Achieving the social impact of science: An analysis of public press debate on urban development

Abstract

Aligning itself with the interactive perspectives in research on science's social impact, this article combines the concept of productive interactions with the method of framing. We argue that this provides a more nuanced picture of the productive interactions between researchers and stakeholders in the social sciences. This approach offers a way to address changes in human valuation and meaning-making in politically controversial issues where social impact is acquired through complicated processes of public press discussion over long periods of time. The social impact of research is demonstrated with reference to the debate between researchers and societal stakeholders about urban segregation in Helsinki, Finland. The case shows how researchers challenged the established housing policy and opened room for alteration of the public understanding of urban development and segregation. The article illustrates how productive interactions, strengthened with the notion of framing, support the achievement of the social impact of science.

Introduction

Science is traditionally regarded as a central knowledge-producing institution contributing to economic and societal development in many ways. Earlier, in the age of

the so-called traditional social contract of science (Martin 2003; 2011), this was seen as materializing automatically without any deliberate attempts to achieve societal impact by means of research. With the advent of a broad structural movement towards intermingling the institutional spheres of science, government, industry, and civil society (Kleinman and Vallas 2006), the traditional social contract of science is giving way to an alternative conception according to which the boundaries of science are becoming porous such that science and society now invade each other's domains (Gibbons 1999: C81–82).

The fact that science is becoming "contextualized" and knowledge "socially robust" (Nowotny et al. 2001) has implications for research policies: the linear process of achieving social impact in science is giving way to interactive approaches. Instead of science as the fountain of new knowledge, unproblematically flowing from universities to society, interactive models acknowledge that societal actors external to science are increasingly important in science's societal impact. Herein, we summarize the current research on the topic, and suggest a route forward with the help of the concepts of productive interactions (Spaapen and van Drooge 2011) and framing (Goffman 1974). This approach is then illustrated with reference to the debate between researchers and societal stakeholders about urban segregation in Helsinki, Finland. We begin with the linear and interactive models of science's social impact.

From an outcome-oriented to a process-oriented approach in understanding the social impact of science

Analysis of science's societal impact has traditionally addressed economic growth and productivity with the focus on indicators designed to track the societal benefits of

investments made in science and technology (Kearnes and Wienroth 2011). Typically, these approaches focus on transactions taking place via formal technology transfer instruments (Olmos-Peñuela et al. 2014), such as patents and licensing, and assume linear modes of innovation starting from investments in science and ending with commercialized technologies (Godin 2006). One example is Everett Rogers's (1995) innovation-diffusion model, which involves relatively straightforward causality from research inputs to outputs via various kinds of activities and communication channels.

Although useful, these models have been criticized as too simple (Godin and Dorè 2005; de Jong et al. 2013; Bornmann 2013). Nieminen and Hyytinen (2015), for instance, claim there is a need for new sorts of frameworks that would take into account the increased interconnectivity and complexity of the present socio-technical world, thereby overcoming the simplified reality of linear models. Other researchers have criticized the economic emphasis of the majority of linear models and highlighted the need to adopt altered approaches which better account for the non-economic effects of research (Molas-Gallart et al. 2002; Bornmann 2013; Jacobsson et al. 2014). The idea about achieving societal impact in terms of linear, one-way transmission of research results from scientists to knowledge users is thus giving way to process-oriented approaches that emphasize mutual interaction between researchers and stakeholders.

The interactive approach has taken multiple forms in different fields of research. In science studies, knowledge production has been conceptualized as an iterative process of co-production that constitutes social order in science and society (Jasanoff 2004). In science communication, knowledge transfer, embedded in the concept of the public understanding of science, has given way to complex approaches, such as public engagement in science (Irwin 2015) and critical understanding of science in public

(Broks 2006). In innovation studies, linear models of science push and market pull (Rothwell 1994) have been replaced by systemic perspectives that conceptualize innovation in terms of complex, dynamic relationships between heterogeneous societal elements, such as actors, technologies and policies, that interactively evolve into durable socio-technical regimes (Nieminen and Hyytinen 2015). Finally, in research evaluation, emphasis is shifting from the linear concept of impact (Martin 2011: 250) to contextual and processual views (Meagher et al. 2008; Upton et al. 2014; Penfield et al. 2014; Morton 2015) that emphasize science's situated and negotiated character within local social contexts (Haywood and Besley 2014) occupied by heterogeneous groups of stakeholders with dissimilar interests, knowledge, and capabilities (Michael 2009). The question is no longer about the transfer of knowledge to society, but about various ways societal actors become engaged in the interpretation and creation of new understandings on the basis of science (Spaapen and van Drooge 2011; Irwin 2015), a topic inadequately understood in current research literature (de Jong et al. 2014; Irwin 2015).

Interactive models thus involve more equal, collaborative and responsive communication between academics and societal actors, and increased levels of transparency and negotiation across the blurred border between science and society (Haywood and Besley 2014). The concept of productive interactions, developed in research evaluation literature (Spaapen and van Drooge 2011; Molas-Gallart and Tang 2011; de Jong et al. 2013), is designed to achieve precisely this. It seeks to shift the focus from linear input–output relationships and mechanistic feedback loops to processes in which impacts are practically created at the interface of institutional and organizational boundaries. According to Spaapen and van Drooge (2011: 212), productive interactions can therefore be defined as "exchanges between researchers and

stakeholders in which knowledge is produced and valued that is both scientifically robust and socially relevant". Further, the interaction is productive if "it leads to efforts by stakeholders to somehow use or apply research results". Productive interactions are thus preconditions of the societal impact of science or, as the authors say, "intermediate indications of *de facto* social impact" (Spaapen and van Drooge 2011: 216).

Although the idea of productive interactions is useful in articulating the social and interactional basis of science's impact, it has limited value in providing a deeper understanding of the process of meaning-making that affects how impacts are produced in society, especially in the social sciences. We also note that in politically controversial issues, societal impact is often acquired through complicated processes where values and contextually robust knowledge are subject to the continuous interpretation, evaluation and transformation that takes place over extended periods of time in open arenas, such as the public press. Thus, to open up the black box of achieving social impact of science, we use the concept of framing, which allows us to conceptualize the processual unfolding of the public perception of scientific research in the public forum of a major Finnish newspaper.

As defined by Goffman (1974: 21), a frame refers to "schemata of interpretation" that allow its users "to locate, perceive, identify, and label a seemingly infinite number of concrete occurrences" in their life and the world at large. Although literature on frame analysis offers multiple definitions and uses of the concept (Fisher 1997), the basic referent remains: a frame "refers to interpretative schemata that simplify and condense the 'world out there' by selectively punctuating and encoding objects, situations, events, experiences, and sequences of actions within one's present or past environment" (Snow and Benford 1992: 136–137). Framing is thus cognitive and social

"processing of events, objects and situations so as to arrive at an interpretation of their meaning" (Johnston 1995: 218). With the help of framing, actors are able to interconnect numerous distinct experiences and occurrences so that they provide a meaningful basis for their comprehension (Snow and Benford 1992: 137–138). Frames can thus be considered "mental orientations that organize perception", or "schemata", for the interpretative work of making sense of issues and situations (Johnston 1995: 217).

Framing, we argue, is a key social process, which helps in understanding the ways in which productive interactions between researchers and stakeholders take place especially in the social sciences, where usually no tangible results are transferred from science to society. For us, this methodological device allows us to open up the black box of long-term social interpretation implicitly postulated but left largely untheorized in the concept of productive interactions. The concept of interpretative framing helps us to capture the diverse meanings and values various societal stakeholders attach to research results during productive interactions. The analytical use of frames facilitates our understanding about the assignment of meaning to otherwise insignificant results, an activity which eventually opens up an avenue for the societal impact of science to emerge. For us, the concept of productive interactions refers to the process of interaction, whereas the concept of a frame helps us to cast light on the interpretative content of meanings attached to the research results in particular phases and contexts of that interaction.

To advance understanding of productive interactions in terms of framing, the current paper draws from the debate on urban development and segregation in the Helsinki, Finland area. We argue that socially meaningful framings which took place in

the public press and related, non-public communication advanced significant conceptual shifts in the debate, an issue that ultimately changed the content of urban policy-making in Helsinki. Major issues in the framings studied here focused on the question of whether urban segregation exists in Helsinki or not, and the role researchers played in explaining certain developments as segregation, in particular. When it comes to productive interactions, public media framings served the purpose of providing a precondition for more direct personal interactions between researchers and stakeholders, preparing the way for the concrete societal impacts of the research results to emerge.

Based on this methodological perspective, the article asks how the issues of urban development in general and segregation in particular were conceptualized during the public media discussion. We are interested in analysing how the research results were presented and used in the debate to open up room for altered understandings of urban development and segregation. The emergence of the concept of segregation was controversial: it became contested, confronted, and re-defined as the debate on urban development evolved. Our aim was to analyze the researchers' contributions as participants in this debate as well as their influence on the societal conceptualization of urban development.

Data and methods

We follow the research by Professors Mari Vaattovaara (a geographer) and Matti Kortteinen (a sociologist), and their research group of multidisciplinary urban studies at the University of Helsinki, Finland. The two professors are active in their efforts to

affect urban planning as well as to develop a new methodology to study urban segregation.

The data comes from two sources: public media debate and interviews. Using the data gathered from a major Finnish newspaper, *Helsingin Sanomat*, we follow the two-decade-long process of public debate on the research results achieved by the professors and their research group. This data allows us access to one of the key forums where the research results were presented, debated and interpreted. This data, and the debates it includes, show us how the social impact of research was created in and through public press debate—it was this particular debate that ultimately made segregation an issue in urban policy-making in the Helsinki area.

During the studied time period, the debate moved from research results about initial signs of social degradation to a dominant interpretation about increasing segregation in the city, illustrating the achievement of the social impact of research in public media interactions. This transformation was characterized in terms of a series of contentious interpretations by heterogeneous groups of actors—a process which gradually paved the way for a shared, dominant conceptualization of the direction of urban development. It can be understood in terms of the stabilization of a scientific fact (Latour and Woolgar 1979) in the public domain: The process started with societally motivated research accomplished at the City of Helsinki's Urban Facts Department, the city's expert organization responsible for statistics, research and information. Transferring later to the University of Helsinki, the project produced some unorthodox results that only gradually became accepted as facts in a debate, which combined a simultaneous evolution of the studied phenomenon, results about it and societally embedded interpretations articulated by various actor groups.

The media data were collected from the electronic archives of Finland's largest daily newspaper, *Helsingin Sanomat*, which has offered extensive coverage of the research, debate, and commentary on urban development in the city. The data consist of 81 newspaper articles covering the years 1995–2013. Of these, 46 were opinion pieces and editorials, and 35 news reporting. We investigated the data with the help of frame analysis (Goffman 1974; Entman 1993) to detect the researchers' contribution in the debate as well as the attention directed at their research results. As mentioned, we use frames methodologically to conceptualize the schemes of interpretation present in media texts to illustrate their structures of social meanings that ultimately shape public dialogues about political issues (Entman 1993; Matthes 2009; Pan and Kosicki 1993). Our approach resembles issue-specific framing (Matthes 2009; de Vreese 2012), which allows for a detailed analytical approach to understanding specific conceptualizations of topics or events in the media. We identified three frames that form a continuum in time and describe the overall debate as well as the studied researchers' input and the use of their research results by other debaters. The frames are summarized in Table 1.

In order to specify and reflect on the research group's impact on policy-making, the analysis of framing was complemented with a qualitative content analysis (Krippendorf, 2013; Saldaña, 2012) of nine theme interviews with key researchers, policy makers, and administrators of the government and the City of Helsinki. The interviewees had long experience on issues related to urban development and policy-

making and were thus able to reflect on the impact of the professors' research in the policy context as well as on urban planning choices and public understanding of segregation. The reason for using these interviews was to probe the impact of the studied research on policy-making in a situation where we did not have direct access to

confidential face-to-face interactions between the actors involved in the process. To cover the outcomes of these non-public interactions and related interpretations the interviewees were asked about the development and history of urban planning in Helsinki as well as the impact of the two professors' research on policy-making. Once the recorded interviews were transcribed, they were reviewed and those text segments that addressed the social impact of the professors' work were coded according to their substantive contents and connected to the frames formed using the media data.

To supplement these data and analyses we used, as additional background data, policy documents and research literature about urbanization in Finland as well as results presented by the professors' research group and their opponents in academic journals and popular publications. This provided a necessary historical contextualization of the debate over urban development and public policy-making.

Frame	Public debate	Impact of researchers and interview examples
	Data examples from public press debate	Data examples from interviews
Status quo frame 1995–2006 There is no segregation in Finland like in other countries	**The absence of problematization of urban development:** Differing from the international picture social segregation or marginalization is not growing and suburbs are not becoming slums. (Special researcher, Ministry of Environment, HS opinion 6 July 1995) According to Eero Holstila (Director of City of Helsinki Urban Facts) the undesirable regional segregation, the divide between rich and poor, is not yet a problem in the Helsinki area. (HS 27 April 1998)	**Initial research results, a new methodology:** I think Mari Vaattovaara was the first who dared to take this up, and got quite a lot of opposition, or faced resistance that there are areas in Finland where segregation takes place. (Representative of Ministry of Environment 1)
Dispute frame 2007 Segregation is an issue of scientific methods and interpretation	**Disputes over the methods of research and controversy over policy choices:** Helsinki is an exceptionally tolerant and socially mixed city. This is valuable and should not be denigrated by labeling areas or insinuating, like Kortteinen and Vaattovaara do, that some areas in the east are experiencing higher levels of deprivation (unemployment, low level of education) or violence. (HS opinion 16 March 2007) Urban planners should take Kortteinen and Vaattovaara's viewpoints about regional differentiation seriously but absolutely discard their programmatic suggestions. To ensure the safe future for the capital area social mixing policy needs to be strengthened (HS opinion 20 March 2007)	**Challenging the current policy and interpretations:** Mari took up the other aspect that this [social mixing] also includes problems. It caused a lot of internal pressure. When we had all directors present in City administration, it led to a very thorough conversation about what we need to do. Not only here in civil servant management but after that, because civil servants need to present something for the political decision-makers before the situation gets worse. (Head of Finance, City of Helsinki)
Control frame 2008–2013 Segregation is real and a political issue that needs to be controlled	**Segregation is related to governance and competitiveness of metropolitan area, and causes local problems in schools:** The development of Helsinki Metropolitan area is one of our country's central questions. During the last couple of years, public debate has focused on the administrative structure of the metropolitan area and common challenges are left in the background. (HS opinion 20 January 2011) There are schools in Helsinki where the majority of pupils do not speak Finnish as their mother tongue. Immigrant families have concentrated in areas where they can have municipal rental housing. These suburbs are in eastern and east-north Helsinki. Multiculturality means new challenges to basic services, schools and teacher education. Now at the very latest, is the time to think how to prevent the differentiation of schools and the differences in learning results in Helsinki. (HS opinion 21 November 2008)	**New line of research and elaborated interpretations based on previous work:** I have lately followed the issues related to immigrants' housing and it is a topic of increasing concern, and Mari has many international contacts and has been involved in international joint projects. These projects have been good. They provide a sound foundation. (Representative of Ministry of Environment 3)

Table 1. Frames in segregation debate between 1995–2013

Policy background: Urban planning and the welfare state in Finland

Social problems related to urbanization, e.g. poverty and residential and ethnic segregation, cause suffering and lead to political conflicts. In political agendas, regions and big cities have become significant in the national and global economy but also appear as centers of social polarization (Friedmann 1986; Sassen 2000). Competition for talent between cities and regions (Florida 2005) has set the stage for urban policies around the world.

In West European cities, economic restructuring in manufacturing and the services prompted the poor economic situation and social problems in the early 1970s. This was followed by a transformation of service-related industries (Andersen and van Kempen 2003: 78). Brenner and Theodore (2002: 367–368) argue that simultaneously with the retrenchment of national welfare regimes, neoliberal programmes have been "interiorized" into urban policy regimes in an attempt to mobilize city space for market-oriented economic growth. As cities have become the embodiment of economic performance, the focus has shifted to issues of exclusion, polarization and segregation.

In Finland, urbanization took place in the 1960s and intertwined with the development of the welfare state (Rasinkangas 2013: 17). In this context, urban planning was oriented towards preventing social exclusion through public housing and social mixing policy. However, the period between the 1980s and 1990s has been viewed as a transition from the welfare state to the competition state (Moisio 2012; Pelkonen 2008). In a competition state, differences between regions become important as the nation's competitiveness depends on its ability to promote its regions' attachment

to global flows of knowledge and capital. In Finland, this has meant that the Helsinki area has become a "metropolis state" (Moisio 2012: 255–256, 265, 297). Against this background, the question of whether social problems are concentrated in certain areas of the city has led to debates on housing policy and social balance in the capital area.

In general, the term segregation has been avoided in Finnish research literature and policy debates because of its negative overtones. However, Mäenpää et al. (2000) suggested that a discursive shift in the use of the concept took place in the City of Helsinki Planning Department in the 1990s. While in the 1970s the central aim of urban planning was to enhance social balance in the city, the 1990s saw initial signs of segregation understood as a tangible, regional, and process-like phenomenon. The phenomenon became a self-perpetuating societal force, and the city needed to change its focus towards returning to the balance that was achieved earlier (ibid: 176–177). Segregation was therefore a threat to the administration, which sought to control the development of the city. However, in urban planning a social mixing policy has been strong and researchers has seen little need to challenge this policy.

The research program of Professors Mari Vaattovaara and Matti Kortteinen can be traced back to 1998 when Vaattovaara published her dissertation on the regional and social differentiation of Helsinki. Already in the 1980s, Kortteinen had started his work on unemployment in suburban areas. Research results on social and residential segregation in Helsinki started a new line of research based on diverse methodological choices and approaches imported from international literature. The professors aimed to understand the social differentiation dynamics of the Helsinki region and later to compare these to international examples. Initially, the research focused on segregation using novel research methodologies based on geographical information systems. After

the research program's establishment, its research agenda diversified to include other themes related to segregation, such as immigration, housing choices of different population groups, and the relationship between poverty and children's success at school. Over the years, the press was interested in the research results, and researchers were willing to explain their results in the media. The scientific work by the group was accompanied by a series of statements, informal and formal contacts with civil servants and policy-makers, as well as extensive media coverage. In addition, the growing interest in funding research related to urbanization at the institutional level of society affected the attention the professors received.

Results

Status quo frame: Shared belief in balanced social development in Helsinki

The status quo frame was most prominent during 1995–2006. The main feature of this frame was the absence of problematization of urban development and a strong belief in the success of social mixing policy in urban housing in the Helsinki area. To explain why Finland did not have problems like other European countries, debaters compared the "Finnish model" and international experiences. If anything, the main problem was the new research that claimed that signs of segregation were emerging.

Among the first researchers to focus on the issue was Mari Vaattovaara. She was working at the City of Helsinki's Department of Urban Facts and her research received a lot of unexpected media publicity. Using a novel research methodology based on geographical information systems and grid cells, Vaattovaara produced in 1998 a more nuanced understanding of the social structure of the city than was possible with the

more commonly used statistical methods of the time. According to these results, there were local "pockets of poverty" in individual blocks of flats:

Deprivation is distributed in particular spots in the capital area and the region is not divided into broadly unequal districts, as is the common belief [in the international discussions]. Even though these pockets of poverty appear more in the east and east-north of the region, the idea of a divided capital area is not correct. This can be seen in Mari Vaattovaara's dissertation that was published on Thursday. (HS news 11 December 1998)

However, according to *Helsingin Sanomat*, the research also included signs of a more alarming development:

The dissertation's results can be considered significant because they show that the development in the Helsinki region clearly differs from similar observations about large international cities. In big cities, almost without exception, deprivation affects entire districts. Vaattovaara's study, however, confirms that single welfare indicators show clear regional differentiation. For example, when measured by education, income and unemployment the results show concentration of disadvantages more clearly than before. (HS news 11 December 1998)

At first, other debaters did not consider these findings problematic, and many emphasized that the results showed the socially balanced characteristic of the Nordic welfare state and successful policy measures as exemplified by the following opinion piece:

Helsinki has been built equal and municipal decision-making has successfully prevented segregation in Finland as well as in other Nordic countries. […] [Vaattovaara's] dissertation shows that deprivation is distributed evenly in the Helsinki region; it is not concentrated in certain regions but is instead found in apartment blocks and individual

houses. One should not forget that our society is one of the safest in the world. (Adjunct Professor (docent), HS opinion 19 February 1999).

This interpretation stressed the uniqueness of Finland compared to other countries. Although the research results pointed to possibilities for a new type of regional development, the direction of this development was not clear. Later, Vaattovaara and Kortteinen presented results that underlined a movement towards deepening socio-economic division that they explained was related to structural change in the city:

New research shows that the balancing of the capital region ended in the 1990s. The direction of regional development has deepened socio-economic differentiation: regional differences are growing. Socio-economic deprivation and ethnic minorities have started to accumulate to some extent. […] Fears and questions arise: Is Helsinki becoming a slum? No. The situation is not alarming. The depression has not led to divisions in the urban structure. Even the weakest areas in Helsinki are, internationally compared, both physically in good shape and socially rich. Different kinds of political conclusions can be drawn. […] If this new type of differentiation is considered unwanted, physical restoration of buildings and social activation of suburbs are probably not enough. The question is also related to labor and business markets. (HS opinion 29 September 1999)

Vaattovaara had connections to the Helsinki city administration through her work but the publicity increased her interactions within the city administration and outside of it. In the interviews, several productive interactions initiated by this frame were described. These were personal contacts through seminars, work meetings, and committees related to urban planning. Some of them were chance encounters and Vaattovaara pointed out that seminar presentations in particular often led to more invitations to speak and discuss the research results elsewhere. Especially the working

groups concerning the development of suburbs around the 2000s were important for establishing direct interactive contacts between researchers and societal stakeholders:

> I was running two working groups on suburbs in the Ministry of Environment around the 2000s and there I first came across Kortteinen's research. That was the starting point. Nowadays, I am included in several networks related to urban planning, housing and urban development with multiple actors, and Vaattovaara actively participates in these board and network meetings. (Representative 1, Ministry of Environment, 21 October 2013)

Despite the fact that the results opened up a new policy perspective, they were also initially rejected by many. However, as a direct result of Vaattovaara's research a new kind of discussion was emerging because:

> I think that Mari Vaattovaara was the first who dared to take this up, and [she] received a lot of opposition, or was faced with resistance that there are areas in Finland where segregation takes place. I think it came from the research, and then we have started to think about it, that can it be like this. We haven't talked about segregation, or preventing it; we have talked about increasing social mixing. With social mixing we have wanted to create a balance, not just prevent some negative phenomena. (Representative 3, Ministry of Environment, 6 November 2013)

The aim of the planning policy had been to increase social balance rather than preventing a phenomenon that, according to the policy-makers, did not exist. Therefore, the new research results that challenged the status quo were primarily a topic within city administration, and were only referenced sporadically in public press debates. The consensus on agreed policy measures within urban planning was particularly strong, and according to the interviews, the new research results challenged the old paradigm in the

City Planning Department. The new results threatened the strong tradition of social mixing policy, as was indicated by another city administrator:

> Mari took this [segregation] up and she was even pressured within the Urban Facts Department. We had old researchers – I have no particular political background, so I can say it – who had a leftist worldview, and who thought that the city has to produce social housing. Mari took up the other aspect that this also brings with it problems. It caused a lot of internal pressure. (Head of Finance, City of Helsinki, 30 October 2013)

Over the years Vaattovaara's research gained publicity and interest in Helsinki as well as in the City Councils of the neighboring municipalities, Espoo and Vantaa. In addition, Vaattovaara and another researcher, Henrik Lönnqvist, wrote a discussion paper on housing policy that was published by the City of Helsinki in 2003. The authors claimed that the then-current housing policy had led to increased inequality between municipalities in the capital area by concentrating the weakest taxpayers in Helsinki. This strongly asserted that municipal rental housing production and social mixing policy were not really working on a regional scale, and that the idea of regional social equality that these policies were based on was insupportable (Pennanen 2003: 99–100). In public, the researchers' viewpoints were criticized as illustrated by the following opinion piece written by the Chair of the Helsinki City Planning Committee:

> The researchers direct their critique especially at the principle of social mixing but do not really present any new recipe, unless one counts positive differentiation as such. The researchers' paper was disappointingly anemic and one-sided. The researchers' initiative is deliberate [political action] because the City Council will decide on a new general plan and housing program in the fall. […] Preventing social segregation with the help of a housing and land policy has received a lot of praise internationally. This line of action has

enabled different parts of the city to be vital. There are no slums in Helsinki. (HS opinion 4 May 2003)

In an interview Vaattovaara expressed a feeling of being silenced: "She [the Chair of the Helsinki City Planning Committee] stood up at the end of the seminar and told me that research done with taxpayers' money, which is not along the lines of political decision-making, is a problem." The fact that the City of Helsinki's Urban Facts Department employed Vaattovaara caused distress, and the attempts "to put the researchers in their place" demonstrated that some political decision-makers saw the role of research as subordinate to the City administration. However, there were also dissenting voices. Representing the National Coalition Party in the City Council of Helsinki, Jan Vapaavuori, future Minister of Housing, expressed the party's concern:

> The parliamentary group of the National Coalition Party in the City Council of Helsinki condemns the attempts to silence researchers as well as attempts to question researchers' motives, and any attempts that assume that the academic community should only produce research knowledge that complies with some political group's thinking. The City of Helsinki's Urban Facts Department has brought its significant input to discussions by presenting Mari Vaattovaara's and Henrik Lönnqvist's statements on housing policy. The researchers in question should be awarded with some kind of State Award for Public Information rather than trying to silence them. (4 June 2003, speech in reading on housing programme) [1]

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[1] The speech is available online: http://vapaavuori.net/kokoomuksen-ryhmapuheenvuoro-asunto-ohjelman-lahetekeskustelussa/.

When it comes to societal impact of research results, the housing program of Helsinki was re-evaluated based on researchers' suggestions and the share of social housing production diminished. Changes were also made to the housing program regarding the size of apartments after the researchers had stated that there is a need for bigger apartments. In addition, the programme now stated that to prevent segregation, the concentration of social problems in blocks of houses had to be avoided (Monimuotoisen asumisen Helsinki 2004: 39).

As shown by the analysis above, the period from 1995 to 2006 was marked by a common belief in the welfare state's ability to maintain socially mixed areas. Diverging viewpoints, particularly those of Vaattovaara and Kortteinen, were also noted in the administration of the Cities of Helsinki, Espoo and Vantaa. Segregation, however, was not considered a real threat to Finnish urban development because it did not exist in the form observed in international contexts. Therefore, the initial results presented by the professors and communicated via press and face-to-face interactions did not lead to broad changes in policy-making or to alternative understandings among the general public.

Dispute frame: A heated debate on social segregation emerges in the press

Following Vaattovaara's initial research results on the new type of differentiation in the Helsinki area, the media took up, in 2007, opposing viewpoints presented by other researchers. This led to a public dispute about the interpretation of urban development in the Helsinki area. First, there was scholarly disagreement over the theoretical, methodological, and interpretative background of the research on segregation and, second, a political debate, which followed the scholarly one. The significance of the

latter was that it functioned as a turning point in the problematization of urban development in the public understanding.

Contrary to the previous frame, which contained elements of maintaining the status quo and suppressing critical research results, the dispute frame provided an opening for new participants in the debate. At the same time, the concept of segregation became familiar to the larger public, as described by the Mayor of Helsinki:

> I would say that segregation has come strongly under focus and into discussions during the last ten years. […] We [have] understood that this is a central factor of change, and that segregation is a phenomenon that needs to be understood. (Mayor, City of Helsinki, 12 November 2013)

The controversy that had been bubbling within the city administration became public and started to have real effects on policy-making. Researchers who worked in the City's Urban Planning Department openly opposed the research methods used by Vaattovaara and Kortteinen. Urban development became a question of the validation of the results and methods of their research. The main dispute culminated between the professors and a senior researcher of the City:

> [The professors] have industriously written and discussed the urban structure of the Helsinki area. They have presented threats of a new type of social segregation and the decay of the city center. They have become prisoners of their own theory and closed their eyes to contrary information, says [senior researcher]. (HS news 7 March 2007)

The senior researcher continued by arguing that statistical observations over a long period did not validate the professors' results. In response, the professors argued

that although the balanced urban structure of Helsinki was a rare exception internationally, some parts of the city were not doing well:

> Parts of Helsinki are lagging behind when it comes to economic upturn. There is strong evidence of this. […] Until the 1990s, social mixing worked well and even today the areas of the city are socially mixed according to Vaattovaara. Internationally, the balance of Helsinki is an exception, which we can be proud of. […] According to the professors, what is alarming is that the economically weaker areas are not experiencing an upturn even though employment has improved significantly. Vaattovaara and Kortteinen point out that [senior researcher] has been a central figure in urban planning and therefore has a strong need to defend the outcomes of the policy. (HS news 9 March 2007)

Vaattovaara and Kortteinen's criticism of policy-making also caused political resistance and their motives were questioned. A student of political science, for instance, assumed that they were promoting a political agenda, oriented towards opposing established social mixing policy:

> Helsinki is renowned for its social mixing policy. Several studies have shown that social mixing is a precondition for creating safety and for socially sustainable urban planning. Kortteinen and Vaattovaara have now given their voice to the opposing viewpoint. Kortteinen is worried about how the market is subordinate to urban planning and official regulations. Vaattovaara instead has called for positive differentiation of areas. In my opinion, the market doesn't need special protection from the professors but people might. Vaattovaara's concept of positive differentiation is only a sugarcoated expression of deliberately produced segregation. (HS opinion 20 March 2007)

Concurrently, the dispute over research methods continued when other researchers claimed that the professors based their interpretations on questionable and superficial

prejudices. A retired adjunct professor questioned the whole starting point of the research:

> Vaattovaara and Kortteinen have ended up in trouble because they interpret unemployment in a mechanical and prejudiced way. Rough and shallow prejudices have replaced the now missing fine-tuned analysis of unemployment and residential areas. The starting point of the research—a strong belief in the capital area as some kind of metropolitan area—is as such very problematic, even though it has been one of the favorite themes in contemporary popular urban discussion. (HS opinion 23 March 2007)

Transformation of a scientific dispute into an open question of urban development opened room for other debaters to participate and politicize the already controversial issue. The issue of urban development, which was considered by the media to be problematic, uncertain and scientifically contestable, became connected with policy-making when *Helsingin Sanomat* made a political statement about the merger of municipalities:

> A senior researcher and Professors Vaattovaara and Kortteinen have clashed in the pages of Helsingin Sanomat. The research subject is of significance for the future. In many ways, the capital region is undergoing a major transformation. The development is moving inevitably towards the municipal merger of the capital region. (HS editorial 12 March 2007)

Helsingin Sanomat used the scholarly disagreement to validate its statements in the editorial . Although the research did not provide policy-makers with unambiguous guidance on what to do, they regarded it as valuable:

Vaattovaara does research which challenges [other views] and she clearly has impact. She takes up issues actively, sometimes aggressively, stirs the pot. But it has impact. It's a way of acting. [...]Mari Vaattovaara is in my opinion one of the most influential researchers. I do not agree with her all the time but she creates discussion and makes people consider different dimensions. This creates a conviction for doing things. Perhaps sometimes differently from what the research results would indicate. But at least you have formed a justifiable stance to back up your actions. (Mayor, City of Helsinki, 12 November 2013)

The interviewees emphasized that the professors had found a way to "get their message through" indicating that they had taken an active role in strongly promoting their viewpoints through networks and personal contacts with policy-makers and journalists:

I think they can promote their message strongly, and media contacts them [the professors], because they know that they will get statements. I know it is sometimes hard to get anything out of researchers, so journalists contact those who [...] have opinions and who have done research. (Representative 1, Ministry of Environment, 21 October 2013)

Especially Mari is widely connected to different kinds of networks, which include civil servants and politicians. [...] This way she certainly gets her message through quite well. (Representative 2, Ministry of Environment, 21 October 2013)

In summary, the dispute frame operated by means of conflicting interpretations of the validity of the findings and the related direction of urban development in the Helsinki area. The dispute made visible the interpretative dimension of research results as well as the role that researchers were supposed to play in policy-making. The impact of the professors' research results and their statements shows an increased interest in

urban development and an understanding of segregation among the general public. After the turning point, which culminated in the dispute frame, segregation was treated as an existing phenomenon, and urban development was connected to other topical and political themes, thereby creating new ways of speaking about the social changes brought about by segregation.

Control frame: taking segregation under political control

During 2008–2013, the debaters directed their attention to different solutions for controlling segregation. First, controlling segregation became important because the government's new metropolitan policy directed attention toward the governance structure of the capital area. In particular, the municipalities competed for good taxpayers, which was a key question affecting social housing policy. Second, segregation was noticed in schools, as weak learning results seemed to result from socio-economic differentiation in certain areas. Controlling segregation in schools combined the issues of school districts, free school choice, the number of immigrants in the area, and public housing distribution. Instead of being concerned about the possible emergence of underprivileged areas, the debaters were interested in the relocation options available to middleclass people regarded as good taxpayers.

From the political perspective, segregation offered politicians a tool to promote aims other than merely housing issues. The different discussion themes meshed: the governance structure of municipalities was in fact both a question of segregation and of attracting good taxpayers within the capital area. A social mixing policy had meant building equal amounts of social housing in each municipality but, as segregation was occurring, it created an imbalance between different areas of the region.

Earlier, the professors had been criticized for describing the capital area as a metropolis. In the control frame, however, many debaters chose to conceptualize segregation and urban development specifically as a metropolitan issue, and focused on the city's global competitiveness. Regardless of this, the debate still aroused criticism from Kortteinen and Vaattovaara:

> So far, the biggest municipalities with an interest in concentrating as many [buildings] as possible in their areas have dominated the discussions and actions [on metropolitan development]. […] In Europe people live in loosely linked areas of settlement. The houses are located in networked town areas of around 50,000 residents, and the areas are easily accessible by train. This is the case in Munich, which is considered a model example of dense building and traffic planning. […] According to research the size of 50,000 residents seems to be optimal for effective service production, public transportation and for the needs of citizens. (HS opinion 16 September 2008)

Based on such international experiences, Vaattovaara and Kortteinen introduced the model of networked villages, thus opposing another suggestion, i.e., forming "a metropolis municipality", which would have combined the biggest cities under one administrative structure. This was particularly the aim of the Mayor of Helsinki, who argued that segregation was "the main reason for continuing the debate about municipal mergers" (HS news 4 February 2011).

Merging the municipalities was not the only suggestion for controlling the social processes in the capital region. Some politicians argued instead that administrative power could be concentrated at the regional level for better planning. This would have meant constraints upon municipalities' autonomy, which was a strong argument to oppose both the merger and any other larger administrative structure:

When the local politicians in Espoo got the floor in the City Council, they forgot about the threat of areas becoming slums. Every single speaker repeated that Espoo needs to stay independent. (HS editorial 25 January 2012)

As indicated in this excerpt, there was a tendency in the debate to direct attention away from the actual problems of urban development. However, segregation was also used to advance the calls for a merger. A professor from the University of Jyväskylä, for instance, criticized using segregation as an argument in favour of merging the municipalities:

Strong concentration is taking place in the global economy and value chains concentrate in metropolises […]. The question of segregation, i.e. regional differentiation and the development of underprivileged areas isa serious one. Segregation would generate an inheritable disadvantage and cause great intellectual and material losses. *Helsingin Sanomat* has, along with the Mayor of Helsinki, raised preventing segregation as a central argument for merging the municipalities in the capital area. […] The competitiveness of the metropolis is not based on governance but on participation, expertise, and true democracy. (Professor, University of Jyväskylä, HS opinion 20 January 2011)

Controlling segregation to attract good taxpayers in municipalities was not the only concern, however. To better understand segregation, the professors' research group had begun to study the connection between regional differentiation and learning results in schools. The results showed that, according to Finnish standards, differences between schools' learning results were growing:

Research carried out a few years ago did not show that regional differences would be a special problem. However, a study in progress on the wellbeing of pupils and school success shows that the differences between schools are big and they are biggest in

Helsinki. There are schools where almost a fourth of the pupils suffer from severe depression. This is connected to low socio-economic background, and these two together are clearly connected to poor school success. (Kortteinen and Vaattovaara, HS opinion 7 September 2011)

Earlier in the debate, the focus had been on social polarization and the increase of deprivation. Now, in the control frame, the focus shifted to attracting "good" taxpayers and those who were already doing well. Once the group's research on schools had advanced, the professors stated that Finland was going through a process similar to what the rest of the Europe had already undergone. Social and economic problems tended to localize and these problems, Vaattovaara and Kortteinen argued, resulted from urban planning affecting the relocation choices of middle-class families:

"The flight of native population is in full speed" evaluated Vaattovaara this week. The number of immigrants was neither the biggest nor the only reason in Helsinki to leave the neighbourhood. This time researchers, however, wanted to know if the number of immigrants affected the decision to relocate. The answer was clear: yes, it did. We should be able to discuss the research results even if we find them unpleasant. Silence does not erase the phenomenon. (HS news 30 October 2013)

The control frame introduced a new direction in the debate about urban development: Segregation was taking place, causing severe effects in schools and pupils' learning results. Moreover, it was no longer a singular issue that was either a matter of interpretation or something to oppose. Instead, it intertwined with other social processes, such as the movement of local population out of certain areas of the city, immigration, and learning results. Finally, the schools' situation was perceived as being produced by legislation and policy as the government of Finland had created an option

for families to freely choose schools for their children, a choice which affected the relocation choices of residents:

> The more the signs of differentiation start to show—in the streets and in media—the more schools will be "shopped for". If the right for a free school choice is withheld, the differentiation between residential areas is likely to speed up when families want to live in "the right neighborhood". (Doctoral student, HS opinion 2 November 2012)

In the interviews, the professors stated that regardless of criticism they had persistently kept on researching and discussing segregation, which had eventually led to a large body of research that provided a picture of how the phenomenon took shape in practice. A case in point was the Peltosaari project.

The Peltosaari project combined a research course by the professors and their students with the developmental needs of the City of Riihimäki, a town some 60 kilometers from Helsinki. The project was initiated by a chance encounter during a seminar of a construction company where Vaattovaara was speaking. A representative of VTT Technical Research Centre of Finland expressed interest in collaboration and eventually the project brought together researchers, students, city administration, numerous research funders, and residents of the suburb of Peltosaari. After producing an extensive report on the history, development and present situation of the area, the findings led to a development plan for Peltosaari with a special focus on the social aspects:

> We have a lot of technical and economic approaches, legislation and regulations […]. It requires lots of facts and guts from a social scientist to bring in the social aspects […]. It is easier to understand [the segregation process] through concrete cases. Peltosaari , this

dreary suburb by the train tracks, made it tangible. (Representative 3, Ministry of Environment, 6 November 2013)

Furthermore, the case led to financial interactions as the Finnish Funding Agency for Innovation, Tekes, contacted Vaattovaara:

The case of Peltosaari was quite funny, because it was a bit random. Now, in hindsight, it looks like a project but they [Tekes] did not even have a question in mind. Tekes just called us and said that "we need social scientists". They had earlier asked me two or three times. It is probably a good thing that I am invited to these events - I have been talking in many different events where "important" persons are present. Tekes was somehow interested in us and they asked us to apply for funding. (Vaattovaara, 17 May 2013)

A growing number of financial interactions, as the one described above, was made possible by the "saturation" and publicity of the professors' work. In short, the public debate during the control frame had shown the usefulness of segregation research as a tool for understanding the concrete problems of regional development as well as a way to promote political agendas other than those related to housing only. Productive interactions related to segregation thus offered opportunities for simultaneously advancing diverse lines of regional policy-making as the professors' results were generally accepted. In this context, the municipalities of the Helsinki region were no longer considered a "model example" of well-balanced urban structure but instead a latecomer in international segregation development.

In summary, the advent of the control frame broadened the focus of the debate from the possible emergence of underprivileged areas to the housing choices of "good taxpayers". Educational segregation in schools meant that segregation was manifesting

itself in the form of poorer learning results of pupils in "bad" schools. Increased immigration affected both the pupil structure in schools and the residential structure within the Helsinki area. Segregation was thus both a threat and a reality, showing local features, especially in schools dealing with problems of funding, socio-economic differences and immigration.

Conclusion

Aligning itself with interactive perspectives of studies on science's social impact, this article further develops the concept of productive interactions with the help of the notion of framing. It claims that framing, which focuses on social interpretation of selected issues, is a methodologically useful device to further conceptualize productive interactions, especially in the public media, as it complements the concept by offering a way to address changes in human valuation and meaning-making otherwise left largely undertheorized—but nevertheless regarded as important (Molas-Gallart 2015; de Jong et al. 2014)—in current literature on productive interactions. Our theoretical contribution to literature about productive interactions is thus to use the concept of interaction to refer to the public social exchange processes in which societally relevant knowledge is produced and valued, whereas the concept of framing helps us to illuminate the contents of the socially shared understandings present in such interactions.

The usefulness of this approach in understanding how impact is achieved via the public press has been illustrated with reference to the debate between researchers and societal stakeholders about urban segregation in Helsinki. The case showed how researchers created opportunities to alter the understanding of regional differentiation in

the city, a reorientation that significantly contributed to change of urban policy in the Helsinki area.

The new framing of urban development was not easily rooted, however, but gained support very slowly, eventually becoming a shared interpretation connected to many other topical areas in policy-making. The process thus parallels the idea of constructing scientific fact (Latour and Woolgar 1979) in exhibiting the way in which initial research results were gradually interpreted, transformed and accepted by various groups of actors. The difference between knowledge construction in academic and political settings is, however, that the interpretation of segregation as a scientific fact is also embedded in a variety of other political issues present in Helsinki, such as the merger of municipalities and the quality of school education. The productive interactions achieved in the public press and informal discussions therefore created an opportunity for debaters to re-conceptualize the issue and use it as a tool for designing and legitimating their own policy choices. This politicization of scientific research should not, however, be seen as a corruption of science but rather as an important condition which makes it possible for research to gain societal impact. The debate over segregation thus provided space for different participants to learn from each other and revise their understandings as the phenomenon itself evolved and underwent scientific scrutiny.

Our analysis of the framing of segregation illustrates that the concept continually changed. In different phases of the debate, it became further specified by additional ideas, some of which were on the political agenda at the time and some of which were imported from international scientific discussions. Each frame thus presented a different take on differentiation and the problems related to it. At the beginning, the status quo

frame likened segregation in Helsinki to the situation in other European countries. Instead of large, deprived, urban neighborhoods described as "ghettos" or "slums", segregation in Helsinki was conceptualized as "pockets of poverty", i.e., a condition in which the poor were scattered mosaic-like in different areas.

Following the initial results, the dispute frame made disagreements between researchers publicly visible, encouraging participants to present different interpretations of urbanization. After this turning point, segregation was treated as a phenomenon which was already taking place. Finally, the control frame addressed solutions for segregation in terms of governance choices for the Helsinki metropolitan area. The debate and the related research also focused on schools in different neighborhoods and the evidence of migration of middle-class local population out of areas where poverty and immigration were increasing.

These conceptual changes in the segregation debate went together with finding new means to study the phenomenon. In the status quo frame, Vaattovaara introduced a new research method and findings interpreted as signs of segregation. However, segregation was associated with the slums and ghettos of other countries; therefore, it was argued, it did not exist in Finland. In the dispute frame, the scientific method became opposed—as did research results and interpretations on urban development. Segregation emerged here as something that researchers were not unanimous about. The dispute frame, however, worked as a turning point for political reconsideration of planning choices. Finally, in the control frame, the concept of segregation was used to develop urban areas as well as backing up political aims related to other issues, such as the metropolitan governance structure. In this context, segregation was treated as a fact especially when measured by learning results in schools.

The development of the concept of productive interactions with the idea of framing contributes to the study of the social impact of science. It offers a way to address social selection and the conceptualization of particular phenomena as antecedents of the impacts of science among a wider array of things present in the world at any given time (Jasanoff et al. 1998). Focusing attention on the social organization of knowledge, the combined concepts of productive interactions and framing thus emphasize the need to move away from linear and indicator-based accounts of impact to interactive approaches, i.e., those that pay attention to interpretative flexibility, long timescales and indirect communication among many actor groups. Furthermore, raising awareness among scientists of issues related to the systemic and interpretative nature of impact achievement would prepare them to engage in formative modes of research recently underlined by Molas-Gallart (2015). To facilitate this, and to help academics manage strong social pressure and public criticism, we suggest that researchers should be educated, for instance during researcher training, to turn conflicts into discussions fostering social learning based on divergent viewpoints.

Segregation and other concepts embedded in scientific discussion should be treated, in our view, as tools in public debate. The question is, therefore, how do different debaters decide to use such terms during productive interactions and in their activities elsewhere? The fact that researchers are often among those capable of introducing new conceptualizations into societal debates makes them introducers of new ways of understanding ongoing social developments. This, we argue, is among the most significant impacts that social science may have on society.

References

Andersen, H.T. & van Kempen, R. (2003) 'New trends in urban policies in Europe: Evidence from the Netherlands and Denmark', *Cities*, 20/2: 77–86.

Bell, S., Shaw, B. & Boaz, A. (2011) 'Real-world approaches to assessing the impact of environmental research on policy', *Research Evaluation*, 20/3: 227–37.

Bornmann, L. (2012) 'What is societal impact of research and how can it be assessed? A literature survey', *Journal of the American Society for Information Science and Technology*, 64/2: 217–33.

Brenner, N. & Theodore, N. (2002) 'Cities and the Geographies of 'Actually Existing Neoliberalism'', *Antipode,* 3/3: 349–79.

Broks, P. (2006) *Understanding Popular Science*. Maidenhead: Open University Press.

de Jong, S. et al. (2014) 'Understanding Societal Impact through Productive Interactions: ICT Research as a Case', *Research Evaluation,* 23/2: 89–102.

de Vreese, C. (2012) 'New Avenues for Framing Research', *American Behavioral Scientist*, 56/3: 365–75.

Entman, R.M. (1993) 'Framing: Toward Clarification of a Fractured Paradigm', *Journal of Communication,* 43/4: 51–8.

Etzkowitz, H. (2003) 'Innovation in Innovation: The Triple Helix of University-industry-government Relations', *Social Science Information,* 42/3: 293–337.

Fisher, K. (1997) 'Locating Frames in the Discursive Universe', *Sociological Research Online* 2/3. Retrieved from http://www.socresonline.org.uk/2/3/4.html.

Florida, R. (2005) *Cities and the Creative Class*. New York: Routledge.

Friedmann, J. (1986) 'The World City Hypothesis'. In: Lin, J. & Mele, C. (eds.) *The Urban Sociology Reader*, pp. 301–7. Second edition. London: Routledge.

Gibbons, M. (1999) 'Science's New Social Contract with Society', *Nature* 402/Supp.: C81–C84.

Godin, B. (2006) 'The Linear Model of Innovation: The Historical Construction of an Analytical Framework', *Science, Technology, & Human Values*, 31/6: 639-67.

Godin, B. & Doré. C. (2005) *Measuring the Impacts of Science: Beyond the Economic Dimension*. INRS, Montreal. <http://www.csiic.ca/PDF/Godin_Dore_Impacts.pdf>

Goffman E. 1974. *Frame Analysis: An Essay on the Organization of Experience*. New York: Harper & Row.

Haywood, B.K. & Besley, J.C. (2014) 'Education, Outreach, and Inclusive Engagement: Towards Integrated Indicators of Successful Program Outcomes in Participatory Science', *Public Understanding of Science,* 23/1: 92–106.

Irwin, A. (2015) 'Science, Public Engagement with'. In: Wright, J.D. (ed.) *International Encyclopedia of the Social & Behavioral Sciences*, 2. ed., Vol. 21, pp. 255–60. Amsterdam: Elsevier.

Jacobsson, S., Perez Vico, E. & Hellsmark, H. (2014) 'The Many Ways of Academic Researchers: How Is Science Made Useful?' *Science and Public Policy*, 41/5: 641–57.

Jasanoff, S. (ed.) (2004) *States of Knowledge: The Co-production of Science and Social Order*. London: Routledge.

Jasanoff, S., Miller, C. & McCarthy, J. (1998) *Assessing Impacts: Framing, Communication, Credibility*. Impacts Working Group Theme Paper. Belfer Center for Science & International Affairs. Cambridge: Harvard University. <https://www.hks.harvard.edu/gea/pubs/98wgp_imp.htm>

Johnston, H. (1995) 'A Methodology for Frame Analysis: From Discourse to Cognitive Schemata'. In: Johnston, H. & Klandermans, B. (eds.) *Social Movements and Culture*, pp. 217–246. Minneapolis: University of Minnesota Press.

Kearnes, M. & Wienroth, M. (2011) 'Tools of the Trade: UK Research Intermediaries and the Politics of Impacts', *Minerva*, 49: 153–74.

Kleinman, D.L. & Vallas, S.P. (2006) 'Contradiction in Convergence: Universities and Industry in the Biotechnology Field'. In: Frickel, S. & Moore, K. (eds*.) The New Political Sociology of Science: Institutions, Networks, and Power*, pp. 35–62. Madison: The University of Wisconsin Press.

Krippendorf, K. (2013) *Content analysis: An introduction to its methodology.* Los Angeles, CA: Sage.

Latour, B. & Woolgar, S. (1979) *Laboratory Life. The Construction of Scientific Facts*. Princeton: Princeton University Press.

Martin, B. (2003) 'The Changing Social Contract for Science and the Evolution of the University'. In: Geuna, A., Salter, A.J. & Steinmueller, W.E. (eds.) Science and Innovation: Rethinking Rationales for Funding and Governance, pp. 7–29. Cheltenham: Edward Elgar.

Martin, B. (2011) 'The Research Excellence Framework and the 'Impact Agenda': Are We Creating a Frankenstein Monster?', *Research Evaluation*, 20/3: 247–54.

Matthes, J. (2009) 'What's in a Frame? A Content Analysis of Media Framing Studies in the World's Leading Communication Journals, 1990–2005', *Journalism & Mass Communication Quarterly,* 86/2: 349–67.

Meagher, L., Lyall, C. & Nutley, S. (2008) 'Flows of Knowledge, Expertise and Influence: A Method for Assessing Policy and Practice Impacts from Social Science Research', *Research Evaluation*, 17/3: 163–73.

Michael, M. (2009) 'Publics Performing Publics: of PiGs, PiPs and Politics', *Public Understanding of Science,* 18/5: 617–30.

Moisio, S. (2012) *Valtio, alue, politiikka. Suomen tilasuhteiden sääntely toisesta maailmansodasta nykypäivään*. Tampere: Vastapaino.

Molas-Gallart, J. (2015) 'Research Evaluation and the Assessment of Public Value', *Arts & Humanities in Higher Education*, 14/1: 111–26.

Molas-Gallart, J., Salter, A., Patel, P. Scott, A. & Duran, X. (2002) *Measuring Third Stream Activities*. SPRU Science and Technology Policy Research, University of Sussex.

Molas-Gallart, J. & Tang, P. (2011) 'Tracing 'Productive Interactions' to Identify Social Impacts: An Example from the Social Sciences', *Research Evaluation,* 20/3: 219–26.

Monimuotoisen asumisen Helsinki: Helsingin asunto-ohjelma 2004-2008. Helsingin kaupungin talous- ja suunnittelukeskuksen julkaisuja, 3/2004.

Morton, S. (2015) 'Progressing Research Impact Assessment: A 'Contributions' Approach', Research Evaluation, 24/4: 405–19.

Mäenpää, P. et al. (2000) *Sanat kivettyvät kaupungiksi. Tutkimus Helsingin kaupunkisuunnittelun prosesseista ja ihanteista.* Teknillinen Korkeakoulu. Espoo: Otamedia Oy.

Nieminen, M. & Hyytinen, K. (2015) 'Future-oriented Impact Assessment: Supporting Strategic Decision-making in Complex Socio-technical Environments', *Evaluation*, 21/4: 448–61.

Nowotny, H., Scott, P. & Gibbons, M. (2001) *Re-thinking Science: Knowledge and the Public in an Age of Uncertainty*. Cambridge: Polity Press.

Olmos-Peñuela, J., Molas-Gallart, J. & Castro-Martinez, E. (2014) 'Informal Collaborations between Social Sciences and Humanities Researchers and Non-academic Partners', *Science and Public Policy*, 41/4: 493–506.

Pan, Z. & Kosicki, G.M. (1993) 'Framing Analysis: An Approach to News Discourse', *Political Communication*, 10: 55–75.

Pelkonen, A. (2008) *The Finnish Competition State and Entrepreneurial Policies in the Helsinki Region.* Department of Sociology. Research Reports No 254. Helsinki: University of Helsinki.

Penfield, T. et al. (2014) 'Assessment, Evaluations, and Definitions of Research Impact: A Review', *Research Evaluation*, 23/1: 21–32.

Pennanen, P. (2003) 'Asuntopolitiikan kommentoinnista kevään kuuma peruna kaupunkitutkimuksessa', *Terra* 115/2. <http://elektra.helsinki.fi/se/t/0040-3741/115/2/asuntopo.pdf>

Pitkänen, P. & Matinheikki-Kokko, K. (2007) 'Multicultural Education as an Educational Response'. In: Antikainen, A. (ed.) *Transforming a Learning Society: The Case of Finland*. Bern: Peter Lang AG, European Academic Publishers. Second Edition.

Rasinkangas, J. (2013) *Sosiaalinen eriytyminen Turun kaupunkiseudulla. Tutkimus asumisen alueellisista muutoksista ja asumispreferensseistä*. Siirtolaisuusinstituutin tutkimuksia A 43. Turku: Juvenes Print.

Rogers, E.M. (1995) *Diffusion of Innovations (4th edition)*. New York: The Free Press.

Rothwell, R. (1994) Industrial Innovation: Success, strategy, trends. In: Dodgson, M. & Rothwell, R. (eds.) *The Handbook of Industrial Innovation*, pp. 33–53. Cheltenham: Edward Elgar.

Saldaña, J. (2012) *The Coding Manual for Qualitative Researcher*. Los Angeles, CA: Sage.

Sassen, S. (2005) 'The Global City: Introducing a Concept', *The Brown Journal of World Affairs*, XI/2: 27–43. <http://heinonline.org/HOL/Page?handle=hein.journals/brownjwa11&g_sent=1&id=279 >

Snow, D.A. & Benford, R.D. (1992) 'Master Frames and Cycles of Protest'. In: Morris, A.D. & McClurg Mueller, C. (eds.) *Frontiers in Social Movement Theory*, pp. 133–55. New Haven and London: Yale University Press.

Spaapen, J. & van Drooge, L. (2011) 'Introducing 'productive interactions' in social impact assessment', *Research Evaluation*, 20/3: 211–18.

Upton, S., Vallance, P. & Goddard, J. (2014) 'From Outcomes to Process: Evidence for a New Approach to Research Impact Assessment', *Research Evaluation*, 23/4: 352–65.