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| **Lund** | **Governance factors and representative quotations** |
| L1  Planning department | **Local government clear leadership and responsibility**  **Private stakeholder involvement:** We are in a situation where we understand that, and we can lay out the areas for stormwater, but we cannot secure legally that it will really be built like that. We try to do that good (private stakeholders involvement), but that is always on the margin. We cannot guarantee that the company will actually build it within the private land. We have a study visit to Germany, and they have the tools for demanding stormwater treatment within the private areas, but we don't. It would be good if it is possible (in Sweden).  **Academia involvement**  **Public land and funding**  **Private land and funding**  **Staff and time:** It is a lack of time.  **Effective market incentives**  **Knowledge of SSM**  **Legislative support:** If we could have some better legislation support (to engage private stakeholders).  **SSM standards:**  **Awareness of benefits:**  **Public education**  **Public awareness**  **Performance of SSM:** It will be very good if you could do this (SSM solution), and show them good examples, or things like that.  **Maintenance funding:** One of the difficult things about the green building things (is that) you can use different vegetation types, but nobody can maintain them. (It maybe) good (for) biodiversity, but nobody knows how to use it. Low maintenance costs is important. The long term effects are not always taken into account. One thing that would really change things is the whole building processes: if more companies build and manage, it will be big different; if they only built, it's not so good.  **Local politicians' priorities:** It all depends on what the political will is. You have (a certain) amount of money, if you put money into something, you have to put less money into something else. It all starts with the political will, do they want to do that there. If so, then we have to create resources, but the problem is resources for that means less resources for schools and other things, and that is very controversial in many municipalities of course even here.  **Trust of SSM (cost efficiency/safety/multi-functions):** We have to do the right thing instead of the wrong thing, every projects matters, from discussing to put money into it, especially private money, it is a long way. Every green area has to be more or less multi-functional. We have more large scale solutions, and it is (they are) more cost effective. |
| L2  Environmental department | **Local government clear leadership and responsibility:** We read all plans from the start nowadays. It is very important to contribute in the early process, and that's the key factor for success.  **Private stakeholder involvement:** We have to have more cooperative work with landowners from the municipality. We can say we provide this area, where you can build on this area if you join us and help us with solutions. We could build more sustainable (solutions) in the future. How and where do we find the areas, where we can build open solutions and how to get the acceptance for it from the inhabitants, we cannot build something that the inhabitants don't want to.  **Academia involvement**  **Public land and funding:** We have a high density in the town and we wanted to make it even denser. I don't think there will be space in the streets to have open solutions. When you don't have space for the open solutions in the streets, I think we have to mix many different kinds of solutions and find places where you can have these open solutions. In outskirts we will have open solutions e.g., big ponds for delay. It's all landing in some sort of money discussion later on. We have to do something for taking rainwater, and we will have floods in Lund also, so we must prepare for that, who is going to pay for that, we don't have that kind of money.  **Private land and funding**  **Staff and time**  **Effective market incentives**  **Knowledge of SSM**  **Legislative support**  **SSM standards:** I think that our government has to do something to help us. It is not easy for a municipality to put rules and regulations (on) how to build (SSM).  **Awareness of benefits**  **Public education:** We have to be good (in) teaching, we have to teach (the public) how to build a good city.  **Public awareness**  **Performance of SSM:** It is easier for politicians to give money (if) I have examples. It's very diffused him (them) if we just say that we want to do something but we don't know what, so we have to be very clear about the sort of things we want to do.  **Maintenance funding**  **Local politicians' priorities:** The politicians not always think as we professionals. The issue (stormwater) has been more important. When we did the strategy, it was quite abstract. More politicians want a strategy, since we haven't had of those heavy storms. The politicians want to make the city even more dense, how is that possible if we also should take care of stormwater. The politicians decreased budget. Lund is one of the fastest growing city in Sweden.  **Trust of SSM (cost efficiency/safety/multi-functions):** We have to reduce pollutants in stormwater to save our rivers. A hundred years ago, even in this part of the world, we had big problems with malaria and if the climate is getting warmer again, that will be a problem for us. If the mosquitoes thrive in this area, we will have diseases once more, so it's a complex problem. We could study what other cities have done. You don't have to be the first to do something, however we could be much better. |
| L3  Street department | **Local government clear leadership and responsibility:** We need to discuss with the water department, and I do not want the project leaders fight with each other in all the different projects, because we can’t decide how to find the money in every project.  **Private stakeholder involvement:** It needs to hurt their (private stakeholders) wallets. We cannot reach the goals (regarding SSM) if they (private stakeholders) do not change (their behaviours). We need the private stakeholders.  **Academia involvement**  **Public land and funding:** you need have some space (for SSM) or have places for it. Those kind of projects tend to get really expensive, and it is easier to have money (for SSM) in the new areas. We do not have money for the old areas. If they (the local politicians) decide that we are no longer going to use the pipes, we do it on ground, then we need to think about who is going to finance it. We need to figure out the finance before we can go so much. We don’t have money just for stormwater, (which means) we need to find money from other areas like pavements, roads, bridges etc.  **Private land and funding**  **Staff and time:** It’s hard to find time to rebuild the existing areas. We haven’t had time to rebuild the old city. In the new areas, you have real estate department to form the project group, and to think about these things (stormwater management). We need to show them (residents) how we will secure the hundred year (return period of) rain, but in the old areas you know (we cannot). We need more projects leaders, time, and money.  **Effective market incentives**  **Knowledge of SSM:** We do not have the knowledge (of SSM). We are so aware of what could happen when it gets the heavy rains, but we need time and right knowledge.  **Legislative support**  **SSM standards**  **Awareness of benefits:** The most important thing is that you have it (SSM) in your mind. (SSM) it is in our minds most of time, but we don’t have a lot of money for this.  **Public education**  **Public awareness:** In the old areas, you need this heavy rain to get attention (of the residents) why we should do something (regarding stormwater) just in this area.  **Performance of SSM:** When you have one good pilot project, it can lead to another one, and so on. Rain gardens can be important because you see them all day and you remember that it (SSM) is important.  **Maintenance funding:** We don’t have the finance that is needed for this type of system (SSM), and especially for maintenance, because there is always a shortage of money when you deal with maintenance. SSM maintenance cost is more expensive and takes more time, and we don’t get any more money for that.  **Local politicians' priorities:** We in the municipality cannot do everything, I am not a politician.  **Trust of SSM (cost efficiency/safety/multi-functions):** We don’t really know what method is the best. We don’t want to try hundreds of different types, and we don’t have a finished plan yet. |
| L4  Parks department | **Local government clear leadership and responsibility**  **Private stakeholder involvement:** We have to work in places like private gardens, and it could be a solution by creating new areas to help us with this (stormwater) question. It is important that everyone takes (his or her) responsibilities to handle their own water.  **Academia involvement:**  **Public land and funding:** The biggest question in the future will be how much does it cost to have them (being) opened, because everybody need a space and we are going to need the space for many things. Find the right place for like ponds and stuff like that (will be difficult).  **Private land and funding:**  **Staff and time:** We need more people work with it (SSM).  **Effective market incentives:**  **Knowledge of SSM:** The municipality knows a lot more about these type of questions than the consultants do. Knowledge and education are important resources for SSM implementation, it must be something super natural to do when you planning a new area. “When we have like big massive trees that you have to cut down, because you need to have places for water instead. We cannot afford to make the whole parks just for stormwater. In the old park, it is very hard to place a pond without destroying everything. If you want to lower a whole park to make space for water, you have to dig a lot, and that will cost a lot of money” (Shows lack of knowledge of SSM).  **Legislative support:** It's very important that people feel that they have supports to explore and work with things.  **SSM standards:**  **Awareness of benefits:** I can really feel how this question has been emphasized all the time. It's not peaking right now, but it's really high on the agenda every time. Five ten years ago, you wouldn't discuss stormwater in every detail plan, but now you do. It is not super dense in Lund, if we work with it right now, we can in the long run get a pretty good way to handle it.  **Public education:** The end of pipe solutions are super important. We have to work with it, and it is also a place to educate people, to emphasize the importance of the question, to do nice, good, and effective solutions in the city. The multi-function is very important.  **Public awareness**  **Performance of SSM:** We have to show them (the committee or the politicians). We are doing some examples every year. We have to show that it works, that it helps to do something. If that doesn't work in the long run, people will try to avoid them if they don't need them.  **Maintenance funding:** Green roofs and green walls look good, but (they are) super expensive and need a lot of maintenance. We have to maintain them well, so they can continue to be attractive and functional as stormwater solutions.  **Local politicians' priorities:** It's important to get people in the important positions to understand how much money we have to invest in these kinds of solutions and to maintain them as well. The politicians are starting to get pretty good at this, and they ask pretty hard and complicated questions, so we have to have answers and that's good to us. It is up to the politicians to prioritize what we do. It is super hard to say that stormwater is number one.  **Trust of SSM (cost efficiency/safety/multi-functions):** It's very hard to say that the open solution will be the solution. We have to find better solutions in the city. If you just work with small things (rain gardens), people love to do that, and we have these solutions. Everybody is going to see it, and it's important with some kind of pedagogical. If it rains really much, this small thing is going to be filled up, and it doesn't give you any solution, so we have to find the best solutions and then we can be pedagogical. If we're going to have them (SSM solutions), they have to be safe, attractive and work without super high maintenance. |
| L5  Land and exploitation department | **Local government clear leadership and responsibility:** It is the VASYD should pay for it, since they get the fees from people using the systems. If Vasyd need the land (to manage stormwater) that not owned by us, we suppose to buy it, but who is going to pay (for) it?  **Private stakeholder involvement:** It could be difficult if we do not own the land to make the people pay for it. We can inspire them, but we cannot tell them to do that, and it is illegal. It is VASYD responsibility to engage the private stakeholders.  **Academia involvement**  **Public land and funding:** It is not easy to find the place to put stormwater. When we do new areas, it is easier for us to think stormwater, and we do think stormwater. It costs too much and we haven’t got places for it. We want the most efficiency (solutions) for our money. It is not economical efficient to take the old systems and change it.  **Private land and funding**  **Staff and time**  **Effective market incentives**  **Knowledge of SSM:** It is difficult for me to say so much about it (rain garden), it is so new.  **Legislative support**  **SSM standards**  **Awareness of benefits**  **Public education:** It is not that we tell them (private stakeholders) what to do, it is more about inspiring and discussing how we can build sustainable society and this (SSM) could be one part of it.  **Public awareness**  **Performance of SSM**  **Maintenance funding**  **Local politicians' priorities:** I can show that (project plan) for the politicians and they have to decide in what way to do, while the best is you can have multi-functional facilities.  **Trust of SSM (cost efficiency/safety/multi-functions):** We tried to make the stormwater facilities in a park with many functions, so they’ll give back more to the society than just taking care of the stormwater, e.g., pedagogical, recreation. |
| L6  Vasyd | **Local government clear leadership and responsibility**  **Private stakeholder involvement:** There's park in Lund, the owner pay the maintenance for the public park, because they did not like the way the organization was handling it, so they took over the maintenance. They want to invest in the public park in restoration or maintenance. The question about maintenance will be shifted.  **Academia involvement**  **Public land and funding:** We are building the cities denser, and we do not have enough space. We do not have money and no resources. Who is going to pay for it?  **Private land and funding:**  **Staff and time:** When it comes to cloudburst management, especially in the planning department (in Lund), they are way ahead of Malmö, that's also because they have a couple of really good people there. They need more people, especially in the technical department.  **Effective market incentives**  **Knowledge of SSM**  **Legislative support:** I am not working with laws and legislations, because it make me crazy, it is a big problem. There are gaps between different laws. The different judges or courts, they have made, and they say that's the way to go, but in five years that could change. The cloudburst, there is no responsibilities, and it's hard because we can't ask private landowners to handle stormwater at all, that's a big problem.  **SSM standards**  **Awareness of benefits**  **Public education**  **Public awareness:** We have to make stormwater management solutions-not the thing you add, but a normal way to do it.  **Performance of SSM**  **Maintenance funding:** The problem is not doing, but maintaining, because maintenance never gets enough money. When cutting down on costs, the first thing people cut down is maintenance. That is the hard truth and it is same in Malmö and Lund. They don't get any money for maintenance.  **Local politicians' priorities:** There is a political interests as well, so that helps.  **Trust of SSM (cost efficiency/safety/multi-functions):** We need more multi-functional areas and that's not just for the water. It is hard to say SSM is the best way to do. We need cost efficient solutions. |
| **Malmö** | **Governance factors and representative quotations** |
| M1  Planning Department | **Local government clear leadership and responsibility**  **Private stakeholder involvement:** We cannot make that demand on the private owners.  **Academia involvement**  **Public land and funding:** We need space. Having more trees in the streets costs more. The politicians have to say: ‘OK. This is the city we want to and we prepare to pay for it’.  **Private land and funding**  **Staff and time**  **Effective market incentives**  **Knowledge of SSM:** We have many demands of the private developers and owners. It is quite new knowledge. Even you told them sometimes, no one can do this. More knowledge would be helpful.  **Legislative support:** We have to act according to the law. We cannot demand them (private stakeholders). If they fail in maintenance or something. They have to make sure they can take all of the stormwater, or we have to be like double systems. We can go hope for changing the law, but it needs something happen in the capital city, or someone die because of stormwater.  **SSM standards**  **Awareness of benefits**  **Public education**  **Public awareness:** The residents has to be informed those parts with stormwater problems.  **Performance of SSM**  **Maintenance funding**  **Local politicians' priorities:** We have to work together with all, e.g., schools, houses. Again there needs strong will from the (the local) politicians to do this. It is not me or VASYD wanting something. It is (the local) politicians make decisions.  **Trust of SSM (cost efficiency/safety/multi-functions)** |
| M2  Environmental department | **Local government clear leadership and responsibility:** We are working on strategical level. As environmental department, we don’t have the muscles to implement, but we can push other departments in the cooperation group in the direction of SSM. The cooperation group I am leading at the moment, there are representative from all the departments, e.g., planning, streets, parks, VASYD, real state, etc.  **Private stakeholder involvement:** This, to visualize it more, could be one way of getting the public more involved and more informed. One of the tasks of the cooperation group is to corporate with private landowners, and to keep dialogue on what they could do on their property to work with stormwater.  **Academia involvement**  **Public land and funding**  **Private land and funding**  **Staff and time**  **Effective market incentives**  **Knowledge of SSM:** It is not always optimal to ask the public to collecting their stormwater, I think there also should be experts involved in dealing with water. They (private stakeholders) do not know what they can do, what they are allowed to do, and how they can do it, since they are not experts on stormwater.  **Legislative support**  **SSM standards**  **Awareness of benefits**  **Public education**  **Public awareness:** One of the problems is lack of an opinion from the public in this today, because they have never seen stormwater in fact, unless there was a flooding, because we have been hiding it in pipes for many years. The general public is not informed. It could be a way to inform, communicate and show it off much more. One of the most important thing is creating more awareness.  **Performance of SSM**  **Maintenance funding:** It is not only on investment costs, but also on management. That needs to get more financing as well.  **Local politicians' priorities:** If we do not get the public opinion on it, we will never get the politicians on it. You (politicians) have to have the public’s view and public confirmation.  **Trust of SSM (cost efficiency/safety/multi-functions):** When we arguing for investments, you have to take into account the social, economic and environmental aspects, the aesthetics and pedagogical, multifunctional ways. |
| M3  Street department | **Local government clear leadership and responsibility**  **Private stakeholder involvement:** We need to have actions on 70% private landowners, but it is only information communication. Most people feel that Malmö Municipality should fix this, but please you (private stakeholders) have to do something. The legislations (do not encourage) private landowners (involvement) because of risks. It is better professionals take care if it (stormwater).  **Academia involvement**  **Public land and funding:** The sewage (department) in Sweden has a big problem to say: why do we need this area. They could say if we do not do it, we will have the possibilities flooding in downstream with 10%, but this is never shown to the politicians. We really need make difference, it will be expensive. It is important to put money where is needed.  **Private land and funding**  **Staff and time**  **Effective market incentives**  **Knowledge of SSM**  **Legislative support:** We need new solutions and new legislations. We need clear identification what the municipality supposes to do.  **SSM standards**  **Awareness of benefits**  **Public education**  **Public awareness**  **Performance of SSM**  **Maintenance funding**  **Local politicians' priorities:** You do not want to put exact goals (regards to stormwater), (because) we do not feel security. If you achieve, maybe that is due to politicians. (Stormwater or flooding) is very seldom the theme for the politicians.  **Trust of SSM (cost efficiency/safety/multi-functions)** |
| M4  Parks department | **Local government clear leadership and responsibility**  **Private stakeholder involvement:** The small measurements could be taken on private land. You need to explain the risk, it can be hard to understand. It needs a lot of information and maybe additional funding.  **Academia involvement**  **Public land and funding:** The crucial point is how much does the city have to invest and nobody really knows that yet. We need more money to rebuild the structures within the city, existing structures, but we do not know how much that will cost. This is one of the challenges to find the space to put enough measurements  **Staff and time**  **Effective market incentives**  **Knowledge of SSM:** We have ambition, but we need resources, like knowledge.  **Legislative support:** The legislations do not say anything about risks and climate change. We are not forced by law to rebuild the (stormwater) system. The decision was taken in the city level, like we need to do adjust to climate change, so the city is a bit ahead of the law. The legislation lag in behind. We can be more updated on the climate change legislations on the national level. We need to have more powerful legislations and you can say it basically about funding the measurements in a sound way.  **SSM standards**  **Awareness of benefits:** Now we think it is very beneficial to be able to manage rain coming every 100 years, because if such rain comes, the cost for the damage will be so high. We need cost effective solutions.  **Public education**  **Public awareness**  **Performance of SSM**  **Maintenance funding:** When you plan to (manage) the cloudbursts that might occur only many hundreds year, then you need to maintenance the system.  **Local politicians' priorities:** There will be a first draft of the cloudburst plan present for the politicians.  **Trust of SSM (cost efficiency/safety/multi-functions)** |
| M5  Real Estate department | **Local government clear leadership and responsibility**  **Private stakeholder involvement:** There has been a test with some kind of common responsibility for the properties and the shared space, but it is not formally correct according to the law and it has created some practical management problems as well.  **Academia involvement**  **Public land and funding:** We do our best to use sustainable solutions but there are conflicts with the streets department who will not accept water in the street construction. There is a conflict between the stormwater policy and the policy to expand the city inwards by densification. It is a big challenge to find the big areas needed to take care of the big stormwater volumes. The Real Estate department is supposed to generate money for the municipality in their projects so it´s possible to use expensive SSM solutions in some projects, but in general it´s not.  **Staff and time**  **Effective market incentives**  **Knowledge of SSM**  **Legislative support:** It is limiting that there are no legal possibility to regulate the amount of stormwater that has to be taken care of in the single property.  **SSM standards:** There are no goals formulated regarding how big amount of stormwater that should be taken care of.  **Awareness of benefits:** There are many different values connected to SSM and there are a decent awareness of these, but it is often the economic situation that is most important in the end. Between the different municipal actors there was a decision that only a small amount of the stormwater could be taken care of on the surface and there had to be pipes to cover up. It is difficult to fit in open solutions (SSM) as there are cultural values to take into account.  **Public education**  **Public awareness**  **Performance of SSM:** There are big problems with open solutions according to plans as the single property owner has to take care of their own stormwater. We are trying to take care of stormwater at the surface in a sustainable way but it is only small volumes that can be dealt with – there has to be a pipe system as the main solution. SSM is mostly to look nice!  **Maintenance funding**  **Local politicians' priorities**  **Trust of SSM (cost efficiency/safety/multi-functions)** |
| M6  VA SYD(Malmö water management agency) | **Local government clear leadership and responsibility**  **Private stakeholder involvement:** According to the current legislation, it is not allowed to force the landowners to reduce the flows from their own land. We actually soon going to start a project together with Malmö Stad to have some personnel to engage with private landowners, to encourage them to see what they can do on their private land.  **Academia involvement**  **Public land and funding:** We have to do all sustainable stormwater solutions on public land, but we need land.  **Staff and time**  **Effective market incentives**  **Knowledge of SSM:** The challenge now is to spread the knowledge, the awareness and way to think about the thing in the different departments. We talk so much about the quantitative of stormwater after the cloudburst in 2014. Besides the cloudburst plan, we have to look at the quality of stormwater. What is the best kind of way to reduce the pollutions? That is one of the questions we are going to look more into.  **Legislative support:** We have to take care of sewage water and distribute drinking water, basically the law says say nothing about stormwater. There are lot things we need to do, but we are not allowed, e.g., increase the amount of private landowners.  **SSM standards**  **Awareness of benefits**  **Public education**  **Public awareness:** The most important thing is make people aware, so basically raising awareness of the problem. Stormwater is not the driving force, because people need houses. You have to have stormwater management (on private land) as a cultural (a norm).  **Performance of SSM**  **Maintenance funding:** The maintenance cost question has to be dealt with.  **Local politicians' priorities:** The cloudburst plan has not been adopt by politicians yet. If it is decided to, the cloudburst plan will working towards (involving more possibilities of stormwater solutions in the dense city)  **Trust of SSM (cost efficiency/safety/multi-functions)** |
| **Xi’xian New Area** | **Governance factors and representative quotations** |
| Planning Section  X1 | **Local Government Clear Leadership and Responsibility:** In the beginning of every year, we make task plan and distribute clear responsibilities among various bureaus. Every bureau takes initiative to coordinate with other bureaus on the task that they are responsible.  **Academia Involvement**  **Public land and funding:** We are one of the pilot Sponge Cities, who get national funding for SC construction. We have also matching funds and self-raised funds, and some co-funding from society through PPP. Currently funding is not a big problem. Sponge City construction depends mainly on a change from the conventional construction concept (to the new). It does not have absolute dependency on urban land use. Sponge City construction does not necessary take more land. It just has another way of doing, e.g. green space is elevated earlier, but now it is sunken.  **Staff and Time**  **Effective Market Incentives:** Currently, the national level strongly promote PPP model to construct, manage and maintain SC projects. Not all people are enthusiastic about Sponge City construction. For the society-funded projects, we can rely on our Sponge City Construction Plan, planning indicators, and making specialized plans to clarify Sponge City construction goals. We also provide financial incentives to encourage them to work with Sponge City. If they are still not interested, we take some compulsory measures.  **Knowledge of SSM:** Sponge City is a new thing. It is difficult to change the conventional construction concept of the people who manage the urban construction, they need some help, e.g. guidance, on how to apply the techniques. It is mainly a matter of change of traditional construction mindset.  **National Legislative Support**  **National SSM Standards:** The national government issued technical guidelines, and Xi’xian has also issued our own technical guidelines and design standards.  **Awareness of Benefits:** Sponge City construction is in a starting stage, so it is too early to disregard its role and effects. Its functions and advantages can only be appreciated after it is implemented in a large area (scaled up).  **Public Education:** We welcome the citizens to understand and participate in Sponge City construction. We have arranged various types of activities for this, e.g. we published some articles on Sponge City in newspaper or internet, then we held some price quiz events. To make everyone understand and support it, it needs some time.  **Public Awareness:** Old residential area retrofitting projects need to departure from the problems and existing situation, consider cost-benefit and respect to residents’ opinions. Citizens’ support is our driving force of Sponge City construction. We first need their support.  **Performance of Pilot Projects:** I think that the citizens care most the effect of Sponge City construction. Whether it can achieve expected functions. Whether it has negative influence on the urban function and urban life, e.g. transportation, green space construction, landscape planning and design. Whether Sponge City in the end can perform its effects depends on whether we can maintain it well.  **Maintenance Funding**  **National Policy (Local adaptation):** We construct Sponge City according to relevant requirements from the National ministries.  **Sponge City Construction Plan:** We generally follow the goals of Sponge City from that document (Guiding Opinions, 2015) to implement Sponge City construction, but aim at higher goals.  Sponge City construction has municipal-funded project and society-investment project. For society-investment project, we from planning level requires them some technical goals and indicators. If they do not implement, the project then does not meet the national regulations.For projects in new areas, we rely on making a good master plan, making good Sponge City plans and defining a clear construction indicator system.  **Sponge City Leader Office:** We specially established the organization to coordinate and promote construction. The Sponge City implementation in Xixian is smooth, thanks for the SC Leader Office and its organization structure.  **Local Leader’s Priority:** The top directors of Xixian’s bureaus are the leaders of Sponge City Leader Office. |
| Technical section  X2 | **Local Government Clear Leadership and Responsibility:** As a newly developing city, we are exploring a new governance structure, but it is not clear yet. The responsibilities of different departments are clear, but the problem is that some of the departments rely heavily on the Sponge City Leader Office, instead of learning the knowledge of Sponge City by themselves. It is a natural phenomenon, while local leader’s priority can solve this problem. The maintenance responsibility is still not clear.  **Academia Involvement**  **Public land and funding:** The national financial support helps us to get more money to build green city, which bring benefits of the city. National financial support can encourage the Sponge City construction.  **Staff and Time**  **Effective Market Incentives:** We need market to do the maintenance.  **Knowledge of SSM:** We achieve knowledge through national and international cases, education seminars and the Sponge City technical guidelines. The concept of Sponge City is ongoing and updated. The maintenance needs professional knowledge. We need more professionals of Sponge City. The engineering mind-set influences the construction of Sponge City, since some of the design still follow the traditional ways.  **National Legislative Support**  **National SSM Standards:** The stakeholders may not know how to maintain the Sponge City facilities, it needs the professional technical staff or company to maintain. It needs the maintain standards.  **Awareness of Benefits:** Awareness is very important. Only if people realized the benefits of the Sponge City, they will start to do it.  **Public Education:** Public education helps to increase the understanding of Sponge City concept.  **Public Opinion:**  **Performance of Pilot Projects:** We all know Sponge City is useful, however, the performance of the pilot projects will influence the public acceptance.  **Maintenance funding:** The maintenance is a big problem. It will influence the performance of the projects, but who are going to pay for the maintenance cost. It (maintenance funding) will be a big challenge for the Sponge City continuity. The functions of Sponge City facilities rely on the frequency of maintenance. Maintenance fee is a big challenge for Sponge City scaling up.  **National Policy (Local adaptation)**  **Sponge City Construction Plan:** We have put all the goals into our Sponge City construction plan.  **Sponge City Leader Office:** It is easy to put the goals in the plan, but the challenge is implementation. Sponge City Leader Office coordinates the relevant departments to implement Sponge City projects. Its responsibilities includes planning, designing, construction, inspection and publicity. The staff of the Sponge City Leader Office have more knowledge regarding Sponge City than those in a specific department.  **Local Leader’s Priority:** The leader (mayor or vice mayor) of the city works as the top leader of the Sponge City Leader Office. Local leader’s priority is important for the upscaling of Sponge City implementation. |
| Technical section  X3 | **Local Government Clear Leadership and Responsibility**  **Academia Involvement:** We cooperate with the universities. The researchers helps to provide technical knowledge of Sponge City.  **Public land and funding:** Financial is a problem for scaling up of Sponge City at a regional or city level. Currently, we have national financial support. During the city developing process, acquiring for land user-ship will influence the Sponge City implementation.  **Staff and Time**  **Effective Market Incentives**  **Knowledge of SSM:** We need more professionals in the scaling up of Sponge City construction.  **National Legislative Support:** We need national legislative support for getting the maintenance funding to ensure the scaling up of Sponge City construction (at a city level).  **National SSM Standards**  **Awareness of Benefits**  **Public Education**  **Public Opinion**  **Performance of Pilot Projects:**  **Maintenance funding:** Financial is a problem for scaling up of Sponge City at a regional or city level. Currently, we have national financial support, but the big challenge is maintenance costs. Collecting maintenance fee would be a solution.  **National Policy (Local adaptation):** Sponge City is a national level policy and the national will, which requires the local government to implement.  **Sponge City Construction Plan:** We put the goals into the city master plan and Sponge City construction plan.  **Sponge City Leader Office:** The implementation of Sponge City projects needs multi-departments cooperation, while the Sponge City Leader Office works as a coordinator.  **Local Leader’s Priority:** The top leader and the heads of different departments of Fengxi New City, Xi’xian New Area play the leading role in the Sponge City Leader Office. This organization shows great advantage in Sponge City implementation. |
| Project section  X4 | **Local Government Clear Leadership and Responsibility**  **Academia Involvement**  **Public land and funding:** If there are no national funding for Sponge City construction in the future, many stakeholders may not implement Sponge City by spending their own money. During the pilot period, national funding support can work. For scaling up at a city level, funding will be a big problem, and we need national level financial support.  **Staff and Time**  **Effective Market Incentives:** Currently, Sponge City construction is just a plan, it is not a business. There is no market yet. The profit of Sponge City construction is sustainability, however, who would like to pay for this. There are limited profits.  **Knowledge of SSM:** Sponge City is a new thing. We always organize seminars to learn the successful cases. For the staff of the relevant departments, the knowledge is not enough, and they do not realize the meaning or the great significance of Sponge City construction. We need continually learning the knowledge.  **National Legislative Support:** It is important that the requirement of Sponge City construction can be commanded from the national level. Currently, the awareness of environmental protection in China is not high, so national legislative support is important for getting construction and maintenance funding or collecting maintenance fee from the citizen. It is very difficult for the local government to force to construct Sponge City, since we need city economic development. Sponge City scaling up at a city level needs national legislative support.  **National SSM Standards:** These national documents are very important for me to understand Sponge City.  **Awareness of Benefits:** Sponge City is a new city development way aiming to protect the environment. People did not realize the significance of Sponge City construction.  **Public Education:** Public education is very important. We need to tell the public what we are doing to get their support.  **Public Awareness:** Increase public awareness is important. Increasing public awareness (regarding Sponge City) is better than national level forcing to do it. If the public can realize the benefits of it.  **Performance of Pilot Projects:** As pilot Sponge City, we need summarize governance strategies and technical guidance for the future city development. We need public education to show the outcome of Sponge City construction to increase their expectations regarding Sponge City.  **Maintenance funding:** The Sponge City facilities maintenance fee will increase comparing with the conventional management fee.Who are going to pay for the maintenance fee? It needs the national legislative support.  **National Policy (Local adaptation):** The national policy is doing its best by supporting funding, encouraging PPP projects. We need the national level force to implement Sponge City.  **Sponge City Construction Plan:** The plan has been made, and we have the mind that constructing Sponge City, so in the future, we can just follow the Sponge City construction plan.  **Sponge City Leader Office:** Sponge City construction includes multi-departments, and the Sponge City Leader Office coordinates these departments.  **Local Leader’s Priority:** The top leader of the Sponge City Leader Office is the vice mayor, and the heads of the different departments as vice leaders, otherwise, it will be very difficult to implement Sponge City projects. The leader as a coordinator decreased the barriers of Sponge City implementation. |
| Coordinate and publicity section  X5 | **Local Government Clear Leadership and Responsibility**  **Academia Involvement**  **Public land and funding:** We got national funding, and we have local funding and PPP. As a new city, it is very difficult for us to get the land to construct Sponge City. Acquiring the land user-ship decreased the Sponge City implementation speed.  **Staff and Time**  **Effective Market Incentives**  **Knowledge of SSM**  **National Legislative Support:** Legislative support is important for Sponge City scaling up at a city level.  **National SSM Standards**  **Awareness of Benefits:** For Sponge City construction, the local government needs to change its mind. The benefits of Sponge City have not been realized.  **Public Education:** Public education is important for the people to understand Sponge City.  **Public Awareness**  **Performance of Pilot Projects**  **Maintenance Funding**  **National Policy (Local adaptation):** It is a national policy.  **Sponge City Construction Plan:** All the detailed goals are put in the Sponge City construction plan, which systematically guided the Sponge City construction in Fengxi New city, Xi’xian New Area.  **Sponge City Leader Office:** The Sponge City Leader Office coordinate all the Sponge City relevant activities, e.g., supporting technical knowledge.  **Local Leader’s Priority:** The top leader of Fengxi New city, Xi’xian New Area is the leader of Sponge City Leader Office, which helps to tear down the barriers in coordinating different departments. |
| Construction company  X6 | **Local Government Clear Leadership and Responsibility**  **Academia Involvement:** We need the academia institutes to calculate the stormwater models, data, etc. However, in China, the research institutes or universities has on rights to join the construction of Sponge City. The companies have rights to construct the projects, but we do not have the knowledge or data to provide suitable stormwater management models.  **Public land and funding**: There is a less of contentious in the Chinese government. If the leader changes, the policies will change. Therefore, the funding for Sponge City construction in the future maybe a problem.  **Staff and Time**  **Effective Market Incentives**  **Knowledge of SSM:** “Sponge City do not need maintenance, it is all based on soils and plants” (Showing lack of knowledge of SSM)  **National Legislative Support**  **National SSM Standards:** We need some standards suitable for northwest China. Currently, the stormwater management data are based on southern China. We need standards to conduct the Sponge City construction, which reduce the unnecessary coordination or discussion with the local government.  **Awareness of Benefits:** The benefits of Sponge City construction has not be realized yet. Currently, Xi’xian New Area, the benefits and advantages of Sponge City have not been shown up.  **Public Education**  **Public awareness:** The citizens are only participants, it is normal if they do not care about the Sponge City initiative.  **Performance of Pilot Projects**  **Maintenance Funding**  **National Policy (Local adaptation):** The local governments of the pilot Sponge Cities have to do their best, since it is the national policy.  **Sponge City Construction Plan**  **Sponge City Leader Office**  **Local Leader’s Priority** |
| **Zhenjiang** | **Governance factors and representative quotations** |
| Techinicsl section  Z1 | **Local Government Clear Leadership and Responsibility:** Multi-departmental communication and collaboration is very important for the implementation of projects.  **Academia Involvement:** Researchers play a key role in the construction of Sponge Cities. Sponge city construction is a systematic project. It needs a strong theoretical support. Some scholars and experts have conducted relevant research. If they can sit down with the people, and answer their questions, it would be beneficial and helpful to the whole project. They propose some new technical ideas, which will influence the Sponge City implementation.  **Public land and funding:** The old communities need parking space.  **Staff and Time**  **Effective Market Incentives:** The construction and maintenance is based on PPP company, and the local government purchases the PPP company maintenance service.  **Knowledge of SSM:** Personally, my understanding of Sponge City is not deep enough. I achieve the knowledge by reading some relevant literatures. The construction quality is a problem occurred during the construction process because the construction personnel have deviations from the understanding of the plans. The Sponge City is different from the conventional (stormwater management). We organized relevant training.  **National Legislative Support**  **National SSM Standards:** From the engineering point of view, Sponge City is a relatively new thing. It may be more useful to have the relevant construction or design standards at the national level.  **Awareness of Benefits**  **Public Education**  **Public Awareness:** It is necessary to do a good job or propaganda work, so that the public can understand what we did and what we plan to solve. We published our plan and listen to the public opinions. If most of the people are satisfied with the plan, we can practice it.  **Performance of Pilot Projects**  **Maintenance Funding**  **National Policy (Local adaptation):**  **Sponge City Construction Plan:** The Sponge City implementation should be based on the top-level design (Sponge City Construction Plan), which needs the support from researchers.  **Sponge City Leader Office:** The mayor of the city as the leader of Sponge City Leader Office.  **Local Leader’s Priority:** The local government leaders pay great attention to Sponge City implementation, so the communication between multiple departments is relatively smooth. |
| Insepction section  Z2 | **Local Government Clear Leadership and Responsibility:** If there is no norms, assessment will definitely not possible. The most important thing for multi-departments cooperation is that there are laws and regulations, and everyone follows a common rule.  **Academia Involvement:** We have professional experts and design institutes to support us, but implementation (of Sponge City) needs time.  **Public land and funding:** The land user-ship acquiring decreases the Sponge City implementation speed.  **Staff and Time**  **Effective Market Incentives**  **Knowledge of SSM**  **National Legislative Support**  **National SSM Standards:** National SSM standards are important for the inspection of Sponge City implementation.  **Awareness of Benefits**  **Public Education**  **Public Awareness:** Before the retrofitting of the neighborhoods, the public's opinions were sought.  **Performance of Pilot Projects**  **Maintenance Funding:** Some problems regarding maintenance may arise next year. A long term maintenance team may be needed.  **National Policy (Local adaptation):** Currently some projects do not follow the time series, then they will have to work hard in the following time, since this (the Sponge City) must be completed. Next year, the Ministry of Housing and Urban Rural Development will check and evaluated the implementation. This is important for each of the relevant departments.  **Sponge City Construction Plan:** We have a plan to cover 80% of the built-up area by 2030. It is a long-term plan, and all functions will be constructed according to the standards.  **Sponge City Leader Office:** It is necessary to have a good management organization, e.g., Sponge City Leader Office, which is responsible for setting the mission and the schedules of project implementation by coordinating the Engineering, Inspection, Finance divisions, etc.,.  **Local Leader Priority:** The local government paid great attention to this work. If there is no attention from the local government, it is definitely more difficult to lead this coordinating work as a certain department. In Zhenjiang, the vice mayor from the municipality is in charge of the coordination. |
| Project section  Z3 | **Local Government Clear Leadership and Responsibility**  **Academia Involvement**  **Public land and funding:** The cost is larger when retrofitting e.g., rain gardens in the old communities and existing roads. The government should pay the bill for implementation and maintenance. In the old communities, the people need parking space.  **Staff and Time**  **Effective Market Incentives:** Sponge City construction can be combined with the renovation or re-developed of the shanty towns or urban villages, thus the government does not need to spend money for Sponge City facilities. For example, the promotion of green roofs, if green roof is counted as the green space, developers may be very active in Sponge City construction. It should be based on market.  **Knowledge of SSM**  **National Legislative Support:** Zhenjiang has now introduced a Sponge City management method, but it is at the local government level. If it is the national level law, it may be different, but it may require a process.  **National SSM Standards:** Conventionally, the tree pool on the road is higher than the sidewalk. When I ask why, he (the practitioner) said that nothing, just a habit. Therefore, it is necessary to strengthen publicity and technical standards.  **Awareness of Benefits**  **Public Education:** After two or three years’ publicity, the public start to accept it, but still more work are needed on public education.  **Public awareness:** When we made the plan, we inquired the opinions of the residents, based on their opinions, we modified the plan and then started the construction.  **Performance of Pilot Projects**  **Maintenance Funding:** The cost is larger when retrofitting e.g., rain gardens in the old communities and existing roads. The government should pay the bill for implementation and maintenance.  **National Policy (Local adaptation):** We follow the national documents, and the implementation opinions from the province. However, how to meet the requirements, there are no such normative documents; The city ​​has to decide by itself.  **Sponge City Construction Plan**  **Sponge City Leader Office:** There should be a permanent institution to do this in the future, and it should be a long-term management organization. Otherwise, there will be no inspection organization to make sure the implementation of Sponge City.  **Local Leader Priority:** No matter it is one unit or one city, as long as the leaders pay attention to it (Sponge City implementation), it will be easier to act. |
| Coordinate and publicity section  Z4 | **Local Government Clear Leadership and Responsibility:** Our responsibility is daily management, e.g., meeting documents, publicity. Each department is divided by function and the responsibilities are relatively clear.  **Academia Involvement**  **Public land and funding**  **Staff and Time**  **Effective Market Incentives**  **Knowledge of SSM:** Sponge City is a new thing. Its professionalism is very strong. Everyone has to learn, through e.g., internal working meetings, and communicated with experts.  **National Legislative Support:** It (Sponge City implementation) requires authoritative legal provisions to guarantee the finances. Policy support at the national level is a kind of legislative support, and also set clear responsibilities and requirements for the local governments.  **National SSM Standards:** There is no authoritative standards. There will be no problem in implementation, inspection, systematic assessment and maintenance based on the technical standards.  **Awareness of Benefits**  **Public Education:** The Sponge City facilities are in front of their houses. The function of the facilities needs to be maintained by everyone. It cannot be covered by professional maintenance alone. The protection of citizens can help to improve the efficiency of the professional maintenance. Forming a sense of protection can avoid a lot of troubles for professional maintenance. It is important to provide knowledge of Sponge City in the community. (The maintenance of Sponge City facilities) can become a daily norm through the community management.  **Public Awareness:** The understanding of Sponge City (of the residents in the old neighborhoods) is not enough. After (they) understand it, there will be no resistance. The public is a beneficiary, and also should be a participant, or a co-constructor. The government can play a leading role, but it still needs the public realizing the significance Sponge City construction. Their understanding can be viewed as a good way of participation. Meanwhile, if they can help us to do some propaganda, it is also a kind of participation. The residents in the neighborhoods can be engaged in the maintenance of Sponge City facilities.  **Performance of Pilot Projects**  **Maintenance Funding**  **National Policy (Local adaptation):** Sponge City construction is a long term strategic, both from a national and local level.  **Sponge City Construction Plan:** The Sponge City Construction Plan is actually a concrete plan for the construction of a Sponge City.  **Sponge City Leader Office:** The Sponge City Leader Office always controls the direction of the Sponge City implementation in terms of its design, plan, and construction. Many of the requirements for investment and construction have been put into the planning conditions, that is, to solve the problem at its source. If there is no planning in advance, it would be very difficult now. Early intervention by the Sponge City Leader Office is a constraint for the construction company, which helps to reduce the reconstruction of the projects.  **Local Leader Priority:** The local leader’s priority is important for the construction of Sponge Cities. |
| PPP Company  Z5 | **Local Government Clear Leadership and Responsibility**  **Academia Involvement**  **Public land and funding**  **Staff and Time**  **Effective Market Incentives:** The next step for us is to negotiate with the local government to determine the profits mechanism. Guanda Company provides social capital. After three years of construction, we have to transfer to maintenance, which is the most important thing. The local government should pay for our services.  **Knowledge of SSM:** In fact, for China, PPP and Sponge City are new topics. Up until now, there is no specific definition of Sponge City from the central government. How to build the Sponge City facilities has not yet formed a consensus. It is a process of exploration and gradually learning. It also needs professional technical tools to maintain the Sponge City facilities.  **National Legislative Support:** Sponge City is a new thing, and the pilot period has not yet been completed. It is certainly not realistic to form some legal restrictions on the Sponge City alone.  **National SSM Standards:** We worked on our own standards for construction. To have a national promotion of Sponge City, it is important that the Ministry of Housing and Urban Rural Development promote the Sponge city standards, and having a national standard of Sponge City. We feel unsure if the construction fulfill the national standards, and no one can provide a clear answer.  **Awareness of Benefits:** Even a small project, more than 400 procedures are needed. Communication with the local government departments is difficult, after all, their understanding of the Sponge City is limited.  **Public Education**  **Public Opinion:** The cognition of the residents in the old communities is not high, and there are many difficulties in the construction period. The high level of awareness of the people is beneficial to our construction and maintenance.  **Performance of Pilot Projects**  **Maintenance Funding**  **National Policy (Local adaptation)**  **Sponge City Construction Plan**  **Sponge City Leader Office:** In the local government, each department has different responsibilities. The advantage of Zhenjiang is the Sponge City Leader Office.  **Local Leader Priority** |