Towards Socially Sustainable Local Government:

A case of Swedish Municipalities

Jun YAMASHITA

Faculty of Social and Cultural Studies, Kyushu University, 770-2 Motooka, Nishi-ku, Fukuoka, 819-0395, Japan. e-mail: yamasita@scs.kyushu-u.ac.jp

Abstract

In the process of the local agenda 21 (LA21), a wide range of actors like local government, private companies, and citizens tackled various environmental problems within Swedish municipalities. National subsidy programmes, the Local Investment Programme (LIP) and Climate Investment Programme (Klimp), were established to financially support the LA21 process in the late 1990s and 2000s in Sweden. The present study attempted to identify chief actors before and after the LIP, and in turn, to reveal whether various kinds of actors were involved in environmental projects after the LIP. As a result, it was explicated that a wide range of actors was hardly encouraged to be involved in such projects after the LIP.

Key Words:

Social sustainability, social network, environmental policy, network analysis, LIP, Klimp

Introduction

Social sustainability has been gaining much attention in the public since the Earth Summit in 1992 because the 28th Chapter in the Agenda 21, which was adapted during the Summit, was dedicated to collaboration of various actors in society. Along with such social interests, the number of academic studies on environment policies and planning for social sustainability, which chiefly comprises the social capital, has rapidly increased recently (Vallence et al., 2011). Among such studies, Rydin and Pennington (2000) indicated that different characteristics pertain to the social capital for the three kinds of environment planning, namely, environmental management, environmental governance, and collaborative environmental planning. Rydin and Holman (2004) also conceptionally pointed out that the social capital contributes to sustainable development. According to the aforementioned conceptional studies, Evans et al. (2005, 2006) conducted their empirical studies in 40 European cities, and revealed that a possibility of success in sustainable development policies is high if the level of social capital is high. However, it is hard to conclude that empirical studies, which clearly show a positive relationship between the social capital or social network and success of environment policy, are fully accumulated.

Two subsidy programmes, the local investment business (LIP) and the climate investment

programme (Klimp) implemented by Swedish government are good research objectives to reveal such a positive relationship because they also aimed at both promoting collaboration of various actors, and in turn creating social networks, although the chief purpose of these programmes was to reduce negative effects of the global warming at local level[1)]. The LIP and Klimp were implemented from 1998 to 2002 and from 2003 to 2008, respectively, to financially support the local agenda 21 (LA21) process. In the process of LA21, various actors, such as central and local governments, private companies and the public, have cooperated with each other, and tackled a wide range of environmental problems within jurisdictions of local governments in the beginning of the 1990s in Sweden.

Although the LIP and Klimp partly aimed at enhancement of actors' involvement, studies on LIP and Klimp chiefly focused on effects derived from preventive measures against the global warming, especially reduction in the greenhouse gas emission. Using data on the amounts of subsidies and carbon dioxide reduction, Vredin Johansson (2006) estimated the marginal costs for various kinds of projects in the LIP, and revealed that subsidies were equally distributed for each project. Focusing on LIP projects in which the Swedish government paid fewer subsidies than the local governments required, Vredin Johansson (2007) also explicated determinants of cuts in the subsidies. For LIP projects specialised in purification of soil pollution sites, Forslund et al. (2008) pointed out that its effects on job creation was lower than those in ordinal soil remediation programmes. Regarding reduction in the carbon dioxide,

Yamashita (2010) explicated that influences of LIP projects were limited, and inferred that other determinants might contributed to the reduction other than the LIP projects. Concerning collaboration between various actors, Baker and Eckerberg (2007) only referred to a restrictive progress in public-private partnership in the process of LIP. Nevertheless, the aforementioned research circumstances indicate that studies on collaboration between actors and social networks are not fully accumulated in the domain of LIP studies. The purposes of the present study are, therefore, to identify chief actors before and after LIP, and to reveal whether various kinds of actors were involved after the LIP. The findings derived from this study could contribute to identification of a positive relationship between the social network and success of environment policy.

To attain the aforementioned purposes, the following chapter briefly mentions various LIP and Klimp projects in two study areas, namely Malmö as a representative of the national centres in Sweden, and Växjö as of the peripheries, and then, shows methods and data for examining differences in actors' participation in these projects. Results derived from applications of these methods are showed and discussed in the second chapter. Finally, some concluding remarks are drawn in the final chapter.

1. Methods

1.1 Overview of the LIP and Klimp

From macro and micro viewpoints, the author examined whether collaboration of various actors was enhanced after LIP. Whole Sweden was chosen as the subject of macro analysis. In this analysis, influences of LIP and Klimp projects to collaboration of actors were identified by urban and rural areas. This is because the urban areas, which are equivalent to the national centres in Sweden, have an advantage of human and financial resources to implement environmental programmes, while the rural areas, are almost the same as the peripheries, seems to be advantageous on social networks, though such resources are less affluent in these areas than the urban. In this study, three metropolitan areas including Stockholm, Göteborg and Malmö, were classified into the urban areas, while the rests were categorized into the rural areas (Fig. 1). In the urban areas, 899 LIP projects in 65 municipalities and 455 Klimp projects in 36 municipalities were implemented, while 944 LIP projects in 99 municipalities and 458 Klimp projects in 49 municipalities were undertaken in the rural areas.

On comparing 1843 LIP with 913 Klimp projects by actor and objective between urban and rural areas, we recognise the following features (Tables 1 and 2). First, regarding actor, municipalities, municipal companies, and private companies highly involved in LIP in both urban and rural areas. Such trend is also observed in Klimp. Conversely, private persons and associations rarely participated in either LIP or Klimp projects in the urban and rural areas. The aforementioned findings show that actors in urban and rural areas are much similar in

both LIP and Klimp projects. On the basis of these findings, moreover, it is inferred that the public participation, which was developed in the process of LA21, was hardly reinforced in either LIP or Klimp in the urban and rural areas. Second, concerting objective, various kinds of projects were implemented in LIP in both urban and rural areas, while projects were concentrated in the two fields of energy and traffic in Klimp in the two areas. Just like actor in the urban and rural areas, such findings could indicate that there was no difference in objective between the two areas.

By selecting one study area for urban and rural area each, chief actors and objectives of LIP and Klimp were also identified from the micro viewpoint along with the macro one. As mentioned above, Malmö represented the case municipality in the urban area, while Växjö was selected as the case in the rural area. The Swedish government subsidised Malmö's 65 LIP projects in 1990. The amount of subsidy was approximately 183 million SEK. Malmö also received around 129 million SEK as subsidies for total 45 Klimp projects in 2003, 2004, 2007 and 2008. On the other hand, Växjö was granted approximately 61 million SEK for total 55 LIP projects from the central government in 1998 and 2001, while getting around 23 million SEK for total 25 Klimp projects as subsidies in 2004, 2007 and 2008.

In comparisons of 65 LIP with 45 Klimp projects implemented in Malmö, and of 55 LIP with 25 Klimp projects in Växjö by actor and objective, we obtained the following findings (Tables 3 and 4). First, as for actor, municipalities share the largest proportion of involvement

in both LIP and Klimp projects in Malmö and Växjö. Apart from the municipalities, private and municipal companies high participated in these projects in Malmö and Växjö, respective. Contrarily, almost no private persons took part in either LIP or Klimp projects. The aforementioned findings indicate that there was no difference between LIP and Klimp project in both Malmö and Växjö, and that the participation of various actors was hardly enhanced in either LIP or Klimp in both Malmö and Växjö. Second, as to objective, LIP projects were scattered over all the objectives except for industry, but had high priority for energy and traffic, while most of Klimp projects were concentrated in the of two fields of energy and traffic. Thus, results derived from the comparison of objectives are very similar to those concerning actors. These findings show that objectives in LIP resembled those in Klimp.

1.2 Analytical methods and data

The analysis of variance and network analysis were utilised to examine differences in actor and objective between the urban and rural areas from both macro and micro viewpoints. Using the analysis of variance, first, actors and objectives in LIP and Klimp projects were compared with each other between urban and rural areas. The number of projects by actor and objective were employed as data for the analysis of variance (Tables 1 and 2)[2)]. Regarding the actor, variances within the urban or rural area were estimated for LIP and Klimp using the number of projects showed in seven categories of actors, which begins with “Central and

county government" to "other" in "a) Actors" section in Tables 1 and 2. Variances between the urban and rural areas were also estimated for the LIP and Klimp. Just like actor, variances within the urban or rural area were estimated in both LIP and Klimp using the number of projects showed in nine categories of objectives, which begins with "energy" to "other" in "b) Objectives" section in Tables 1 and 2. Variances between the urban and rural areas were also estimated for the objectives. Finally, variance ratios, which are defined as ratios of estimated variances between the urban and rural areas to those within these areas, were calculated, and in turn, the variance ratios were statistically examined using the χ^2 test to identify whether actors and/or objectives differed between the urban and rural areas.

From a micro viewpoint, the network analysis was employed to identify who were chief actors and how linkages between actors were changed before and after the LIP. The average shortest distance, density, and degree centrality were used to explicate network structures. The average shortest distance for a social network is calculated in the following way. First, we sum up shortest distances, by which each actor moves to other actors using the shortest paths in the network, and then, the summed shortest distances are divided by the total number of actors. The divided summed shortest distance is defined as the average shortest distance. The more a network becomes dense, the shorter the average shortest distance is (Knoke and Yang, 2008). The density (D) is defined as follows: $D = m / n (n - 1)$, where m denotes as the number of sides in a network, and n indicates the number of vertexes, namely actors, in the network.

The density of a social network becomes larger with increments in the number of connections between actors. The degree centrality shows to what extent an actor has an impact on a network. When an actor has high scores of the degree centrality, this actor's centrality is high. This also indicates that this actor takes a main part in the network.

For the network analysis, this study utilised questionnaire data. Questionnaires were sent to 25 actors in 55 LIP projects in Malmö and 11 actors in 65 LIP projects in Växjö. According to the five point scale showed in Table 5, each one of the 36 actors rated contact frequencies among them at the three time periods: before LIP, in the process of implementation of LIP, and after LIP. The final time period is equivalent to the time period of implementation of Klimp. As results derived from the questionnaire study, five actors in Malmö and four actors in Växjö retuned their valid responses. Using these valid responses, the network analysis was conducted. In the calculation process of average shortest distances, the distance was set as one, if any two actor had any contacts with another one. Conversely, the distance is null, if any two actors have no contact with each other.

2. Results and Discussion

2.1 Results derived from applications of the analysis of variance

As results derived from applications of the analysis of variance, it is revealed that there is

statistically no difference in either actor or objective between urban and rural areas (Tables 6 and 7). Regarding actor, estimated variances between urban and rural areas are remarkably smaller than those within urban and rural areas in the LIP (Table 6a) and Klimp (Table 7a) projects. This means that differences between urban and rural areas are smaller than differences between seven actors within these two subsidy programmes. Far larger values of estimated variances within urban and rural areas than between these areas lead to no statistical significance of variance ratios at even 10 percent level. In consequence, it is statistically verified that there were no differences in actors between urban and rural areas for LIP and Klimp. Thus, it was confirmed that chief actors were municipalities and municipal companies in the LIP and Klimp projects, as mentioned in the preceding chapter. Although the LIP and Klimp projects aimed at promoting collaboration among various actors, it is, therefore, concluded that this aim was hardly attained.

Just like the actors, differences in objectives were very small between urban and rural areas (Tables 6 and 7). Differences between urban and rural areas are smaller than differences among nine objectives because the estimated variances between the two areas are remarkably small than those within the two areas in the LIP (Table 6b) and Klimp (Table 7b). Such small figures of the estimated variances between the two areas brought statistically no significance of the variance ratios at 10 percent level. Regarding objectives, it is statistically confirmed that there was statistically no significant difference between urban and rural areas. In the

preceding chapter, it was found that the objectives in the LIP projects were more diversified than those in the Klimp projects. However, results derived from applications of the analysis of variance statistically revealed objectives in the LIP and Klimp are not different but concentrated in energy and traffic in the LIP and Klimp in both urban and rural areas.

2.2 Results derived from applications of the network analysis

On comparing social networks of actors at the aforementioned three time periods, we could find that network structure principally did not change before and after LIP. It is inferred that the actors in both Malmö and Växjö were closely connected with each other at the implemental stage of LIP because the average shortest distances were shortest among the three time periods (Table 8). Contrarily, social networks of actors rapidly diminished after LIP because the average shortest distances after LIP were longer than those at the implemental stage of LIP, and became almost the same length as those before LIP.

Densities of social networks also supported the fact that the networks were almost unchanged before and after LIP (Table 8). Just like the average shortest distances, densities in both Malmö and Växjö were the hightest at the implemental stage of LIP. This indicates the networks between actors were closely related with each other. However, densities became smaller after LIP, and the dense networks at the implemental stage of LIP were quickly shrunk after LIP like those before LIP.

Through observation of changes in values of the degree centrality, we could confirm that chief actors were municipalities and municipal companies in the LIP and Klimp projects in both Malmö and Växjö. This is partly because values of degree centrality are high in municipalities and municipal companies over the three time periods, and partly because those are low in private companies, associations and organizations at the same periods (Table 9). It is worth noting that actor No.11 in Växjö, which was the technical section in this municipality, has the highest value of the degree centrality. This suggests that techno-centric preventive measures against the global warming were chiefly implemented in the energy and traffic domains, which were the main objective ones in the LIP projects, especially in Växjö.

To the contrary, it is quite difficult to conclude that various actors were participated in LIP projects. LIP participants from associations and organizations, and private companies, namely, M14, M15, M19, V8, V11 did not involved at all in any environmental projects before LIP or after LIP. Among 25 actors in Malmö and 11 in Växjö, who were designated as examinees in the network analysis, no private person were involved in the LIP projects, while eight actors in Malmö and seven in Växjö came from the municipalities or municipal companies. Taking such findings into consideration, we hardly conclude that various actors were participated in the LIP projects, but infer that municipalities and municipal companies mainly implemented the LIP projects.

Changes in sociogrammes also confirmed the fact that the municipalities and municipal

companies were chief actors in the LIP projects (Figure 2). In this figure, each peak expresses actors and widths of each side between two peaks indicate degree of connection between them, while sizes of circles on the peaks denote values of degree centralities. Among Actors No. 1 to 8 in Malmö and Actor No. 1 to 7, networks have already been formed before LIP. The connections between these actors were strengthened at the implemental stage of LIP. After LIP, such networks were lessened but still remained. Links between municipalities or municipal companies and private companies or associations and organizations were established at the implemental stage of LIP. Nevertheless, these links were not maintained after LIP, but dissolved after LIP. It is, therefore, concluded that various actors including private companies, associations and organizations, and private persons were not continuously involved in environmental policies or planning after LIP, but that municipalities and municipal companies chiefly implemented the LIP, and might do Klimp projects.

A positive relationship between the social network and success of environment policy did not observed in this study. Table 10 shows the changes in Changes in energy consumption in Malmö and Växjö between 2000 and 2008. The time period between 2004 and 2008 is regarded as the implemental stage of LIP, while this between 2004 and 2008 is of Klimp. The energy consumptions in Malmö and Växjö increased during the time period between 2000 and 2004, though the social networks were tightened and various actors involved then, as mentioned above. Contrarily, the energy consumptions in Växjö decreased during the time

period between 2004 and 2008. However the social network was loosened then, and a few actors, mainly municipalities and municipal companies took their parts after the LIP. The aforementioned findings might suggest that no or possibly a negative relationship between the social network and success of environment policy.

2.3 Discussion

As Feichtinger and Pregernig (2005) pointed out that main actors were technical specialists in the process of LA21 in Sweden, it might infer that most of the LIP and Klimp projects were implemented by actor with high technical skills and affectivity like technology section of municipality or municipal companies specialising in energy, district heating or waste treatment because the central government required short term and concrete results of reduction in the carbon dioxide for LIP and Klimp municipalities. Contrarily, it also might imagine that actors without such skills or effectively, namely NPO or private persons were discouraged to participate in the LIP Klimp projects. In the case of the LIP projects in Växjö, it was confirmed that the technical section of this municipalities had the highest degree centrality, and in turn, this section was the chief actor in the LIP projects. In Sweden, counties and municipalities are responsible for the public transport, while municipal companies have responsibilities to sewage and waste treatment and district heating and cooling. It is inferred that municipalities and municipal companies prioritised instantaneously effective carbon

dioxide reduction projects rather than less effective ones in the in LIP and Klimp using advantage of technologies accumulated before LIP or Klimp. Such inference might be supported by the following examples of such techno-centric LIP and Klimp projects against the global warming: municipal companies extract biogas in the treatment process of sewage and waste, while reducing incineration costs for waste or sewage disposals. Instead of utilising fossil fuels, buses in public transportations, which counties or municipalities operate, utilise such biogas, while energy or district heating and cooling companies employ such biogas to reduce carbon dioxide emission. It could, therefore, be inferred that such techno-centric LIP and Klimp projects implemented by municipalities or public companies gave higher priorities over other projects managed by private companies, organizations and associations, and private persons.

Conclusions

The purposes of this study were to identify main actors before and after LIP, which was implemented by the Sweden government to financially support the LA21 process, and in turn, whether collaborations among various actors were enhanced after LIP. As results of the analysis of variance for the LIP and Klimp projects carried out in both urban and rural areas, it was explicated that municipalities and municipal companies were main actors, and that there

was no difference in actor and objective between the centres and peripheries. This indicated that various actors did not participate in the LIP and Klimp projects, and in turn, that collaboration of various actors was not attained. These results also revealed that energy, traffic, and waste treatment were chief objective in the LIP and Klimp projecdts. As results derived from the network analysis, moreover, it was confirmed that municipalities and municipal companies were main actors in the LIP projects because the municipalities and municipal companies had high scores of centricity.

As the results derived from application of both analysis of variance and network analysis, it is, therefore, concluded that the participation of various actors, which have been formed in the process of LA21, was hardly enhanced in the LIP and Klimp projects. This conclusion also suggests that social sustainability, which partly aims at making and sustaining social networks, was not attained in LIP and Klimp. However, it is difficult to draw general statements on actor participation in the LIP and Klimp projects on the basis of only two local municipalities. Finally, it was suggested that no positive but a negative or no relationship between the social network and success of environment policy in this study. However, further case studies are needed to reconfirm the aforementioned conclusions because this study was based on the findings derived from the limited number of study areas.

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Notes

[1)] LIP had six objectives. To attain socially sustainable development, the fifth was dedicated to promoting collaboration of various actors in society. Klimp aimed at reduction in greenhouse gas emission, and distribution of knowledge and information acquired in the process of Klimp projects to non-Klimp municipalities, while addressing reinforcement of activities and collaboration against the global warming among various actors.

[2)] Data showed in the environmental investment registration (MIR, miljöinvesterings-registret) of Environmental Protection Agency were employed in this study. The data in the completed projected as of the end of March 2011 were only utilised in this study.

References

Baker, S. and K. Eckerberg (2007) Governance for sustainable development in Sweden: The experience of the Local Investment Programme. *Local Environment*, 12(4), 325-342.

Evans, B., M. Joas, S. Sundback and K. Theobald (2005) *Governing Sustainable Cities*. Earthscan, London, 146 p.

Evans, B., M. Joas, S. Sundback and K. Theobald (2006) Governing local sustainability.

Journal of Environmental Planning and Management, 49(6), 849-867.

Feichtinger, J. and M. Pregernig (2005) Imagined citizens and participation: Local Agenda 21 in two communities in Sweden and Austria. *Local Environment*, 10(3), 229-242.

Forslund, J., E. Samakovlis, and M. V. Johansson (2008) Is it wise to combine environmental and labour market policies? An analysis of Swedish subsidy programme. *Ecological Economics*, 65, 547-558.

Knoke, D. and S. Yang (2008) *Social network analysis*. Sage Publications, Los Angeles, 133 p.

Vallance, S., H. C. Perkins and J. E. Dixon (2011) What is social sustainability? A clarification of concepts. *Geoforum*, 42, 342-348.

Vredin Johansson, M. (2006) Are carrots as good as sticks? Exante efficiency of a Swedish environmental subsidy programme. *European Environment*, 16, 89-107.

Vredin Johansson, M. (2007) Incentives and outcomes: Evaluation of a Swedish environmental subsidy programme. *Journal of Environmental Planning and Management*, 50(3), 343-362.

Yamashita, J. (2010) Effects of the LIP, an environmental subsidy, on regional measures against the global warming. *Papers on Environmental Information Science*, 24, 375-380.

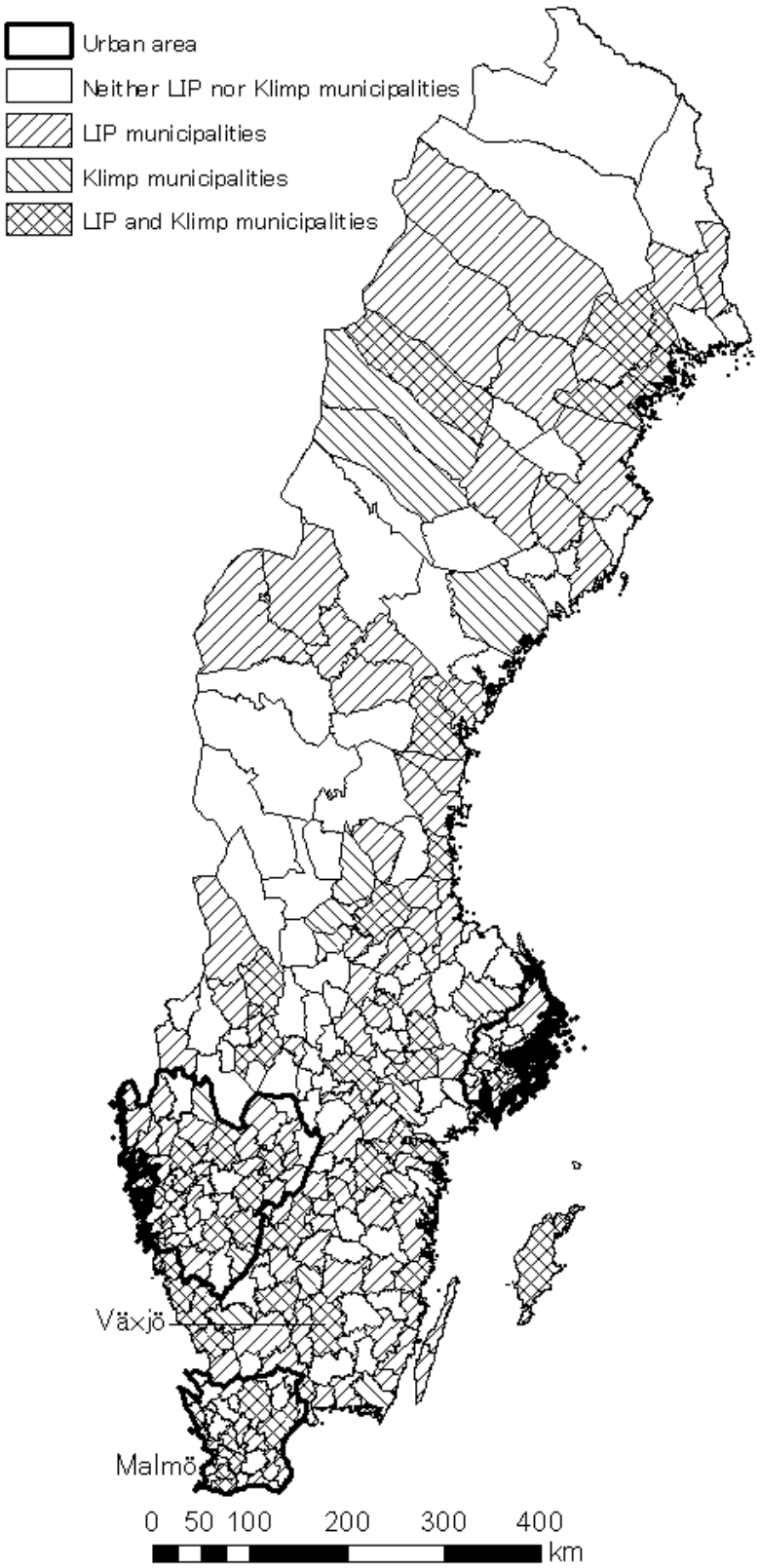

Figure 1 Study area

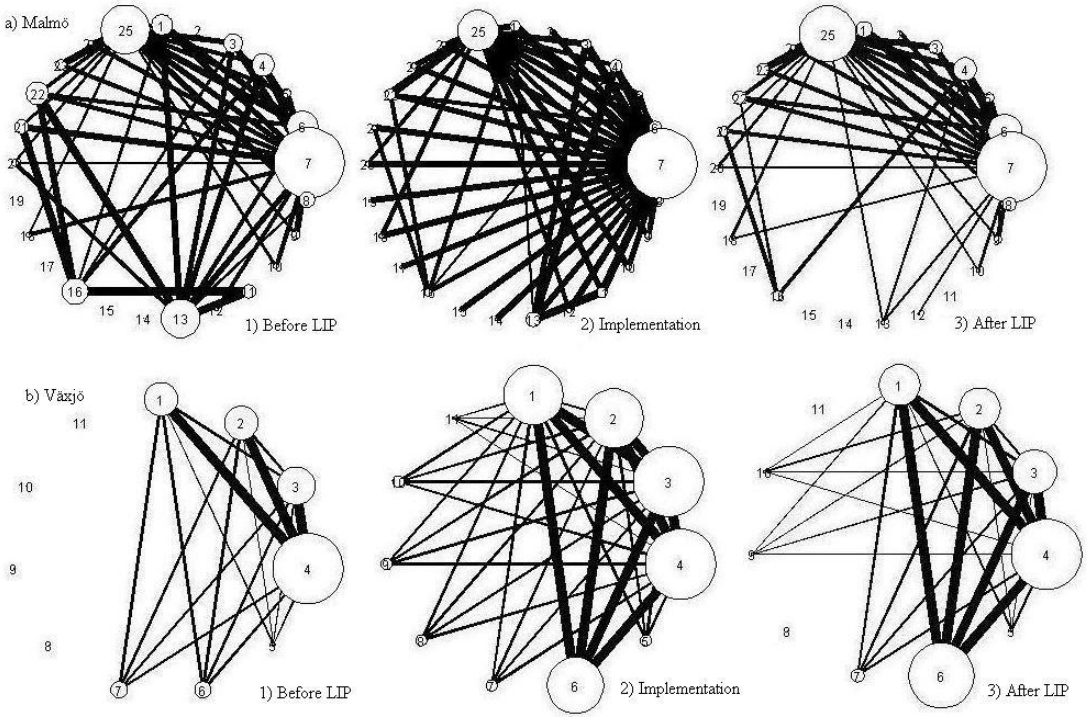

Figure 2 Sociograms of actors in Malmö and Växjö at the three time periods

Table 1 The number and percentage of LIP projects in the urban and rural areas by actor and objective

a) Actors

1) the number of projects

	Urban areas	Rural areas
Central and county government	14	30
Municipality	492	497
Municipal companies	122	197
Private companies	134	132
Asssociations	47	36
Private persons	10	8
Other	80	44
Total	899	944

2) Percentage

	Urban areas	Rural areas
Central and county government	1.6	3.2
Municipality	54.7	52.6
Municipal companies	13.6	20.9
Private companies	14.9	14.0
Asssociations	5.2	3.8
Private persons	1.1	0.8
Other	8.9	4.7
Total	100.0	100.0

b) Objectives

1) the number of projects

	Urban areas	Rural areas
Energy	255	335
Water and sewage	129	115
Bio-diversity	111	79
Waste	79	105
Transport	97	84
Multi-task	48	38
Industry	12	23
Housing	22	10
Others	146	155
Total	899	944

2) Percentage

	Urban areas	Rural areas
Energy	28.4	35.5
Water and sewage	14.3	12.2
Bio-diversity	12.3	8.4
Waste	8.8	11.1
Transport	10.8	8.9
Multi-task	5.3	4.0
Industry	1.3	2.4
Housing	2.4	1.1
Others	16.2	16.4
Total	100.0	100.0

Table 2 The number and percentage of Klimp projects in the urban and rural areas by actor and objective

a) Actors

1) the number of projects

	Urban areas	Rural areas
Central and county government	29	19
Municipality	233	248
Municipal companies	82	92
Private companies	72	68
Asssociations	0	2
Private persons	1	2
Other	38	27
Total	455	458

2) Percentage

	Urban areas	Rural areas
Central and county government	6.4	4.1
Municipality	51.2	54.1
Municipal companies	18.0	20.1
Private companies	15.8	14.8
Asssociations	0.0	0.4
Private persons	0.2	0.4
Other	8.4	5.9
Total	100.0	100.0

b) Objectives

1) the number of projects

	Urban areas	Rural areas
Energy	138	187
Water and sewage	0	0
Bio-diversity	0	0
Waste	33	19
Transport	109	99
Multi-task	0	0
Industry	0	0
Housing	0	0
Others	175	153
Total	455	458

2) Percentage

	Urban areas	Rural areas
Energy	30.3	40.8
Water and sewage	0.0	0.0
Bio-diversity	0.0	0.0
Waste	7.3	4.1
Transport	24.0	21.6
Multi-task	0.0	0.0
Industry	0.0	0.0
Housing	0.0	0.0
Others	38.5	33.4
Total	100.0	100.0

Table 3 The number and percentage of LIP and Klimp in Malmö by actor and objective

a) Actors

1) the number of projects

	LIP	Klimp
Central and county government	0	0
Municipality	28	28
Municipal companies	4	2
Private companies	28	10
Asssociations	5	0
Private persons	0	0
Other	0	5
Total	65	45

2) Percentage

	LIP	Klimp
Central and county government	0.0	0.0
Municipality	43.1	62.2
Municipal companies	6.2	4.4
Private companies	43.1	22.2
Asssociations	7.7	0.0
Private persons	0.0	0.0
Other	0.0	11.1
Total	100.0	100.0

b) Objectives

1) the number of projects

	LIP	Klimp
Energy	8	14
Water and sewage	2	0
Bio-diversity	1	0
Waste	4	2
Transport	7	11
Multi-task	20	0
Industry	0	0
Housing	6	0
Others	17	18
Total	65	45

2) Percentage

	LIP	Klimp
Energy	12.3	31.1
Water and sewage	3.1	0.0
Bio-diversity	1.5	0.0
Waste	6.2	4.4
Transport	10.8	24.4
Multi-task	30.8	0.0
Industry	0.0	0.0
Housing	9.2	0.0
Others	26.2	40.0
Total	100.0	100.0

Table 4 The number and percentage of LIP and Klimp in Växjö by actor and objective

a) Actors

1) the number of projects

	LIP	Klimp
Central and county government	2	0
Municipality	29	8
Municipal companies	10	13
Private companies	6	1
Asssociations	3	0
Private persons	0	0
Other	5	3
Total	55	25

2) Percentage

	LIP	Klimp
Central and county government	3.6	0.0
Municipality	52.7	32.0
Municipal companies	18.2	52.0
Private companies	10.9	4.0
Asssociations	5.5	0.0
Private persons	0.0	0.0
Other	9.1	12.0
Total	100.0	100.0

b) Objectives

1) the number of projects

	LIP	Klimp
Energy	20	14
Water and sewage	9	0
Bio-diversity	3	0
Waste	4	0
Transport	12	5
Multi-task	2	0
Industry	0	0
Housing	1	0
Others	4	6
Total	55	25

2) Percentage

	LIP	Klimp
Energy	36.4	56.0
Water and sewage	16.4	0.0
Bio-diversity	5.5	0.0
Waste	7.3	0.0
Transport	21.8	20.0
Multi-task	3.6	0.0
Industry	0.0	0.0
Housing	1.8	0.0
Others	7.3	24.0
Total	100.0	100.0

Table 5 Contact frequency among actors

Scores	Frequency
4	Two or three times a week
3	Two or three times a month
2	Two or three times a year
1	Once a year
0	No contact

Table 6 Results derived from applications of the analysis of variance to LIP by actor and objective

Sources of variation	Sum of square	Degrees of freedom	Variance estimates	Variance ratio
a) Actors				
Between groups	144.64	1	144.64	0.00498 n.s.
Within group	348,484.57	12	29,040.38	
Total	348,629.21	13		
b) Objective				
Between groups	112.50	1	112.50	0.01488 n.s.
Within group	120,939.78	16	7,558.74	
Total	121,052.28	17		

Note : n.s.: Statistically not significant at 10% level.

Table 7 Results derived from applications of the analysis of variance to Klimp by actor and objective

Sources of variation	Sum of square	Degrees of freedom	Variance estimates	Variance ratio
a) Actors				
Between groups	0.64	1	0.64	0.00009 n.s.
Within group	84,631.71	12	7,052.64	
Total	84,632.36	13		
b) Objective				
Between groups	0.50	1	0.50	0.00009 n.s.
Within group	84,869.11	16	5,304.32	
Total	84,869.61	17		

Note : n.s.: Statistically not significant at 10% level.

Table 8 Changes in the average shortest distance and density in Malmö and Växjö

	Before LIP	Implementation	After LIP
1) Malmö			
Average shortest distance	10.35	1.86	10.34
Density	0.38	0.47	0.27
2) Växjö			
Average shortest distance	7.25	1.38	4.65
Density	0.60	1.33	0.82

Table 9 Changes in degree centrality in Malmö and Växjö by actor

No.	Actors	Before LIP	Implementation	After LIP
1) Malmö				
M1	Municipality (Road management)	0.5	0.5	0.3
M2	Municipality (Recreation)	0.0	0.1	0.1
M3	Municipality (Urban Planning)	0.5	0.4	0.3
M4	Municipality (Environmental Protection)	0.5	0.5	0.5
M5	Municipality (Real estate)	0.2	0.3	0.2
M6	Municipal company (Gas)	0.7	0.5	0.7
M7	Municipal company (Distirict heating)	1.7	3.2	1.5
M8	Municipal company (Water and sewage)	0.4	0.3	0.3
M9	Assoication (Housing) 1	0.2	0.3	0.2
M10	Assoication (Housing) 2	0.1	0.3	0.1
M11	Private company (Construction) 1	0.3	0.5	0.0
M12	Private company (Real estate) 1	0.1	0.2	0.0
M13	Private company (Construction) 2	1.0	0.6	0.1
M14	Private company (Real estate) 2	0.0	0.1	0.0
M15	Private company (Housing)	0.0	0.1	0.0
M16	Private company (Real estate) 3	0.6	0.3	0.2
M17	Private company (Construction) 3	0.0	0.1	0.0
M18	Private company (Construction) 4	0.1	0.2	0.1
M19	Private company (Construction) 5	0.0	0.1	0.0
M20	Private company (Construction) 6	0.2	0.2	0.1
M21	Private company (Real estate) 4	0.3	0.2	0.2
M22	Private company (Construction) 7	0.5	0.5	0.3
M23	Private company (Construction) 8	0.3	0.3	0.3
M24	Private company (Construction) 9	0.1	0.2	0.1
M25	Private company (Real estate) 5	1.2	1.8	1.2
2) Växjö				
V1	Municipality (Natural resource conservaton)	1.0	2.2	1.3
V2	Municipality (Waste)	1.0	2.2	1.3
V3	Municipality (Environment and social welfare)	1.2	2.3	1.5
V4	Municipality (Technology)	1.4	2.3	1.7
V5	Municipal company (District heating)	0.4	0.8	0.4
V6	Municipal company (Energy)	0.8	1.2	1.2
V7	Municipal company (Housing)	0.8	0.8	0.8
V8	Association (Environmental conservation)	0.0	0.8	0.0
V9	Priavte company (Transport) 1	0.0	0.8	0.4
V10	Priavte company (Transport) 2	0.0	0.8	0.4
V11	Priavte company (Car service)	0.0	0.4	0.0

Table 10 Changes in energy consumption in Malmö and Växjö (2000-2008)

a) Total energy consumption (MWh)	2000	2004	2008
Malmö	6,737,372	7,121,428	7,515,998
Växjö	2,174,709	2,459,538	2,075,023
b) Growth (%)		2000-2004	2004-2008
Malmö		5.70	5.54
Växjö		13.10	-15.63

(Source: Statistics Sweden's energy database)