

## **SUPPLY CHAIN PARTNERSHIP WITHIN HOUSING RENOVATION – APPROACHES AND EXPECTATIONS IN THE DUTCH HOUSING ASSOCIATION SECTOR**

**VINCENT GRUIS**

Utrecht University of Applied Sciences and Delft University of Technology  
v.h.gruis@tudelft.nl

**MARTIN RODERS AND AD STRAUB**

OTB Research Institute for the Built Environment, Delft University of Technology

### **Abstract**

*Supply chain partnerships within housing refurbishment have not been given much specific attention which may be found surprising because the refurbishment market is becoming of increasing importance compared to new construction and has specific characteristics that require adapted approaches to supply chain integration. In this paper approaches, expected benefits and challenges of supply chain partnerships within housing renovation are explored. From general literature on building process innovation, dimensions of supply chain integration and potential advantages and challenges of have been derived and employed in a preliminary inquiry among Dutch housing associations and their partners that are experimenting with supply chain partnering in housing refurbishment projects. The results indicate that approaches are in a relatively early stage of development towards ‘mature’ supply chain partnerships. Furthermore, many of the general expectations also apply to the Dutch housing refurbishment sector, but at a more detailed level, refurbishment may require specific attention for the division of tasks and risks between the partners, particularly regarding communication with tenants.*

### **Keywords**

Supply chain partnership, housing associations, refurbishment

## **INTRODUCTION**

Supply chain partnering and integration has become a prominent topic of research and debate within the building sector. Several advantages have been attached to building processes that emphasize partnerships between clients, contractors and suppliers in the construction industry, such as decreasing the waste and improving value to the client (e.g. Black et. al., 2000; Bresnan and Marshall, 2000). Nevertheless, most studies have focused on supply chains within new building projects, with some having a specific focus on the housing sector (e.g. Barker and Naim, 2008; Hong-Minh et al., 2001). Publications on supply chain integration in housing refurbishment are scarce. This may be found remarkable, since investment in refurbishment has become increasingly important. As for example Thomsen and Van der Flier (2009) show, the number of new housing construction in Europe constitutes only about 1 percent of the number of existing dwellings, which indicates the importance of maintenance and refurbishment of the existing housing stock to keep housing supply in line with changing demands. Within the current economic climate, the pressure on the existing housing stock to accommodate changing needs, has even further increased, due to the decline in new housing construction in Europe in recent years. According to Mulder (2010) housing construction in Europe, excluding Spain and Ireland, decreased by 10% in

2008, 15% in 2009 and 4% in 2010 compared to the previous year. Housing refurbishment is often a more complicated task than new construction, certainly in cases in which refurbishment encompasses substantial functional and technical improvements to improve the economic and environmental sustainability of the dwellings. Compared to new construction, it is often less easy to develop a more or less continuous production flow, because each dwelling has its own specific challenges. Moreover, refurbishment has to take into account the current tenants, which may create additional socio-economic problems, but also opportunities by knowing the preferences of end-users. At the same time, this complexity may increase the need for supply chain partnerships, in which knowledge of clients, contractors, sub-contractors and supply industry is used efficiently in an early stage of the redesign process. Therefore, combined with the increasing market share for housing refurbishment, there is a (potentially) large opportunity to increase supply chain partnership in housing refurbishment as well.

The market for housing refurbishment is highly fragmented. The existing stock encompasses a wide variety of dwellings and tenures. This paper is focused on the social rented stock, employing recent, innovative practices that are applied by Dutch housing associations and their contractors. There are several reasons why this sector is of particular interest. In contrast to private (owner-occupied) housing, the social rented stock is generally operated by professional management (although to different extents), which enables the development of professional partnerships. Furthermore, throughout Europe, a substantial share of the social housing stock has been built in the (early) post-war period. This part of the housing stock is often encountering a range of physical as well as socio-economic problems and has increasingly been considered to be out-of-date, which increases the need for refurbishment. Moreover, a large part of this stock consists of (large) housing estates that have been constructed in a highly repetitive manner, which potentially enables the introduction of a 'reconstruction flow', project learning and strategic supply chain partnering.

In the Netherlands there may be relatively large opportunities for increasing supply chain partnerships in the social rented sector. The Dutch social rented sector stands out internationally due to its large share in the housing stock; in 2009 2.3 mln dwellings out of a total stock of 7.2 mln, approximately 32%, ([www.cfv.nl](http://www.cfv.nl)). This stock is operated by housing associations, which are private organizations that have the public task of providing housing to households who have difficulties to obtain a dwelling on the housing market on their own. On average, a housing association owned 5,800 dwellings in 2009 ([www.cfv.nl](http://www.cfv.nl)) which are operated by a professional management. In the Netherlands, there has been an increasing interest in supply chain partnership in the construction sector in general and in the social rented sector as well. A survey by EIB (2007) indicated that the clients' preferences have shifted towards building processes that are based on increased partnership. Furthermore, several Dutch housing associations have begun to experiment with supply chain partnership in new construction, maintenance and refurbishment (e.g. Straub, 2007 and 2009; Van der Brug (ed.), 2009; Vernieuwing Bouw, 2010).

Linking the reducing opportunities for demolition and replacement strategies with continuing challenges to improve the socio-economic and environmental sustainability of the housing stock, it can be expected that housing associations will place more emphasis on management and refurbishment. The financial pressure also stimulates housing associations to increase the efficiency of their organization and building processes, which in turn stimulates their interest in the opportunities that supply chain partnership generates for cost reduction. In addition, many housing associations encounter a shortage in professional skills among their staff

(FLOW, 2007), which is likely to increase in the future due the ageing and retirement of experienced staff with technical skills, thus increasing the need for more efficient sharing of knowledge and staff with their contractors.

This paper aims to contribute to filling the apparent gap in research on supply chain partnerships in housing refurbishment. Specific opportunities of increasing supply chain partnerships in housing refurbishment are discussed as well as various shapes of supply chain integration that are applied by Dutch housing associations, employing literature on the (housing) construction sector. Data was used from 9 housing associations and their partner-contractors that are experimenting with supply chain partnering in housing refurbishment within a knowledge exchange project initiated by the authors.

Section two discusses the dimensions that can be used to typify the approach towards supply chain partnerships. Section three gives an overview of the potential advantages and challenges that have been subscribed to supply chain management in literature. Section four discusses the approaches and expectations of the housing associations and contractors involved in our exchange project. Section five sums up the conclusions.

## **DIMENSIONS OF SUPPLY CHAIN PARTNERSHIPS**

Numerous definitions of supply chain partnerships and related concepts can be found in literature. Table 1 contains a selection of these definitions which can be used to identify key characteristics of supply chain partnership.

Almost all definitions emphasize supply chain partnership is based on transparency, trust and mutual interests. This approach is usually stated as being opposing to traditional procurement approaches, which are characterized by hierarchical relations between functional and organizational divided units within the production chain. Some definitions also emphasize the importance of long-term relationships that enable continuous improvement in the supply chain. This implicates that the partnership should exceed individual building projects. Risk and profit sharing has also been mentioned as an essential component and could be a key characteristic to create the equality and common interests that may be necessary for successful partnerships in the construction industry as well. Another feature of supply chain partnership is that it involves the whole production chain and not just the client and the principal contractor, ideally involving the end-users and supply industry as well. Perhaps more specific for the construction industry, supply chain partnering implicates that contractors and other parties are involved in a much earlier stage in the building process. Within traditional procurement approaches, the contractor is involved after the design has been fully completed. In a building team, the contractor is involved in the elaboration of the design as well, but within (full) supply chain partnership contractors will be involved from an early stage in the design process and will continue to be involvement in the management of the buildings.

In construction practice, supply chain partnership occurs to varying extents. From the characteristics of supply chain partnerships dimensions according to which the extent of supply chain management can be derived. These dimensions are summarized in Table 2.

**Table 1:** Some definitions of supply chain partnerships and related concepts

Source	Definition
Kim e.a., 2010, p. 188	A supply chain partnership is a strategic alliance to achieve business advantage and exclusive goals by paying attention to critical success factors such as organizational commitment, co-ordination, leadership, trust, communication, conflict resolution, techniques and resources.
CIIPTF (1991) and NEDC (1991) in Hong-Minh e.a. 2001, p. 50.  Cox en Townsend, 1998 in Khalfan en McDermott, 2006, p. 145	Partnering is a long term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources (...).The relationship is based on trust, dedication to common goals and an understanding of each other's individual expectations and values. Expected benefits include improved efficiency and cost effectiveness, increased opportunity for innovation and the continuous improvement of quality products and service.
Ellram en Krause in Minh e.a. 2001, p.50	Supply partnering is an ongoing relationship between firms which involves a commitment over an extended time period, and a mutual sharing of information and the risks and rewards of the relationship.
Lambert e.a., 2004 in Kim e.a., 2010, p. 188	A supply chain partnership is a tailored business relationship based on mutual trust, openness, shared risk, and rewards to create business performance.
Coopers en Ellram, 1993 in Vrijhoeff en Koskela, 2000, p. 170	Supply chain management views the entire supply chain, rather than just the next part or level, and aims to increase transparency and alignment of the supply chain's co-ordination and configuration, regardless of functional or corporate boundaries.
National Agency for Enterprise and Construction, 2004 (Denmark)	Partnering is a type of collaboration in a construction project based on dialogue, trust, openness an with early participation from all actors. The project is carried out under a mutual agreement expressed by mutual activities and based on mutual economic interests.

**Table 2:** Dimensions of the extent of supply chain partnerships in building processes

Dimension	Full supply chain partnership according to this dimension occurs when:
Building life cycle	Partners are involved from initiative till management phase.
Production chain	All parties in the production chain are involved, including subcontractors, suppliers and end-users.
Continuity	Partners are involved in a series of projects.
Risk and profit sharing	Risks and profits are divided between the partners in a balanced and transparent manner.

In addition to the dimensions to assess the extent of supply chain partnership, different approaches can also be found towards the (initial) selection of partners by the clients. In Dutch housing associations' practice (European legislation for public tendering is not mandatory for Dutch housing associations) three different approaches can be found (e.g. Straub and Van Mossel, 2007; Vernieuwing Bouw, 2010). A first approach is that partners are selected on the basis of past experiences. Some housing associations that have begun to experiment with supply chain partnership have selected contractors with whom they already had a satisfying relationship. The level of partnership is increased by having the partners involved in a much earlier stage in the design process and giving them much more responsibility in working out of the design and building plans on the basis of budget restrictions and general performance criteria set by the housing association. Sometimes framework agreements are set up between the housing association and the contractors for continuity in the relationship. In a second approach, partners are selected on the basis of their competences for partnership rather than on the basis of a bid for realizing a concrete design,

after which the housing association forms a design and construct team with the selected contractor(s). In a third approach, a housing association invites consortia of contractors and subcontractors to bid for a building project with a concrete plan on the basis of only some general performance criteria and budget restrictions. The best plan and therefore partner consortium is then selected in a transparent setting after which the selected consortium can further develop and build their plan.

## **OPPORTUNITIES AND CHALLENGES OF SUPPLY CHAIN PARTNERSHIP**

Several (potential) advantages are attributed to supply chain partnership. Hong-Minh et al. (2001, p. 51) summarize the “principal benefits that can be achieved by entering into a partnership...as; on-time delivery (hand-over), on-budget completion, value for money, end-consumer satisfaction, improved quality, improved working relations (team-work spirit) and reduced conflicts (Lamming, 1993; Cooper et al., 1996)”. Many of these advantages have also been recognized in practice, as can be derived for example from a survey by Akintoye et al. (2000) in which contractors from the UK state similar reasons for entering into partnerships (see Table 3).

Perhaps the most frequently stated advantage of supply chain partnership within the construction industry is that it can reduce waste. According to a survey conducted by USP Marketing Consultancy (2008) costs as a result of waste in the Dutch construction sector have been estimated to be over 11% of the total turnover, with one of the most frequently mentioned reasons being a lack of cooperation with regular partners in the construction supply chain. But supply chain integration could lead to additional cost savings as well, due to a reduction of the costs of the procurement process itself as well as the avoidance of overlap in the work of the supply chain partners. Straub (2009) concluded an average cost reduction of 20% due to performance-based contracting in housing maintenance compared with traditional contracting. Vrijhoef (2009) states that supply chain management in a new housing construction project, conducted in partnership between housing association Com.wonen and contractor Dura Vermeer, has led to a cost reduction of 8%. Similar effects have been found in studies from the UK (e.g. Hong-Minh, 2001; Khalfan and McDermott, 2006). In addition to cost savings and the other factors already mentioned above, supply chain partnership has been stated to contribute to innovation (e.g. Spekman et al., 2002; Soosay et al., 2008, Khalfan and McDermott, 2006). This could be of particular relevance for developing and implementing the necessary innovations for improving the sustainability of the housing stock.

Next to the advantages, (successful) supply chain partnership also generates challenges for the organizations involved. In this respect, the results of a study by Briscoe et al. (2001) among smaller and middle-sized contractors are of specific interest for the refurbishment market in which such parties are often a logical partner for the housing associations (see Table 4). Briscoe et al. mention as important skills to be developed: ICT skills, communication, marketing, client-oriented behavior, being able to deal with academics, architects and clients, as well as leadership skills aimed at cooperation and innovation. Many studies emphasize the importance of soft skills, such as trust, leadership and commitment (e.g. Kim et al., 2010; Table 5).

**Table 3: Principal objectives in developing construction supply chain collaboration**

Principal objectives	Overall
Benefits to the client	4.53
Improved customer service	4.50
Reducing bureaucracy/ paperwor	4.50
Increased profitability	4.48
Cost reductions within organisation	4.38
Increased market competitiveness	4.35
Benefits to the supplier	4.03
Improved quality assurance	3.93
Overall supply chain reduction	3.70

Source: Akintoye et al. (2000, p. 163).

**Table 4: Necessary attitudes within supply chain partnerships**

1. Full communication with partners
2. Working together (rather than trying to take advantage)
3. Sharing of information and knowledge (often with common IT systems)
4. Straight talking with no hidden agendas
5. Rapid responses to queries and requests for help
6. Enabling partners to perform (providing partner training if required)
7. Teamwork and interdependence
8. Seeking continuous improvement through co-operation
9. Willingness to change to accommodate partners
10. Open accounting and making timely payments
11. Profit sharing on a "win-win" basis
12. Common interest in providing client satisfaction

Source: Briscoe et al. (2001)

**Table 5: Critical success factors for supply chain partnerships according to literature**

	Mohr and Spekman (1994)	Parung and Bititci (2006)	Brinkerhoff (2002)	Lambert et al. (2004)	Beach et al. (2005)	Riggin et al. (1992)	Archer and Cameron (2005)	Fuller and Vassie (2002)	Maloni and Benton (1997)	Perry and Sohal (2001)	Maheshwari et al. (2006)
Leadership		○	○	○	○	○	○		○	○	○
Commitment	○	○	○	○	○	○	○	○	○	○	○
Coordination	○	○	○	○		○			○		○
Trust	○	○	○	○	○			○	○	○	○
Communication	○	○	○	○	○		○		○	○	○
Conflict resolution techniques	○	○	○		○				○		○
Partner capability		○	○	○			○		○		○

Source: Kim et al. (2010)

### **Approaches and expectations in Dutch housing associations' refurbishment**

As stated in the introduction, pairs of housing associations and their (principal) contractors that have begun to work on the basis of supply chain partnership in refurbishment are participating in a two year project, initiated by the authors, to exchange knowledge and experience. Five housing associations are really partnering, another 4 have shown interest in the project and started participating although they did not have a partner at the moment of writing. They are to find a partner during the first months of 2011 in order to continue participation. The project has started in January 2011. The participating organizations were selected on the basis of their willingness to participate and co-finance the project. They were required to bring in a concrete refurbishment project in which they have begun to, or will begin to within a short period, to develop, employing principles of supply chain management. At the start of the project, the organizations have been asked to typify their partnership on the basis of the dimensions and approach towards partner selection as have been described in section 3. Furthermore, they were asked to state their expectations about the opportunities and challenges that supply chain partnership will generate for them within the selected project. The results of these inquiries have been discussed in a workshop with the involved parties in order to validate and complement the outcome. In this section we will summarize the findings of the first stage of this project.

### **Approaches according to the dimensions of partnership**

In order to classify the approaches of the participants, each couple was asked to fill in an inquiry where they could express their used approach, if already decided. If they did not decide yet, they were asked to state their preference. Five inquiries were returned before the completion of this paper. In a plenary session the results were discussed and a common conclusion was derived as well as its advantages and disadvantages.

#### *Building life cycle*

The following 6 phases were distinguished:

1. Initiative and feasibility study
2. Project definition
3. Design phase
4. Execution
5. Evaluation and transfer to maintenance department
6. Maintenance phase

Three of the couples have started their partnership in phase 1 of the project, whereas one couple started in phase 2 and the last couple started during phase 4. In the plenary session the general opinion was that the best moment to start was during the first phase, however right after the first initiative, as the initiative is a matter of corporate strategy of the housing association. The main benefit of an early involvement was stated to be the optimal use of knowledge, to improve the process and outcome of the design and execution phase. The main disadvantage of early involvement was stated to be the lack of competition and possible resulting uncertainties about the market conformity of the price level.

#### *Production Chain*

The number and nature of partners involved in the production chain are quite different. In all cases the involved parties are at least the housing association together with the general contractor. Two respondents stated to involve parties such as sub contractors for electrical equipment and HVAC-systems, consultants for building physics or construction and local authorities as supply chain partners as well. The other three have one or two other parties

involved as supply chain partner. In the plenary session it was concluded that the potential advantages of supply chain partnering would benefit from involvement of partners as soon as it is clear that their expertise is necessary. This implies that particularly in more complex refurbishment projects, a wider range of parties should be included in the partnership in an early stage of the redevelopment, of course also depending on the available expertise within the housing association and general contractor.

#### *Continuity*

Four of the five couples had selected their partner with the intention to maintain the partnership for a long term, although no specific agreements had been made about future projects. The benefits of a longer term relationship were confirmed in the plenary session. Benefits of a long term relationship were stated to be among others: more efficiency ('learning opportunities resulting in a lower price and faster process) and working satisfaction, as people grow used to working together as a team, with common objectives.

#### *Risk and benefit sharing*

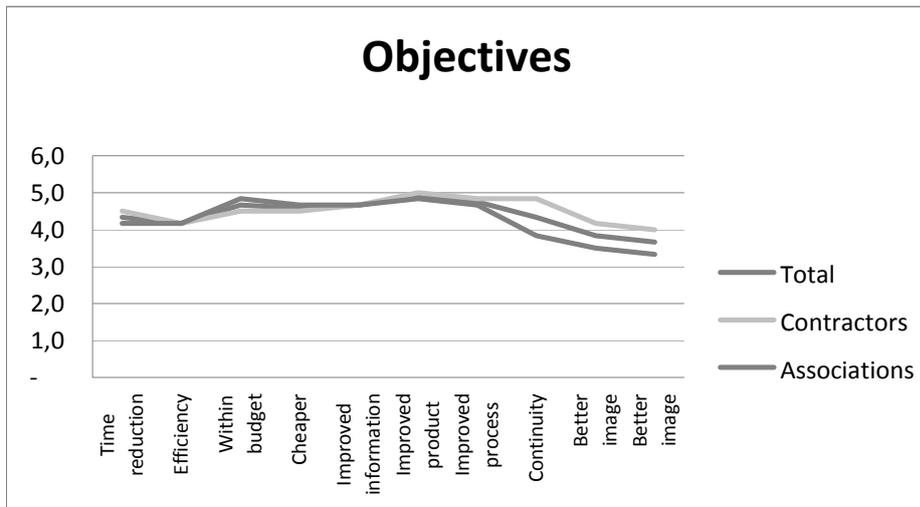
At this stage in the exchange project, the partners have not made agreements on risk and benefit sharing yet. During the plenary session it became clear that the most important condition for effective risk sharing is to create as much as transparency as possible. When all parties express their possible risks, a comprehensive risk management can be set up and agreements can be made on how to deal with each risk. However, some associations also stressed that the risks of the actual building process should remain with the contractor, since otherwise, the housing association would take on risks outside its core business and contractors might have less incentive to remain within the budget.

At the plenary session it was concluded that all cases involved in the exchange project have explicit elements of increased supply chain partnering, but it was also acknowledged that these were just the first step of growing towards mature partnerships, which require much more explicit and further reaching choices about the involvement of more parties in an early stage of the redevelopment project, the responsibility for maintenance after the refurbishment, the application of 'framework' agreements that involve partnership over a number of projects and much more explicit agreements on sharing and division of benefits and risks.

#### **Expected advantages**

From the 16 inquiries, 12 were returned in time for inclusion in this paper (75%), equally divided between general contractors (6) and housing associations (6). During the plenary project session the results have been discussed and complemented. The evaluation scale rated from 1 (very unimportant) till 5 (very important). Figure 1 depicts the average results for the importance of the objectives of supply chain partnering in the housing refurbishment projects. As can be seen, most of the objectives are ranked as important or very important by both housing associations and contractors. Of relatively less importance for housing associations are the possibly positive effects on the company's image as well as the continuity of the company and the workflow, which is not remarkable, since these factors are mainly of importance for the contractors, because these factors help them to maintain or improve their market position.

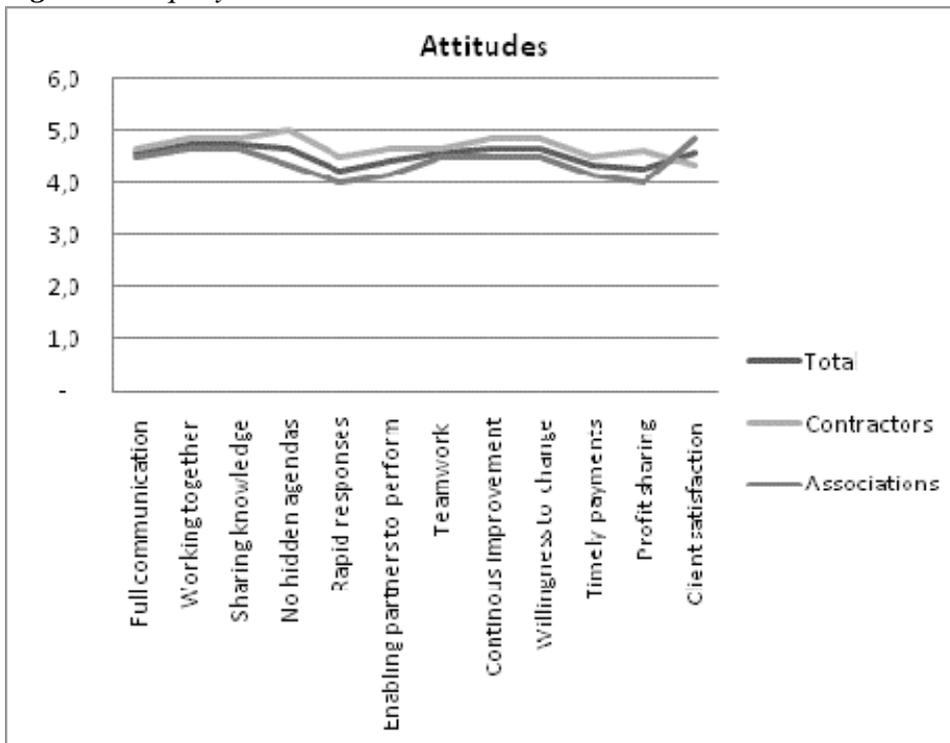
**Figure 1: Inquiry results on objectives**



**Expected challenges**

The participants were also asked to address their expectations about the challenges for successful supply chain integration. These challenges were divided into attitudes of the partners and (other) success factors.

**Figure 2: Inquiry results on Attitudes**

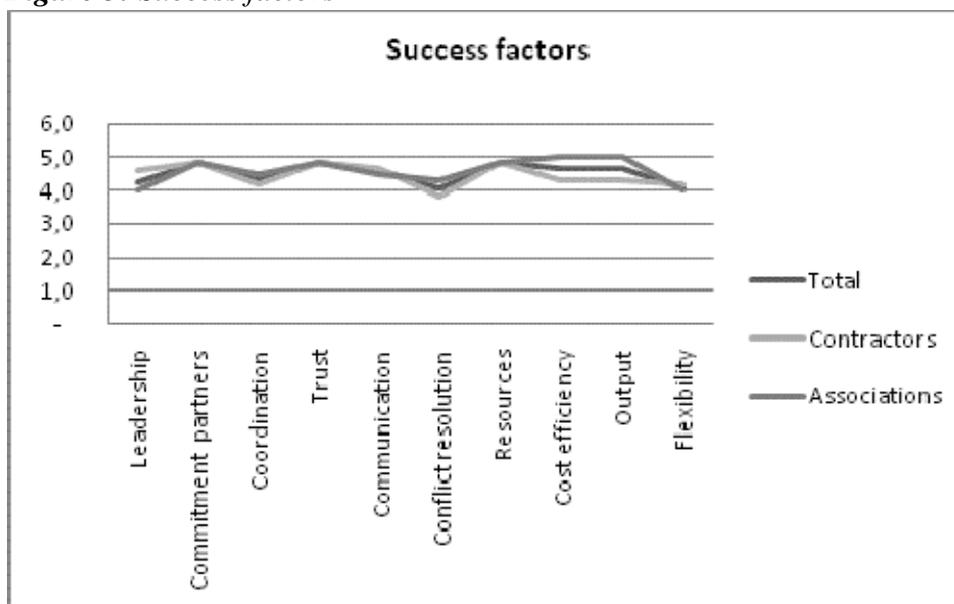


The participants were asked to express their sense of importance of the attitudes as found of major interest for successful partnering by Briscoe et al. (2001), shown in table 4 in the previous section. In general Briscoe’s attitudes are considered of high importance, as the average results are rated between 4 (important) and 5 (very important) (see Figure 2). Although the small number of inquiries makes it impossible to make any statistically sound comparison, some of the topics to which the housing associations and contractors responded

differently were discussed in the plenary session to test if there was any significance to the differences and if so, what the background of these differences were. ‘Straight talking with no hidden agendas’ was evaluated of relatively high importance by the general contractors. At the plenary session the contractors stated that this could be because they sometimes feel accused of working with hidden agendas by their principals, while this is not the case. ‘Rapid responses to queries and requests for help’ scored relatively low among the housing associations while one could expect that associations find this topic more important than contractors, because any delay is in the associations’ disadvantage. The workshop participants stated that, when working as partners, the roles and responsibilities are more clear and the contractor can take more decisions, without referring to the responsible person(s) in the housing association first and thus they expected it to be less of a challenge within supply chain partnerships.

The success factors of partnering according to literature were also evaluated by the participants of our project. Again, they were asked to rate the factors on a scale from 1 (very unimportant) to 5 (very important) (see Figure 3). The average scores are between 4,0 and 5,0, which confirms the expected importance of the success factors derived from previous studies for the Dutch housing associations’ refurbishment practice as well. The topic ‘Conflict resolution techniques’ is scored relatively low by both contractors and associations, which may be found remarkable in an environment known for its conflicts. According to the participants, the explanation for this low score is that working as partners results in clearer and/or shared responsibilities and a focus on common interest. Thus, they expect that conflicts will be reduced or even avoided as a result of supply chain partnering.

**Figure 3: Success factors**



This emphasis on ‘soft skills’ needed for successful partnering as stressed in previous studies was confirmed in the exchange project as we asked the participants to give their ‘top 3’ challenges for the project. Among the top 3 of challenges, 2 topics relate to the necessary soft skills and attitudes:

1. How to change competences and mentality and how to create sense of common responsibility?
2. How to create trust among partners?

3. How to share risks and profits among all partners and which (legal) contracting options are appropriate to formalize the partnerships?

Overall it was concluded that many of the expected advantages and challenges of supply chain partnership within housing refurbishment concur with the generally expectations about supply chain management in construction. At the plenary session, the most specific challenge for the application of supply chain partnership within housing refurbishment was stated to be the communication with the tenants. Since tenants are a natural part of refurbishment projects, choices have to be made about who communicates with the tenants, which may also differ from phase to phase in the redevelopment process. Some housing associations stated that supply chain partnering generates specific opportunities for communication with the tenants, since the contractors are sometimes taken more seriously by the tenants if they say that some refurbishment options are not feasible, while the tenants may sometimes suspect the housing association of having a hidden agenda. Other housing associations stated that there could also be a pitfall in involving the contractor in communication with the tenants, since the contractor might promise some things which may eventually be outside the association's budget restrictions. Furthermore, and perhaps specifically for the social rented sector, it was questioned if and how the tenants should be involved as a 'full' partner in the refurbishment process. Although, perhaps ideally, mature supply chain partnership would imply that the tenants as end-users are involved as partners throughout the process, this might not be preferable in the social rented sector since tenants usually pay a rent under the market price and therefore do not fully bear the financial consequences of the decisions made in the redevelopment process. Furthermore, many tenants do not aspire an active role in building processes.

## **CONCLUSION**

Linking the reducing opportunities for demolition and replacement strategies with continuing challenges to improve the socio-economic and environmental sustainability of the housing stock, it can be expected that housing associations will place more emphasis on management and refurbishment. Financial pressure also stimulates housing associations to increase the efficiency of their organization and building processes, which in turn stimulates their interest in the opportunities that supply chain partnership generates for cost reduction and other potential advantages. In this paper we have explored what the approaches and expectations of Dutch housing associations and contractors in refurbishment projects are on the basis of an inquiry among participants in a knowledge exchange project. It is concluded that all cases involved in the exchange project have explicit elements of increased supply chain partnering, but it was also acknowledged that these are just first steps towards mature partnerships, which require much more explicit and further reaching choices about the involvement of more parties in an early stage of the redevelopment project, the responsibility for maintenance after the refurbishment, the application of 'framework' agreements that involve partnership over a number of projects and much more explicit agreements on sharing and division of benefits and risks. It is also concluded that many of the expected advantages and challenges of supply chain partnership within housing refurbishment concur with the generally expectations about supply chain management in construction. The most specific challenge for the application of supply chain partnership within housing refurbishment relates to the communication with the tenants: if, how, when and by whom tenants should be involved in the redevelopment process is a specific question that requires much attention in supply chain partnerships for housing refurbishment.

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