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FROM POST-INDUSTRIAL WASTELAND TO ECO SUCCESS: THE INNOVATIVE RENEWAL OF HAMMARBY SJÖSTAD

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Abstract

This paper appraises the development of Hammarby Sjöstad, an eco-district located in the south of Stockholm. As a refusal of the previous unsustainable development, Hammarby Sjöstad is now well known for being built to the highest environmental standards. Since the 1990s, the area has been re-developed into a sustainable and innovative district, with mixed-use space and a low environmental impact. The main goal was to create a residential neighbourhood based on sustainable resource usage, simultaneously minimising energy consumption and waste production, while maximising resource saving and recycling. Hammarby therefore promotes efficient environmental management, with low-carbon development, renewable energy and well-integrated public transportation. It also strongly supports climate change reduction and a sustainable energy future by promoting energy efficiency and renewable energy. The building process has adopted an innovative sustainability technology, maximizing light and enhancing the views of water and green spaces. Likewise, the city has given great emphasis to sustainable and long-lasting materials such as wood, glass, steel and stone, showing the application of the modern architectural program that Hammarby promotes. The case study also reveals the powerful role of strong public sector leadership in ensuring high quality development. In fact, the project was based and delivered through a process of state-led consensus integration between all parties and at all levels. A major result of this successful integrated planning approach is the Hammarby Model, which deals with energy, fresh water and waste.

1_Introduction

Hammarby Sjöstad is an eco-district located in the south of Stockholm and developed around Hammarby Sjö Lake. In the 1990s it was a large industrial harbour with a negative reputation as a polluted and unsafe area. Since then, the area has been re-developed from a disused industrial brownfield into a sustainable and innovative district, with mixed-use space and a low environmental impact. Today, it is one of Stockholm's nicest residential districts and internationally it is held to be one of the most successful urban renewal districts; in 2010 the project helped Stockholm win the European Green Capital award (Notaras 2010) and an average of twelve international study visits take place every week to the GlashusEtt information centre in Hammarby Sjöstad (Rutherford 2013: 1).

This paper will first outline the project's conception, design and implementation and then explain why it is considered so successful, including its use of sustainable and long-lasting materials. Finally, it will focus on a number of factors that characterise the project, such as the interrelationship of its solutions, which could provide useful lessons for other similar projects in the future, including recent data on energy performance. For its evaluation of the quality and performance of the sustainability improvements the paper will draw on and discuss data that is widely available, also in the light of critical studies (Vestbro 2005, Adams et al. 2010, Pandis Iveroth & Brandt 2011, Rutherford 2013, Jernberg et al. 2015).

2_Strategic master plan, design and implementation

A strategic master plan for Hammarby was elaborated in 1994 by Jan Inge-Hagström, as part of Stockholm's proposal for the Olympic games in 2004. Later, Stockholm lost the Olympic opportunity, but the Stockholm City Planning Bureau nevertheless decided to develop the Hammarby site as a mixed-use urban area with a major focus on energy efficiency and sustainable development. Initially conceived in the 1990s, the first elements were completed in 2000. The project began with the delineation of the strategic master plan, divided into twelve sub-districts, and has been implemented as a series of development phases (fifteen in total). The implementation and control of the project has been helped by the City owning and acquiring most of the land in the area. A parallel sketch process was adopted for the preparation of a detailed plan for each sub-district. In order to test the master plan and prepare more detailed proposals for the sub-districts, the City involved many architects and planners. The City of Stockholm then evaluated the sketches and chose the best features to arrive at an agreed detailed master plan (CABE 2011).

As mentioned, the project has fifteen phases and a rapid build out process (approximately 600-700 units per year). Phasing has been efficiently managed so that the development is continuous and there are no large and obvious gaps in the middle of the urban form. Apart from the flats on the north shore, Hammarby's development has started from the core (Sickla Udde) and spread outwards. The implementation of the project has been achieved in a number of different ways, such as applying the strategic master plan for the entire neighbourhood, in order to guarantee the overall character of the plan to be implemented into practice, and detailed design codes for specific sub-neighbourhoods, encouraging an engagement process with the developers.

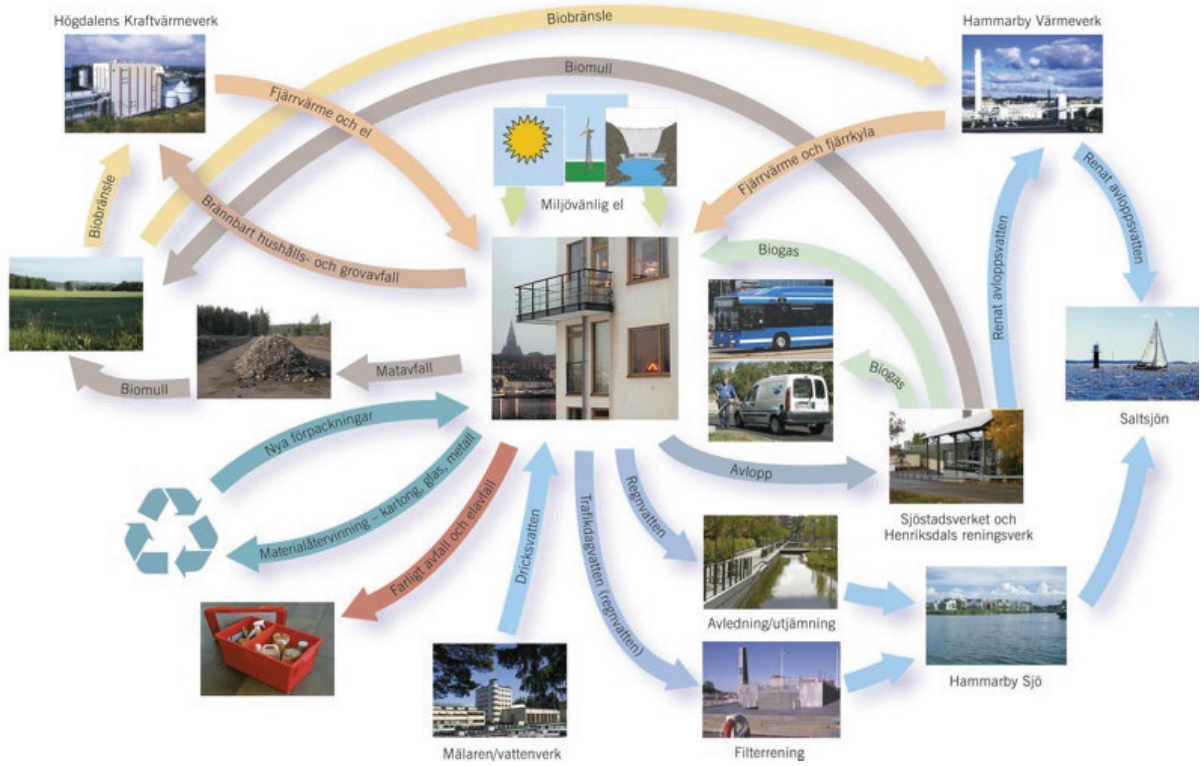

Figure 1. The Hammarby Model (source: Lena Wettrén, Bumling AB).

The building process has been strictly regulated and the codes which emerged from the detailed plans have been widely supported. However, both the master plan and the design codes have been "critical in translating the strategic vision to a local scale" (Adams et al. 2010: 116). Therefore, a two-stage process of detailed plans and quality programmes was adopted by the City Council. In particular, the detailed plans, made for the smaller details of the project, were based upon consultation between the City Council, the developers and the architects. After applying the detailed plans and guaranteeing the outcome of the building designs, quality programmes were also applied. These programmes, similar to the design codes, show a detailed specification of how each building must appear (Adams et al. 2010: 116).
The innovative parallel sketches process has been carried out to design the sub-neighbourhoods and a coherent design theme applied both to public buildings (e.g. the church) and to private development. As established by the master plan, the aim is to ensure both diversity and unity throughout the neighbourhood. Moreover, the project management has been helped by the collaboration between the various developers, the highly skilled team within the City of Stockholm, the robust environmental sustainability aspiration and land use policy. One of the most "striking features is the similarity between the master plan on paper, the aspirations it embodies and the physical environment as it has been developed" (CABE 2011) to ensure a neighbourhood with mixed-use space.

3_Strong local authority leadership and high stakeholder engagement

Since the beginning of the project, Hammarby Sjöstad has incorporated integrated urban planning into its design and implementation (Loftus 2011: 3) and the Hammarby design and decision model is well known for the strong local authority leadership during every stage of the master plan. Indeed, the Hammarby Sjöstad case study shows the powerful role of public sector leadership in ensuring high quality development, since the project was based and delivered through a process of state-led consensus integration between all parties and at all levels. The City Planning Bureau has collaborated with private sector architects, planners and urban designers, while the Stockholm City Council has had a leading role in engaging a large number of private and public sector actors, including 41 developers and 29 architectural practices. This process has led to a rapid and integrated development of the area with a robust local economy and high property values.
Moreover, Hammarby shows a high level of stakeholder engagement (e.g. private developers, architects, public sector stakeholders and residents) and numerous meetings have been organised throughout the project. The planning process has been successful and well integrated, with all of the different actors closely engaged since the beginning. Therefore, there has been great emphasis on the importance of collaboration between the various actors, each having responsibility for different segments of the project. This collaboration has led to 'new' ways of working or doing (Rutherford 2013: 13), involving partnerships and collaborations between different (public and

private) stakeholders. In particular, the City of Stockholm acted as land developer, promoting physical and social infrastructure (e.g. the tram extension), whereas the developers delivered apartments and commercial spaces, fulfilling the requirements of the specific design codes. The water, waste and energy actors (companies) worked together to produce the Hammarby Model (see figure 1) (Energy Cities 2008), aiming to put in place or to sustain existing pragmatic solutions for interlinking their respective infrastructures and flows (Rutherford 2013: 13).

Public interest has been supported by the Swedish democratic and transparent decision-making process and extensive forms of public participation and consultation were undertaken throughout the whole planning process. Further support was given by the nearby neighbourhoods, because the development of waterside paths and bike tracks along both sides of Hammarby Sjö potentially benefits residents in Södermalm. Paradoxically, public engagement and further modification and refinement of the design codes has become much harder now that the majority of the development is complete (Adams et al. 2010: 116).

4_From post-industrial wasteland to eco-success

4.1_Industrial wasteland

In the 1800s, the neighbourhood was a popular excursion destination for the inhabitants of southern Stockholm. The area was partially destroyed when the Hammarbyleden highway was built, and the seabed filled in with excavated soil, rocks and refuse as part of the planned port area (Fränne 2007: 6). A canal was built in the early 20th century to connect Hammarby Sjö Lake to the Baltic Sea, facilitating industrial development in the area. Rail lines were also built to enhance heavy industry such as the General Motors automotive factory and the Luma cooperative light bulb factory (Vestbro 2005). Over the years, light industry also located in this area, "activities of a type for which the City always has great difficulty planning" (Dastur 2005: 60). So after the early 1900s the site was mostly occupied by low value industrial buildings, storage depots, scrap yards and car breakers, and the constant threats of demolition show that the buildings in the area were of a temporary nature. In fact, no single company or industry established itself in the area and a "shantytown began to grow up, and the area eventually became a small-scale industrial area" (Fränne 2007: 7).

In the development of the area only one building of cultural value has been identified and preserved: the early modernist Luma bulb factory, today used as a conference centre (Vestbro 2007: 9).

By the 1990s Hammarby Sjöstad was widely regarded as an unhealthy and dangerous area, a haven for illegal activities and the consensual opinion was "it couldn't be worse" (Adams et al. 2010: 116). Since the area was previously an industrial area, there were no pre-existing suitable public spaces, and because of its unsustainable and hazardous land and environment, as well as unregulated growth, the place had become undesirable for anyone to live in. Therefore, there was a general positive greeting for the redevelopment of Hammarby.

4.2_Modification of the urban structure

In the 1990s redevelopment proposals and plans were drafted. The removal of the various informal and illegal enterprises was possible because the City of Stockholm owned and acquired most of the land. While government officials "raised the threat of expropriation, they ended up compensating many business owners at rates far above market value to avoid lengthy appeals" (Gordan & Sigrist 2013). The decision to remove industry from the area was driven by a rising demand for a sustainable and ecological development of the neighbourhood. Indeed, Hammarby was one of the main locations for the government's 'build the city inwards' strategy (Poldermans 2005: 11) and a response to the suburban housing construction process during the 1960s and 1970s, commonly known as the 'million homes program' (Gordan & Sigrist 2013).

As a refusal of the previous unsustainable development, the main goal of Hammarby Sjöstad was to create a residential neighbourhood built to the highest environmental standards, thus a neighbourhood based on sustainable resource usage, where energy consumption and waste production are minimised, and resource saving and recycling are simultaneously maximised. As Hammarby is built on former industrial land, extensive decontamination was another essential and expensive main requirement.

4.3_Eco success

Today, Hammarby is a modern, semi-open, block-based neighbourhood. The inner street dimensions, block sizes, building height, density mix are integrated with the waterfront views and the green parks. Even though located outside the inner city, the design of the buildings is urban and follows the Stockholm City standards of street width (18m), block sizes (70x100m), density and land use (Gaffney et al. 2007: 50). The scale of development varies from four to five storey buildings along the Sickla Canal to six to eight storey buildings along the main corridors (CABE 2011). Some specific construction features of the Hammarby project are especially worth pointing out: along both sides of the Hammarby Seaway (Hammarbyleden) the buildings facing the water are tall and built in a classic inner city style, integrated with the large-scale quay facilities and open water areas; along the avenue (Sickla Kaj), large-scale, multi-functional buildings have been built, together with small-scale backstreet and courtyard houses between the dock and the new park walkway (Sjöstadsparterren); the setting along the canals (Sickla Udde and Sickla Kanal) is more intimate and small-scale, and buildings gradually develop towards the natural shorelines and beaches; Hammarby Gård has dense, urban milieus around a park area and a pool; Lugnet, on the shores of Hammarby Sjö, has a waterfront terrace (Lugnets Terrass) and a special building in the form of a latticed cube, double the height of those that surround it; Henriksdalshamnen harbour, among the last of the planned areas in Hammarby Sjöstad, has a large numbers of quays to create a harbour with space for restaurants and small boats. The majority of the apartments are privately owned or for rent and the percentage of those available for social housing is slightly lower than the Swedish national average of 20%.

The building process has adopted both the traditional city structure of Stockholm and an innovative sustainability technology, maximizing light and

enhancing the views of water and green spaces (CABE 2011). Moreover, the City has placed great emphasis on the use of durable and sustainable materials such as glass, wood, steel and stone, showing the application of the modern architectural program that Hammarby promotes. The buildings have limited building depths, large balconies and terraces (which to look out onto the streets, waterfront walkways and open spaces), big windows, flat roofs and light colours on water-facing façades. Many of the apartments have a semi-open block form, thus providing open access to the courtyards of the residential blocks (CABE 2011).

The main backbone of the district is the 37.5m wide boulevard and transport corridor, which connects key transport nodes and public focal points, creating a centre for activity and commerce (e.g. shops, cafés, restaurants, supermarkets). Additional opportunities for commercial uses, are also provided through the two-storey pavilions along the Sickla Canal (CABE 2011).

4.4_Infrastructure integration and public spaces

Hammarby is very well integrated with the nearby neighbourhoods. The expansion of Hammarby coincides with the development of the area's municipal and commercial services, and with the increased investment in public transport. Much of the public infrastructure was put in place early on, such as the Hammarby Allé and its tramway, which links with Stockholm's T-Bana and ensures the development is well connected to the rest of the city, in direct contrast to Hammarby's previous status as a "somewhat ill-connected backwater" (Adams et al. 2010: 62). The public investment in land decontamination and transport infrastructure generated consequent private commitment. Indeed, "costs were recovered from sales of development parcels, so the municipality achieved a financial return as well as delivering an attractive new part of the city" (Adams & Tiesdell. 2013: 241).

Today, a network of various green spaces, squares and walkways runs through the district, providing public space for outdoor activities. All public spaces are owned and managed by the City of Stockholm. The aim for the development is to provide 25 square meters of public green space per apartment unit, for a total of 300,000 square meters in the district. The development has also the goal to provide 15 square meters of private courtyard space per apartment unit (Foletta 2011: 35). Attractive forms of public transport are also offered, such as the light rail link, boat traffic and access to a carpool (Fränne 2007: 9), highlighting the successful integration with the surrounding areas.

"I think it has been very successful, especially along the main road. There are lots of shops and restaurants and it is a location for good urban life and good public life. I also think there is a good mixture between the public parts (i.e. the parks) and the more private aspects (i.e. the courtyards)." Louise Heimler, Stockholm City Planning Bureau, cited in Adams et al. (2010: 118).

5_Achievements and lessons to be learned

Since the very beginning of the project, Hammarby Sjöstad has tried to achieve very ambitious environmental goals. This can be seen though the holistic Hammarby Model, an innovative closed loop system which allows waste, water and energy to integrate into each other. This approach also tries

to better integrate the transportation system and technologies for water and energy into the existing urban infrastructure. In 2015, approximately 80% of the total energy use in Hammarby Sjöstad was renewable.

Even though the project is not yet finished, it has been the object of scrutiny and evaluation, as for example in Jernberg et al.'s study (2015). According to them (Jernberg et al. 2015: 73-74) the following overall goals have been achieved: all contaminated soils have been sanitized (soil remediation goal); 100% of all development land has been adapted to the district (land use goal); most of the commuters walk, cycle or use public transport (transport goal); the goal to purify water is almost achieved and 90% of the local waste collection traffic has been eliminated (water and waste goal); the energy goal is not yet fully achieved, but the average of 118kWh/m² energy consumption is still better than 150kWh/m² as a benchmark for construction at the time (energy goal) and the overall consumption is still lower than the average in Stockholm. In particular, the district's integrated system is alimented with approximately 50% of energy produced from renewable sources, including waste, and most of the building materials used in the construction, such as wood, glass, steel and stone, are either fully recyclable or could be recycled. The comprehensive planning of land use, transportation, and the eco-cycle has made it possible for every building to achieve a high level of environmental performance. So that, even though the energy consumption of buildings has still not reached the original goal, the project meets high environmental standards in comparison with similar international developments.

It is important to remember that one of the overarching aims of the project was to create an environmentally-friendly behaviour among the residents also through the design of the development's infrastructure. Surveys from 2007 declare that 79% of the all commuters walk, cycle, or use public transport. For Hammarby, it is often cited that 75% of pro-environmental behaviour comes from the design. The remaining 25% is achieved through raising awareness and educational projects targeted at all the key stakeholders. Individuals are also financially incentivized to reduce their environmental impact by being billed for their utilities in proportion to their usage (Jernberg et al. 2015: 13). Moreover, while the initiation of an ambitious Environmental Programme for the project appears to have benefited from the presence of a left-green majority in Stockholm of the mid 1990s, the fact that it was not abandoned by the subsequent right-wing majority (1998-2002) shows that it developed bipartisan support or could be aligned to quite different political goals and frameworks (Rutherford 2013: 14). For Jernberg et al (2015: 108) the major lessons to learn from the experience of the Hammarby Sjöstad's project include the following: that sustainable urban development requires a holistic approach; the importance of prioritizing the densifying of areas that are adjacent to the city, even if these are brownfields; that various departments from the government, the private sector, and academia must all be deeply involved in the planning process. To these we can add some other factors that typify the Hammarby Project, such as its emphasis on strong leadership alongside high stakeholder involvement, and on the interrelationship of solutions, as well as its focus not just on low carbon emissions but also on green areas to enhance biodiversity and also the residents' sense of wellbeing.

These factors can sometimes prove difficult to reconcile. Poldermans (2005: 24-5, 28) observes that while the large size of many windows facing the lake, providing nice views on the natural surroundings, is often appreciated and desired by the inhabitants, large windows do not fit into the strategy to reduce energy use in an environmentally sustainable housing project. Indeed, they can cause unnecessary heat loss in winter and in summer temperatures can reach high levels because of poor air circulation in some of the buildings. This reservation is in line with the comment by Rutherford (2013), following Pandis Iveroth & Brandt (2011), who notes that some of the strengths of the Hammarby project's visions are also its weaknesses. For example, "As a result of the holistic view, system based technical solutions were prioritized, but at the same time system technologies were not easy to join up with new environmental technology; such as solar cells, sun panels, fuel cells and other new technology" (2013: 12).

To conclude, there is no doubt that Hammarby Sjöstad serves as an important international showcase of the City of Stockholm's successful implementation of its eco goals. Moreover, it would also seem that the City is making good use of the lessons learned at Hammarby in its current development of the Norra Djurgårdsstaden (Royal Seaport) project to the north east of the city centre.

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