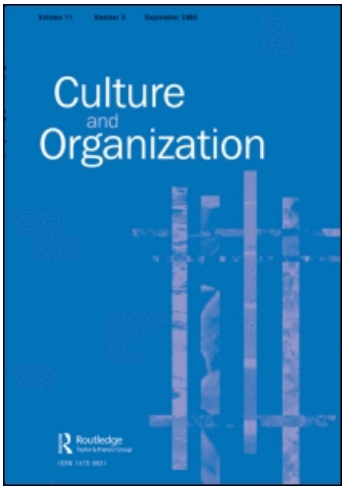

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How objects shape logics in construction

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How objects shape logics in construction

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The notion of institutional logics is a key tenet in institutional theory but few studies have attended to the micro-foundations of logics. The sociology of associations is used to explore the micro-foundations of logics, their emergence and temporal–spatial importance. A case study of the construction of the skyscraper, 'Turning Torso', in Malmö city, shows how technical objects and actions implicated in the material practices of building construction shape logics and identities associated with professions, economy, market, science and design. We summarize our findings by theorizing logics and identities as emergent and contingent outcomes of the material practices of building construction. The argument is concluded by considering the building construction as a materially mediated meaning structure.

Keywords: institutional logics; sociology of associations; actor-network theory; construction; skyscrapers

Introduction

> It must be tall, every inch of it tall. The force and the power of the altitude must be in it, the glory and the pride of exaltation must be in it. It must be every inch a proud and soaring thing, rising in sheer exaltation from bottom to top … without a single dissenting line … it is the new, the unexpected, the eloquent peroration of most bald, most sinister, most forbidding conditions. (Louis Sullivan, The Tall Office Building Artistically Considered (1896), quoted in Holleran 1999, 860 and Willis 1995, 14)

Skyscrapers, particularly the more spectacular ones, are often seen as the work – the oeuvre – of the individual architects and referred to as their buildings, e.g. Cass Gilbert's Woolworth Building in Chicago, Foster's Gherkin in London, Gehry's titanium and glass tower in New York City, just to mention a few. There is, however, a growing body of literature emphasizing that finance and real estate structures, zoning ordinances, and office space and housing norms have had more influence on skyscraper form than the individual architect's prowess (Willis 1995). Viewed from this perspective, skyscraper form is shaped by what some have called institutional logics (Friedland and Alford 1991).

The concept of institutional logics is a key tenet within institutional theory – they are considered the 'master principles of society' that 'guide social action' (Greenwood et al. 2010, 521). Associated with society's core institutions, institutional logics are the beliefs and practices that both enable and constrain the actions of individual and organizational actors. Although institutional logics are said to include cultural mores,

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cognitive understandings and material practices (Friedland and Alford 1991; Thornton, Jones, and Kury 2005; Thornton and Ocasio 2008; Greenwood et al. 2010), extant research has primarily emphasized the cultural and cognitive aspects and virtually ignored how the material and material practices can shape behaviour. Moreover, much of the existing research focuses on the behaviour of field-level actors in dealing with competing institutional logics rather than on how actors deal with or manage them in their day-to-day work (Reay and Hinings 2009). Hence, while the historical contingency of institutional logics is widely acknowledged, relatively little attention is given to unearthing the ways in which these contingencies manifest themselves. This paper attends to these issues by drawing attention to the material practices of building construction. The empirical basis for this is an analysis of the construction of a skyscraper.

Building construction is, however, seldom an object of inquiry within the social sciences, in general, and organizational research, in particular. This is surprising, given that we spend most of our lives in the built space for all sorts of reasons, such as shelter, work, sleep and leisure; and that the construction sector's economic importance measured in terms of the number of people employed and the money involved is enormous, as witnessed by the fact that household economies and the global financial markets seem to grow and shrink together with the building construction. Moreover, the organizational complexity of constructing a building also makes it a particularly interesting research object and site.

Focusing on construction, we seek to respond to Thornton and Ocasio's call for devoting more attention to 'the microfoundations of institutional logics' (2008, 120). We do so by drawing upon insights from actor-network theory (ANT) and particularly the notion of socio-logics (Callon 1980; Latour 1987), which emphasizes the processes of problematization and of building strong socio-material associations. This approach, also dubbed the 'sociology of associations' (Latour 2005, 9), defines 'the social' as a (provisional) outcome of processes of association amongst heterogeneous entities rather than considering it as pre-defined by the researcher. The question of which entities to include in the definition of the 'social' is kept open. This is to avoid privileging the human actors, i.e. the social in the conventional sense of the word, at the expense of the non-humans such as the material objects used in building construction. By keeping the definition of the social open, ANT seeks to do away with the commonplace dichotomies between the social on the one hand and the material and technology on the other hand. It attends to the ways in which material practices, organizations and institutions are 'made durable' (Latour 1991). As noted by Law (2010, 173), 'matter matters', and the important question is: how this happens, i.e. how do material practices effect logics?

In the context of this study, we attend to the material practices and details of how logics in construction change and are 'in a state of becoming' (Hernes 2008, 62). We ask more specifically how technical objects and actions implicated in the material practices of building construction shape logics and identities and their temporal–spatial importance in construction. In attending to this question, we seek to augment and extend the debate on institutional logics and their micro-foundations.

The rest of the paper and argument is organized as follows. The next two sections present the context of our study and the theoretical approach and position our argument in relation to institutional theory. This is followed by an account of our case-based methodology and our analysis. The case and analysis focuses on three moments during the construction process to reveal the emerging logics and their temporal–spatial importance. Finally, we discuss the challenges and implications of taking a 'sociology of associations' approach to logics in construction.

Architecture and building construction as a context for studying logics

'Skyscraper scholarship' (Holleran 1999, 861) has, as noted above, the propensity to focus on the accomplished buildings, the architects and the architectural achievements, and on the (corporate) clients (Höweler 2003; Dale 2005; McNeill 2005). Willis (1995) is, however, a notable exception. Based on a historical study of skyscraper construction in New York and Chicago, she accounts for the differences in skyscraper design in terms of rent value rather than architectural abilities and design merits. She documents how key actors – clients, architects, engineers and contractors – were concerned more with the economics of real estate than with skyscraper style or design. Thus, rather than seeing skyscrapers solely as symbols of architectural ambition, Willis emphasizes the importance of understanding skyscrapers as businesses themselves (1995, 153) and concludes that: 'Skyscrapers are the ultimate architecture of capitalism. The first blue-print for every tall building is a balance sheet of estimated costs and returns' (1995, 181–2). Paraphrasing the axiom of Louis Sullivan that 'form ever follows function', Willis argues that 'form follows finance' (1995, 14, 7) and that the 'distinct vernaculars of capitalism evolved in each city from this combination of *economic logic* and the particularities of place' (1995, 19, emphasis added).

Although Willis brings logics to the fore in the analysis of skyscraper construction, Willis does not address the question of how these logics are shaped (in the material practices of skyscraper construction). In this respect Willis' analysis resonates well with the definition of institutional logics introduced by Thornton, Jones, and Kury (2005) who also consider how logics transform architecture. What is surprising in their analysis is that they do not consider how the professional logics of architects are related to architectural practices and the processes of building construction. They identify designers and engineers as two professional ideal types, and argue that the (American) architectural profession is 'comprised of a pair of often-competing logics: an artistic concern for the beauty of the built environment, emphasizing design skills [designers], and a concern for safety and utility of buildings, emphasizing technology [engineers]. These logics are combined with corporate and market logics to create two hybrid logics, an *aesthetic logic* and an *efficiency logic*' (Thornton, Jones, and Kury 2005, 141, emphasis in original). They do so without considering how the logics of the American architectural profession are related to the material practices of the building construction. This is particularly surprising given the emphasis that they, echoing Friedland and Alford (1991), put on considering 'material practices' (Thornton, Jones, and Kury 2005, 128). What is also surprising is that the construction sector is not included in their list of what sectors and institutional logics 'Western societies are composed of' (Thornton, Jones, and Kury 2005, 128), particularly since they consider the architectural profession as being influenced by the logics of 'multiple sectors' (Thornton, Jones, and Kury 2005, 128). Instead of investigating how the material practices of building construction shape professional (architectural) logics, the authors consider the logics of other societal sectors, i.e. six institutional logics they define as inherent to the core institutions of western societies – professions, markets, corporations, states, families, religions, but the construction sector is strangely absent.

According to Thornton and Ocasio (2008, 121), it is important to 'distinguish between changes in logics and changes in practices'. It appears as if logics are independent of practices, and that material practices concerning building design and construction are subsumed under the domain-specific logics the authors have defined for themselves. In the next section we develop an alternative approach, one that

allows us to consider how the building and some of the objects used to design and construct it can be (more) actively involved in shaping logics in construction.

The sociology of associations: An alternative theoretical approach

Rather than considering 'logics' as something residing in society's core institutions (Friedland and Alford 1991) that can be combined to form 'hybrid' institutions and logics (Thornton, Jones, and Kury 2005, 128), they can be considered an emergent effect – a temporal stabilization of socio-material associations. Theoretically, our argument is grounded in ANT, which emphasizes relational materiality and performativity, i.e. that objects are what they are qua their relations with other things and people, and they are performed through these relations. ANT – like institutional theory – seeks to develop our understandings of the 'social' and how 'social' processes stabilize and change, but unlike institutional theory, ANT does not seek to provide 'social explanations' as in the more conventional or commonplace sense of the word 'social'. The 'social' is, in ANT, not considered a special domain or a specific realm that can be predetermined by the analyst. It is seen as 'something' that is assembled through the 'associations' of things and people (Latour 2005). As Czarniawska notes: '… the world is not created (from nothing) but constructed or assembled from what already exists' (2009, 156). This construction process can include both humans and things such as words and machines – it is not assumed to be limited to humans as implied by the more conventional concept of 'social'. And if things come to be taken for granted as passive objects, this is considered to be an effect of what has been assembled or of the associations made, and as such, they are precarious achievements, more often than not subject to contestation and, perhaps, even change.

As argued by Czarniawska (2008), Joerges and Czarniawska (1998) and Holm (2001), there are some*thing(s)* missing in institutional theory – there is a tendency within institutional theory, as in much other organizational research in general, to overlook the materiality and the role of objects – things – in organizational processes. ANT, however, specifically directs attention to the role of material objects in stabilizing organizational processes. The objects can have an active, material role; one of 'doing things' rather than just acting as a passive, immaterial go-between between humans. Latour (2002) exemplifies this argument with reference to a commonly used object in construction, i.e. a hammer. According to Latour, a hammer is not confined to having a passive role as a means to an end, as in a rationalized 'means-end relationships' (Scott and Meyer 1994, 3). Rather, when inserted in the hand, the hammer holds both permission and promise of different ends for a construction project. Latour introduces the concept of 'technical action' as an alternative to the concept of 'social action' to draw attention to the active (material) role of the technical objects. One important point following from this line of reasoning is that artefacts, technology and even the materiality of a building can be regarded as entities actively involved in transforming, translating, modifying or even distorting the meaning that they are assumed to carry. In the context of our study, we more specifically propose that the building construction and the technical objects used in construction can have an active (material) role in shaping logics as materially mediated meaning structures. Several contributions within management and organization studies have suggested that objects and models can be active in shaping business and strategy (Corvellec 2002; Whittington 2004; Hansen and Mouritsen 2005; Tryggestad 2005; Corvellec and Risberg 2007; Doganova and Eyquem-Renault 2009; Skærbæk and Tryggestad 2010; Justesen and

Mouritsen 2011), construction and building design (Yaneva 2005; Harty 2008; Whyte et al. 2008; Bresnen and Harty 2010; Tryggestad, Georg, and Hernes 2010; Våland 2010; Whyte and Lobo 2010). Although some recent contributions have investigated the strategies involved in architectural competitions (Kreiner, Jacobsen, and Toft 2011) and the dynamic links between architectural design and economic calculations (Georg and Tryggestad 2009; Justesen and Mouritsen 2009), the question of how objects shape logics in construction is still largely unaddressed.

Rather than subsuming objects under the 'master logics' of society's core institutions and considering the organizational processes of skyscraper construction as infused with (given) institutional logics, we consider the logics as emergent 'socio-logics' (Callon 1980; Latour 1987): 'In effect, we have moved from questions about logic (is it a straight or distorted path?) to socio-logics (is it a weaker or stronger association?)' (Latour 1987, 202). In more specific terms, Callon (1980) uses the concept socio-logic to denote a process of problematization that links knowledge and different actors in such a way that they can define (and redefine) problematic situations. This happens through a process of translation, which relates or ties things together that were previously separated and different. In more general terms, Callon proposes 'to call this particular logic by which problems are directly associated with groups; the socio-logic of translation' (1980, 210). In brief then, actors are able to (re)formulate their concepts and knowledges through problematizations of particular objects, and logics emerge as a response to these problematizations. Following from this, problematizations also produce the context for the actors involved.

In the context of our study, the two concepts 'socio-logic' and 'technical action' offer an alternative and complementary analytical toolkit to institutional theory's notion of 'institutional logics' and 'social action' (see Thornton and Ocasio 1999, 2008; Greenwood et al. 2010 for literature reviews of the latter) that allows us to consider the possibility of objects playing an active role in shaping logics and the context in which they are put to use. We begin our exploration of these issues in the following section.

Research method and analysis

Empirically, the paper draws upon a case study of the construction of the skyscraper 'Turning Torso' in Malmö, Sweden, which is presently one of the highest residential buildings in Europe. It is also a new landmark in the Öresund region. It was commissioned and built by the Malmö branch of the cooperative housing association, HSB-Malmö.[1] Construction started early 2001 and was completed in early 2006.

Data collection took place from late 2004 to early 2006, and it was based on document studies, in situ visits and interviews. The documentary data included public city plans, consultancy reports, memos, decision protocols, architectural drawings, pictures, movies, press releases, and articles from magazines and the local newspapers. The in situ visits allowed for viewing how construction progressed, and took place in late 2004 at the celebration of the finished roof, in mid-2005 at the world press conference on the 54th floor and at the ensuing public celebration, and in early spring 2006 when construction was nearly completed. In the twin capacity of being a citizen of Malmö and a researcher, one of the authors made additional visits to the construction site when conducting interviews and when passing by for less formal visits and observations. Interviews were conducted with 11 people: the head of project management and project marketing, respectively; the head architect from the firm responsible for interior layout and design; the engineer from the firm responsible for

quality control of structural design; the head architect and one additional member of the city's planning department; and five representatives from the owner/client organization, i.e. the CEOs, the head of building maintenance and service, and the chairman of the board. The client organization changed their CEO three times in the course of the construction process, and they were successively interviewed during early summer 2005 and early spring 2006. These interviews provided additional insights into the client organization's financial situation during the construction process and shortly after the skyscraper's completion. The interview conducted early spring in 2006 with the head of maintenance and service added to the historical account of the client organization and the construction process, and also provided insights into the regular use and functioning of the building. All interviews were recorded and transcribed, and each lasted on average approximately 90 minutes. The interviews were conducted as conversations with the aim of reconstructing the history and the critical moments during the construction process. There were no follow-up interviews.

The method of analysis is a reconstruction of the chain of related events that led to the materialization of the Turning Torso building. This involved a systematic reading of the data to develop time lines, identify controversies, identify objects with a significant role in the chain of events and to follow the chain of associations connecting the key decision-makers with these objects, e.g. the architect/engineer's sketch and a model of a twisting torso, multiple versions of the budget and the design drawings, laboratory simulations, as well as the emergent building. Latour (1987) has summarized this method in a rule of thumb as 'following the actor' or the chain of associations. Analytically, this has the advantage of encouraging the analyst to trace connections across localities while reducing the propensity to take the relevance of a particular organizational locality for granted. The combination of documentary data, in situ observations and interviews allowed for tracing the devices and the people actively involved in the construction process. For example, drawings obtained from Malmö city's public archive depicting different structural design solutions over time were used as focusing devices in on-site interviews with project management and the engineer responsible for quality control of structural designs. They enabled our conversation on the important design changes concerning the skyscraper's structural stability.

Many researchers informed by ANT have moved beyond the study of scientists/engineers in their laboratories to study other professions and sites outside the scientific laboratories, e.g. the offices of architects (Yaneva 2005; Ewenstein and Whyte 2009; Våland 2010). Our study augments this work by attending to the complex web of organizing across organizational sites and professions during a building process. For pragmatic reasons (due to timing of the study), we have unfortunately not been able to conduct in situ observations of the bench work within the 'laboratory' of the architect office (Yaneva 2005). Instead we relied on documentation and verbal accounts of how architectural prototypes and drawings have circulated and linked up with such diverse localities and temporalities as a construction site in Malmö city, prospective clients, city planners, ordinary citizens and prospective users of the building, thus extending the laboratory from the office of an architect to a city (Czarniawska 2002).

Logics in construction

Our study has two starting points: one in Switzerland and one in Malmö, Sweden. Taking the Swiss connection first, this part of the story starts with a sculpture called 'Twisting Torso' (see Figure 1), conceived of by the Spanish architect and engineer

Figure 1. Left picture: Nine-cube sculpture study named 'Twisting Torso'. Right picture: 'Turning Torso', in construction October 2004.
Source: Kjell Tryggestad.

Santiago Calatrava. Calatrava, known for his interest in organic form and movement, had created the sculpture consisting of nine cubes in 1985 and had it in his personal art collection at home:

> … They describe the spine, or how our body stands up. The spine is made up of vertebrae that are *represented* in the sculptures in a very elemental way, as a series of cubes … Also quite important is how our spine twists, how it turns around an axis, and how it bends and reaches. (Calatrava 2002, 95, emphasis added)

The 'Twisting Torso' was just a piece of art in a private collection until the sculpture was put into circulation by Calatrava, and it made it to the second starting point of our study – Malmö, Sweden. In what follows we focus on three movements from when the 'Twisting Torso' made it to Sweden. First, we show how an aesthetic concept emerges and evolves into a design logic for the building construction; second, how an economic logic emerges and co-evolves with the design logic; and third, how these two logics are further negotiated and combined with a truth logic and a market logic. Taken together, the three movements show how logics are shaped in interaction with the emergent building.

First movement: The emergence of an aesthetic concept and design logic for the building

The city of Malmö was in the late 1990s in a period of transition. Local government was greatly interested in revitalizing the western harbour that, once the site of thriving

shipyards, had lain desolate as an urban wasteland for more than a decade. Creating new housing was to play a pivotal role in this urban transition, and they planned to open a housing exhibition, 'Living 00' [Bo00] in 2000 in a small town just south of Malmö. Only, the construction industry was not particularly interested in developing this (relatively) marginal location, and the housing expo was therefore re-located in Malmö's western harbour in May 2001 and re-named 'Living 01 – City of Tomorrow' [Bo01]. Malmö city's goal was to demonstrate 'that the industrial wasteland could be transformed into the center of the world'; a green sustainable city of the future (Homepage Bo01, http://homepage.mac.com/studioarchives/amcnet/bo01.html, accessed April 12, 2011), and as it turned out, the skyscraper 'Turning Torso', inspired by Calatrava's sculpture, was to figure prominently in realizing this ambition. As the head of city planning explained:

> The [shipyard's] crane was destined to be sold and sent away. The city's landmark was to be replaced by a new one, representing the transformation from an industrial city to the new area – Malmö, the city of knowledge and events.

The way in which this happened is by way of the 'Living 00' exhibition. Calatrava had exhibited his model of the 'Twisting Torso' at this exhibition, and it was the architect responsible for organizing the exhibition who brought Calatrava's work to the attention of the head of Malmö city's planning department in 1999. Up until then, the city had not yet developed any detailed plans for the 'Living 01' expo apart from designating that the site would contain a fairly tall building – 25 stories, with a maximum height of 77 meters – that would 'fit' into the otherwise relatively low-rise cityscape. They did not have a prospective developer or owner of the building, and they had not yet decided upon the purpose or design of the building. It was on all counts – relative to what was to become the 'Turning Torso' – a fairly normal construction project. However, once the head of city planning had seen Calatrava's model, things took a decisive turn and visiting Calatrava became an imperative for him.

The city was, however, not the only organization planning on constructing a high-rise. The CEO of a housing association, HSB-Malmö, was also considering constructing a 75-meter-high building, and while visiting the city planning office in spring 1999, the CEO came across an exhibition folder displaying a picture of a seven-cube version of the 'Twisting Torso' sculpture: 'I was heading for a different meeting with some architects at the office for city planning. There were some brochures scattered around that Calatrava had left behind and [in the brochure] there was this sculpture Twisting Torso. At that time, it was seven cubes high, because this is the way architecture divide the human body' and '… having seen the sculpture, I contacted the general management of the housing exhibition ["Living 01" in Malmö] in order to establish contact with Calatrava.' This coincidence marked the start of a series of meetings between the CEO, Calatrava and Malmö's city planners. When visiting Calatrava they brought with them pictures of the western harbour in order to argue that the harbour would, indeed, be an appropriate site for a high-rise building.

Initially Calatrava sketched a building resembling a cobra, but as the CEO explained: 'I was not very interested [in the cobra] and succeeded in persuading him to consider doing something else for us.' It took a site visit to convince Calatrava that the western harbour would be an appropriate site for one of his buildings, and it took the CEO, representing the prospective project owner and client, quite some effort to persuade Calatrava that his small piece of art, 'Twisting Torso', would be a good

prototype for a residential building. They coined this mixing of art and architecture as 'living art', a phrase that captures the emerging design logic. The city's master plan – a legal–political document – was adjusted accordingly so as to 'fit' with this proposition, i.e. the original height constraint stipulated in the plan of 77 meters was adjusted by the city planners so as to allow for the construction of a building with the extraordinary height of 211 metres.

As suggested, the aesthetic concept and design logic is a (provisional) outcome of the continuous interaction with and circulation of pictures of the 'Twisting Torso', drawings and models, and a process of progressive elaboration of these objects. This interaction is illustrative of Latour's (2002) notion of technical action in the sense that largely undefined design goals are shaped and given a more precise form as the objects are circulated, problematized and elaborated. It is a translation process through which new links are established between separate organizations such as the city planning office and the HSB association. These links grew out of a concern that both organizations had about what to build, and involved numerous interpretations, deliberations and negotiations in interaction with Calatrava's sketches, photos of the art piece and drawings. The design concept and logic that emerged from these processes provided a possible shared solution to what initially had been an unresolved design problem in two separate organizations.

At this point in time, the concept and design logic is still in a process of becoming, and it is to be further refined and stabilized through the ensuing construction process. The initial plan had been to construct a building consisting of seven cubes. However, when the CEO and architects put themselves in the place of the user, they discovered that the dimensions of the cubes would mean that the angles of the windows and walls would be quite skewed. According to CEO:

> When we made the first models we believed that seven cubes and 133 metres would be sufficient, but it turned out that it would be very difficult to absorb the sharp angles of windows resulting from the [building's] 90 degrees twist.

Their initial beliefs and assumptions about the design are problematized and transformed as they interact with models and the more detailed drawings of the building. The issue could, however, be resolved by increasing the number of cubes from seven to nine. This allowed for reducing the sharp angles; something which according to the CEO and architects would be quite an improvement for the prospective end-users, because as the CEO explained: 'The sensation of living in the Turning Torso would become less of a challenge, if the angles of windows and walls approached the ordinary 90 degrees standard.' Adding two more cubes to the building increased the height and called for subsequent re-workings of the design, drawings and models. This allowed them to preserve the sculpture's kinetic qualities in the building while also taking prospective users needs into account. It was a process of translation that linked drawings, models and peoples' beliefs while simultaneously transforming them.

When Calatrava entered the HSB board room a few months later, in February 2000, the architect was well equipped. He brought with him sketches and drawings that convinced the board members to continue exploring the feasibility of the project. The name 'Turning Torso' emerged in the wake of the meeting, and as the CEO explained, 'the name [Turning Torso] seemed natural'. Naming is, however, important in constituting identity, both for humans and objects. By naming the building after a piece of art and in English rather than in Swedish, its identity is strongly tied to sketches and models of the twisting form of a human torso. It is through the progressive elaboration,

circulation and use of prototypes, simulation models, mock-ups, sketches and drawings that the initially largely undefined design concept and logic as well as the building's identity emerges.

The next movement accounts for the dynamic interplay between the emerging design logic and an emerging economic logic. Inspired by Willis' (1995) claim regarding the primacy of economic logic, we inquire further into the ways in which the economic logic can shape and also be shaped by the design logic. To this end, we focus on one particular instance in which the design and economics of the building construction come together and are further negotiated and (provisionally) stabilized through peoples' interaction with architectural drawings and the construction budget.

Second movement: The emergence of an economic logic and its co-evolution with the design logic

By mid-2000 HSB had yet to decide whether or not they would build this nine-cube building. Based on the architect's revised drawings, the cost of constructing a building with 14.797 square metres for apartments and offices was estimated to be approximately 550 million SEK. The drawings and cost estimations were presented to HSB's board in early autumn 2000, and subjected to intense debate for the rest of the year. The budget sum opened up a chain of problematizations (Callon 1980) that the ensuing deliberations created a new, dynamic link between the emerging design logic and the economic logic of the budget. Although production costs had initially been board's prime concern, over the course of their meetings in the fall they became increasingly interested in the potential revenue that the project could generate. This had not previously been a concern, but the production costs made visible in the budget sum spurred the HSB board members to consider what had been missing in their initial calculations, i.e. the potential revenues. When project management started revising the budget to accommodate this concern, new distinctions had to be made between what could be considered as commercial and technical, non-commercial areas so that it would be possible to calculate what the potential revenues might be. The prospect of gaining additional revenue by enlarging the 'commercial space' led to a redesign of the building, adding approximately 3000 square metres to the building and another 178 million SEK to the 550 million SEK cost budget. While the budget process prompted the board's economic realism and provided a rationale for developing a more favourable cost/benefit ratio, the redesign swayed their economic concerns about the missing revenues, and in December 2000 the HSB approved the project according to the revised design and budget cost of 728 million SEK. The potential revenues were, however, according to project management, far below the norm for skyscrapers, because the commercial area was still relatively small compared to the technical, non-commercial area. Although project management's economic reasoning appears to have much in common with Willis' (1995) account of a dominating economic logic and the more crass economic truism, 'form follows finance', there are important differences concerning the dynamic links and associations.

First, the economic logic was not so strong that it dominated the construction process. Rather, it seems that the aesthetic design logic had more influence in the sense that project management remained faithful to the concept of a twisting torso when trying to negotiate for more 'commercial space'. The design logic was not fundamentally challenged by the economic logic of getting more revenue, despite the fact that the expected revenue was below the commercial norm. Had the economic

logic figured more prominently, this would likely not have been the case. This is, however, not to say that the economic logic did not make a difference, on the contrary. Project management could not have calculated and problematized the potential revenue and returns of the Turning Torso without knowing the size of the commercial area. The budgeting process – *in dynamic interaction with the architectural drawings* – provided new knowledge about the building's economy that was translated into financial concerns about the existing cost/revenue ratio, which, then, prompted project management to negotiate a redesign of the building, which the professional architects redrew so as to accommodate project management's request for more 'commercial space', and the budget sum increased accordingly (728 million SEK). Project management's distinction between technical and commercial area was a (provisional) outcome from their interaction with the budget *and* the architectural drawings. The interaction is a particular instance of technical action that allowed project management to calculate the spatial distribution between technical and commercial area, and to problematize their spatial distribution from an economical point of view. The budget enacted this reflexive economic point of view, but it could only do so in association with the architectural drawings. The design concept and logic, the need for more commercial space, the amount of technical space and the economic cost/return ratio were simultaneously intertwined as project management, through the subsequent budgeting process, arrived closer to an economically grounded building design based on the relative distribution of technical and commercial area.

Second, the budget prompted project management to reconsider and alter the building's design, thus taking on a new role. For project management it was no longer sufficient to just stay on the budget and let the professional architects to deliver the design. Instead they engaged in developing a *more* economical design, thus rendering project management as a hybrid between the traditional virtue of staying on budget *and* design. This hybrid identity as project manager–architect is emergent, co-produced through interactions with a progressively elaborated budget *and* architectural drawings, and by implication, the identity and boundary between professions such as project management and architects become hybridized.

Hence, the more crass economic truism, 'form follows finance' (Willis 1995), appears to hold, but only in a limited spatial–temporal sense. Both the Empire State Building and the Turning Torso appear to have become larger due to the intervention of financial calculations. In the case of the Empire State Building, it was transformed from a 50–55-storey building to the significantly higher one due to the economic calculations: 'all plans had been *entirely financial, not architectural* […] No drawings were included' (Willis 1995, 95, emphasis in original). However, closer analysis also reveals some differences with regard to the mutual dynamic link between the architectural drawings and the budget (the financial calculations). In contrast to what happened in the case of the Empire State Building, it appears that in the Turning Torso case the architectural drawings preceded the budget sum (550 million SEK), i.e. the budgeting activities appear to have existed in a dynamic co-dependent relation with the drawings. In contrast to Willis' (1995) findings, there is not an economic logic that exists independently of the building's design, and it does not have primacy over the design logic – form only follows finance in a limited spatial–temporal sense as project managements' logic of an economical design for a brief moment becomes stronger in dynamic interaction with the progressively elaborated drawings and budgets. In the next section we will show how additional logics come to emerge and be shaped by the objects of construction.

Third movement: The emergence of a truth logic and a market logic

Delving further into the process and events leading to the Turning Torso's construction, the budget and economic logic it sustains, gives way to a hybrid logic that we will call 'finance follows functional form'. In order to explain this shaping of both the economic logic and the aesthetic design logic, we have to account for the emergence of a (science-based) truth logic and market logic and show how they, together, challenged the two other logics to give way for this hybrid logic.

During the first years of the construction process, the concept and logic of 'living art' came to develop and maintain a particular identity for the building's prospective inhabitants. This is, for instance, inscribed in the marketing material – the prospective inhabitants were to be homeowners as opposed to tenants, which are more commonly associated with municipal housing cooperatives. Moreover, it appears that: 'It is mainly wealthy Swedes, international businessmen, celebrities and Corporations who have taken an interest in the apartments' (Press release: 'Turning Torso – An Öresund region landmark', 12 September 2003), and who would have the opportunity to design their own apartments according to their desires. The inhabitants' identity that is inscribed into the building design is not that of an ordinary, middle-class inhabitant seeking affordable housing, but rather what Koolhaas (1996) has termed as the *kinetic elite*. This exclusivity is, however, problematized and renegotiated as a host of actors struggle to ensure a basic functional need – stability.

The commitment to produce the twisting torso design and the materiality of the building itself resulted in numerous subsequent and unexpected redesigns with regard to both the exterior and interior of the building, causing major delays (more than 100%) and major cost budget overrides (about 100%). Here, we will delimit the account of the objects and the ensuing technical actions to one particular problematic situation during which a truth logic emerged and triggered an unexpected chain of problematizations (Callon 1980; Latour 2002). Increasing the building's height led to another functional issue – the structural stability of the building. This issue 'cropped up' just as the excavation for the building's foundation was to start with a symbolic first dig in February 2001. It called for having a project meeting on site. Amongst those present were a representative from the Calatrava office and his Swedish counterpart, the 'structural checker', whose task was to audit the drawings and calculations made by Calatrava's office.

Equipped with the more refined drawings, the structural checker problematized the construction design: he questioned the structural stability of the tower design by mobilizing the building's 'resultant'. The main argument was that the radius at the base was too small to secure vertical stability, because the estimated 'resultant' (measuring the vertical axis of the building design) would be outside the building's structural core. A well-reputed laboratory at a Canadian university was asked to test the construction design by conducting a wind-tunnel test of a nine-cube mock-up. This simulation of the building's structural stability under extreme wind conditions confirmed project management's concerns. At high winds, the 'resultant' would most certainly be outside the structural core. The results from the wind simulation establish a new, science-based truth logic about the construction design. Equipped with the wind tunnel results, project management decided to enlarge the building's radius at the base from 12 to 15 metres. The architects followed by revising their drawings. The functional concern – stability – was so overriding that project management also decided to reinforce and enlarge the building's foundation and structural core, thus adding large amounts of concrete and steel to the construction.

These design changes increased project costs significantly and delayed the construction process considerably. When stability emerges as a design issue and concern, it does so through technical action (Latour 2002) and the ensuing problematization (Callon 1980) of architectural designs and drawings; the truth logic becomes stronger through the mobilization of wind simulation models in a scientific laboratory, while the economic logic becomes weaker and is transformed into 'finance follows functional form'.

Although this refinement of the building's functional design certainly served a basic user need – stability – it unexpectedly undermined HSB's plans to engage prospective users in designing their apartments. Originally, and in keeping with the exclusivity of the building, the plan had been to design each apartment according to the individual customer's preferences. However, the stability-related changes in the building's exterior and interior design put an end to these ambitions, as the interior architect noted: 'It [the project] took too much time. The list of interested users became shorter and shorter as people opted for another place to live, or simply because they started to become concerned about the additional costs.' By fall 2003, there were only a handful of interested customers left, and the HSB board redefined their interior design strategy accordingly – from user involvement to standardization. The decline in prospective customers' interests suggests that they too can calculate and problematize. More specifically, their problematization suggests the emergence of an unexpected market logic, which can be considered as a reflexive, dynamic and (more) distributed form of economic logic. If the management of the Turning Torso project had not reconsidered their original programme and plan to sell the apartments, then the project might have ended much like the Empire State Building – as an almost empty 'ghost house' at the point of delivery (Willis 1995). Instead, when confronted with the calculations and concerns of prospective apartment owners, management revised their calculations and definition of the end-users' identity to become rent-paying tenants. With this sensitivity to the market logic and reshaping of end-user identity, their interests and commitment could be stabilized, as could the revenue stream from the building construction. Upon completion, the Turning Torso was filled up with tenants willing to pay the rent, and this is a relatively successful outcome at least compared to what, for instance, happened with the Empire State Building.[2]

Conclusion

These three movements are illustrative of the material practices – the constant intertwining of the humans and material objects – involved in shaping logics in building construction. Playing on Louis Sullivan's phrase 'form follows function', we show how the design logic of living art evolved as an instance of 'function follows form'; how economic logic has a brief moment of primacy in shaping the building construction when project management mobilized the budget and problematized the lack of commercial space, thus echoing Willis' (1995) finding that 'form follows finance'. However, as the construction process continues we show how the primacy of the economic logic was limited by a design concept and logic, given that the latter was never fundamentally challenged by the economic logic. This, in turn, suggests that the design concept and logic enrolled other entities strong enough to oppose the economic logic. Moreover, the economic logic becomes weaker as the unexpected costs associated with the emergence of a science-based truth logic regarding the building's stability

were taken into account – forcing 'finance to follow functional form'. Still further into the building process, the economic logic was challenged by an emerging market logic that redefined the identity of end-users. Instead of being owners of an apartment, the inhabitants became tenants. In effect, also the identity of the building construction and its ownership changed, since the building now also became an asset and liability on HSB's balance sheet. In short, the economic logic, budget and balance sheet can be regarded as emergent outcomes in a process of association. As such, these three movements are indicative of the temporal–spatial dynamics of logics – they are an effect of the material practices rather than exogenously given dictates.

As an alternative to considering institutional logics as 'master principles' that guide social action (Greenwood et al. 2010, 521) in building construction, our case attends to the material micro-foundations of the logics, and our analysis suggests that the logics could be theorized quite differently as integral to the objects implicated in the process of building construction and that this reveals new insights about the dynamics of their emergence – their becoming – and mutual dependencies. Our findings suggest that it is a contingent and open empirical question how logics emerge and eventually influence building construction.

More specifically, the case analysis of the socio-logics shows that the logics and identity of the professional are in need of further explanation. The identity is not autonomous or separate from the material practices of the building construction. Rather, professional identities appear to be dynamically linked with technical objects – and become hybridized. As the building design scales up (Yaneva 2005) and grows in size, so does the budget due to their dynamic inter-linkages. Professional project management assumes an active role in negotiating the larger and more 'commercial' design and the professional architects comply by revising their drawings, but in the course of these events the logics and identity of project management are hybridized into an architectural, aesthetic variant promoting an economical design. Like Willis (1995), we find the presence of an economic logic and financial calculations (budgeting and cost/benefit calculations) that actively shaped the building size, but unlike Willis we could only account for this by including the dynamic link to other objects such as the architectural drawings. These findings suggest that logics and (professional) identity should not be taken as given with an existence independent of the technical objects and actions implicated in building construction.

But does this dynamic just mean that logics co-exist and can replace each other, as in the historical shift/replacement accounted for by Thornton and Ocasio (1999)? Our findings suggest a more complex and inter-dependent sequencing of logics and historical events. For example, the twisting torso sculpture remained 'dormant' as part of a private art collection for more than a decade before it was circulated to other sites and domains with the help of a picture in a brochure. Form of matter matters, a picture of a sculpture in a brochure can circulate with more ease than the sculpture, hence the former helped in pacing the history and events that constitute construction time. The progression of events does, however, not necessarily mean one logic replaces another or that there is a shift from one logic to another. Logics are not just separate entities and events over time, but can be simultaneously linked and mutually transformed through the progressive elaboration of the architectural drawing and the budget, i.e. the technical objects and actions (Latour 2002). Like other authors (du Gay and Pryke 2002) commenting on 'epochal' shifts over (exogenous) linear time, we find forms and matters that endogenously define construction time. Time, although linear at the point of project approval, with an estimated two-years completion time, is transformed

as the construction process takes its turn. Rather than remaining linear, time seems to be transformed as events (e.g. the stability issue noted above) redefines and thoroughly undermines the linearity of construction planning. When we claim that the twisting torso sculpture assumed a crucial role in shaping construction time, design, economy, logics and (professional) identities in building construction we do not point to a singular object – the sculpture. Rather, it is due to the multiplicity of the object, i.e. the progressive elaboration into sculptures, sketches, drawings, pictures, models, budgets, concrete and steel that the twisting torso could assume such an active role in shaping the context of construction, while simultaneously stabilizing itself as the building Turning Torso.

Following from our analysis of the role of objects in the chain of events, one can question if the object of our study – the Turning Torso – is just a passive outcome from of the guiding influences of 'master' logics. We beg to differ on several accounts. First, institutional theory urges the researcher to focus on the higher (field) level 'master' logics in order to provide an explanation of the material practices at the micro-level. The challenge here is to maintain a focus on the material practices in order to examine the micro-mechanisms that shape the logics and their relative strength and duration. Second, the distinction between logics and practice in institutional theory poses an additional challenge since it makes it difficult to attend to how logics emerge from the material practices. Third, and closely related to the above, institutional theory involves a temptation to short cut the analysis by invoking the logics as an explanatory resource. The challenge here is to reconsider the distribution of explanatory resources and topics by considering logics as a topic in need of further explanation. In order to overcome these challenges in our case analysis, we have used the sociology of associations and the concepts of socio-logics (Callon 1980; Latour 1987) and technical action (Latour 2002). Even though 'Scandinavian Institutionalism' (Czarniawska and Sevón 1996, 3) does not specifically address institutional logics, their approach is similar to ours in challenging the taken-for-granted distinction in institutional theory.

With the construction of the Turning Torso, the city of Malmö is, according to critics and supporters of the Turning Torso, no longer the same. But nobody questions its stability anymore. The building has become part of the city. Now it is a taken-for-granted feature of the cityscape, and as such has become an object that tourists flock to see and that patterns the behaviours of those living and working in a building with slightly skewed windows and walls. It might be considered a symbol or icon but more important to our argument is to consider the possibility of the construction sector and in particular the building construction as an institution that (re)produces on a massive spatial scale materially mediated meaning structures that continues to shape the horizon and the lives of its inhabitants and visitors. This possibility remains largely unexplored in organization theory.

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Notes

1. HSB is the acronym for Hyresgästernes Sparkasse och Byggnadsförening (literal translation: Tenants Savings Bank and Buildings Society) that has 33 regional offices across Sweden.
2. The Empire State Building was delivered by and large on time and according to cost budget, yet it was '[t]he most colossal miscalculation of the 1920s […] which remained three-quarters empty for a decade after its opening in 1931 and did not turn an annual profit until 1950' (Willis 1995, 90). The Turning Torso was not completed on time or on budget, but it was quickly inhabited.

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