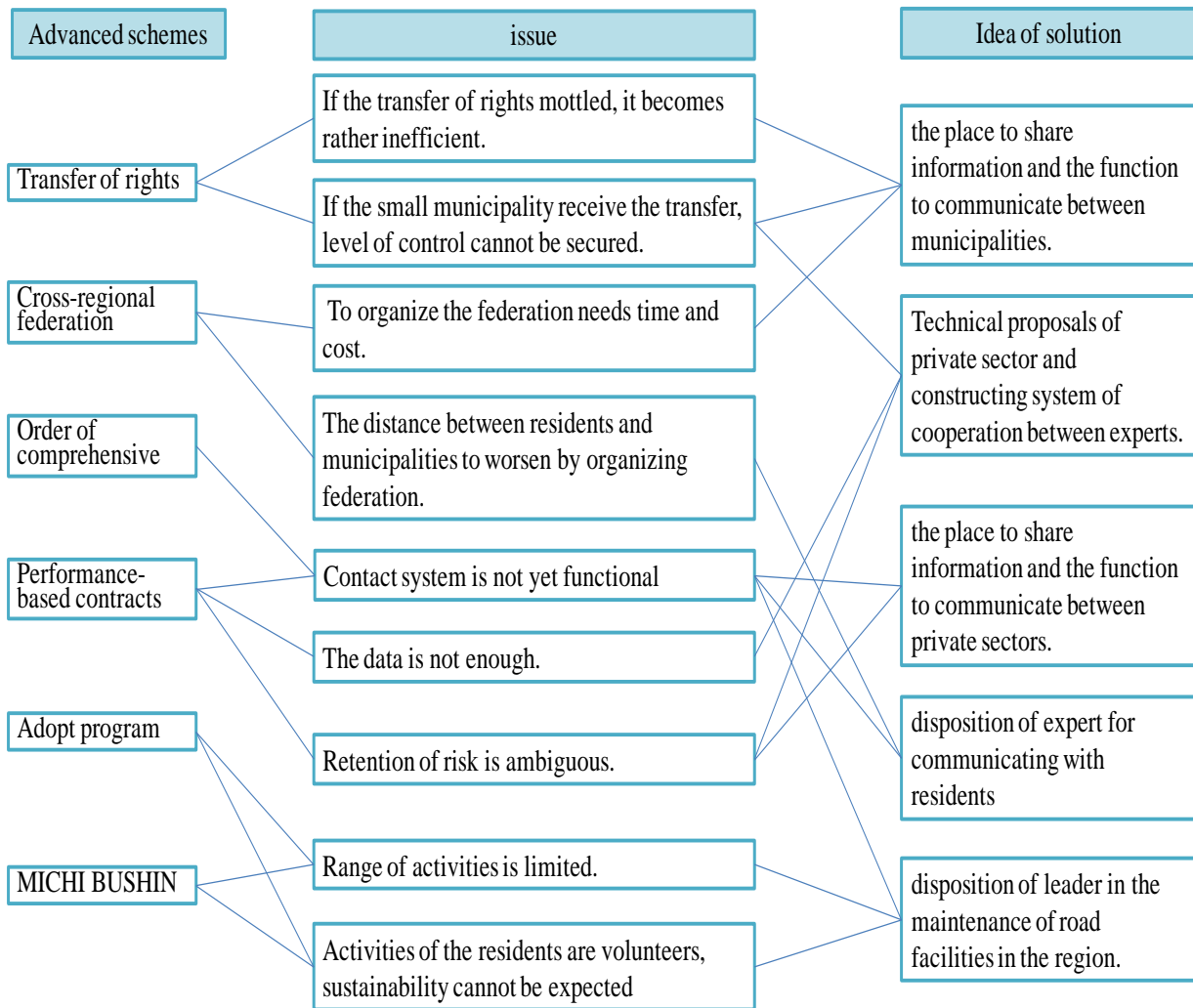


Figure 2 Relationship between advanced schemes, issues and idea of solution

role of intermediary support. However, private sector, and residents are relationship to attend a lecture from the municipalities, does not lead to system beyond the boundaries of the principal. In order to be formed PDCA-cycle in the regions, it is useful that various stakeholders work together. It is ideal of this study that the intermediary organization is constructed of various stakeholders and there it is necessary to have a function to be connected between them. The vital point is that the intermediary organization is formed with their respective positions.

It should be noted, in civil engineering field, based on a similar awareness of the issue, the research on NPO are studied. The study of the research subcommittee NPO Society of Civil Engineers Con-

struction Management Committee, for the review of public and private traditional dualism, has proposed the use of NPO. In addition, the Educational Planning and Human Resources Committee Society of Civil Engineers have studied about NPO, by reviewing the advanced schemes. In these studies, consistently, the following has been shown as a problem. These are that, fare receipts cannot be expected, because social capital improvements are public goods, ensure the reliability is not easy, the service with the social significance cannot be provided, because efficiency is important. It is clarified that NPO of the civil engineer is hard to be established as a social business from financial problem. To operate the intermediary organization, it is ne-

cessary to construct partnership and network, also to find an investor. Rather than rely on government subsidies, it is necessary to get the cost while taking advantage of activities such as fund. As already mentioned, the vital point is that the intermediary organization is formed with their respective positions. The intermediary support is important in order to facilitate them. To do this, if it is defined the intermediary supporter as a new stakeholders, as will be pointed out in previous studies, will need to secure funding, also sustainability cannot be collateral. It must be constructed new relations with the advent of a new stakeholders. Furthermore, there is concern also that the distance between the stakeholders may has deteriorated. Many disadvantages appear by defining the third-party organization. It is notable that, in order to connect the relationship of various stakeholders in the region, third party is not necessarily being appropriate. In other words, it is the ideal of intermediary support that information and technology are circulated by gathering with their respective positions for maintain the region. Figure 3 shows image of the Intermediary organization. Intermediary organization that proposed in this study is configured as a parastatal organization which consist members with technology gathered from each stakeholders. Characteristic of intermediary organization is that the relationship between the stakeholders is not a one-way traffic. Also, it is that it consists in relationship with others.

## 6. SUMMARY

This study focused on the schemes for the cooperative road facility management. From analyzing of the advanced schemes, the practices are summarized from four perspectives; “cooperation among municipalities”, “private-sector participation”, “residents participation” and “educating supporters”. As a result, the prospect of the cooperative road facili-

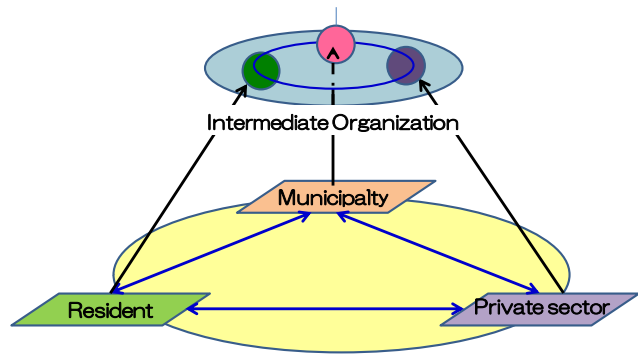


Figure 3 Image of the Intermediary organization

ties management is shown with the role of the stakeholders and the cooperation among them. Furthermore, it also point out that intermediary organization is important to smoothly realize the cooperation among stakeholders. It is ideal that intermediary organization has the function to communicate between expert and residents. We believe that the cooperative road facilities management will become milestone contribution to maintain the regions.

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