

Collaborative and Performance-based Delivery Models

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Abstract

In the recent years construction sector has been focusing more and more on performance issues such as developing new delivery models and collaborative procurement procedures. This work presents an exploratory and case study research over collaborative and performance-based delivery models in the public sector. The chosen project is a construction project in Finland contracted using the Project Alliance approach. In order to get a comprehensive understanding on Project Alliance, there was conducted collection from literature review and on case project specific documentation. In this regard, there were conducted interviews with project's participants and results from a project survey were descriptively and statistically analyzed.

The purpose of this research is to investigate how an alliance project is implemented, giving particular attention to the selection phase and public procurement codes. Also, special attention was given to experiences and feedback obtained from owner's, contractor's and designer's sides, and understand also the positioning of external parties such as subcontractors towards the alliance. Furthermore, it was an objective to understand project's features, including the ones promoting collaborative features as the ones contributing for performance improvements.

The Project Alliance characteristics that differ most from traditional practice include features such as: the alliance organization and agreement, joint decision-making, problem-solving, risk sharing, the incentive system and open-book principles. These features are seen as part of Project Alliance identity and potentiate a collaborative project driven to overall success.

Keywords

Project Alliance, Construction Procurement, Collaboration, Performance Management, Multicriteria Evaluation, Key Result Area.

Resumo

Nos últimos anos, o sector da construção tem vindo a focar-se cada vez mais em aspectos relacionados com desempenho e têm sido desenvolvidos novos modelos de contratação e procedimentos mais colaborativos. Este trabalho apresenta um estudo exploratório e de caso conduzido sobre modelos de contratação no sector público baseados em colaboração e desempenho. Uma hipótese de tradução do título da dissertação para Português poderá ser: “Modelos de produção e gestão baseados em colaboração e desempenho”. O projecto escolhido é um projecto de construção na Finlândia contratado recorrendo à abordagem *Project Alliance* (uma tentativa de tradução poderá ser Projecto Aliança). De forma a obter um conhecimento adequado sobre *Project Alliance*, procedeu-se à recolha de informação quer na literatura existente, como na documentação própria do projecto. Neste contexto, foram realizadas entrevistas com representantes do projecto e os resultados de um inquérito ao projecto foram descritiva e estatisticamente analisados.

O objectivo desta investigação é perceber como um projecto em aliança é implementado, procurando dar particular atenção à sua fase de selecção e aos códigos públicos de contratação. Adicionalmente, foi dada particular atenção às experiências e comentários obtidos por parte de dono de obra, construtora e projectistas, e ainda perceber o posicionamento de participantes externos como subempreiteiros face à aliança. Também, foi um objectivo perceber as características principais do projecto incluindo as que promovem a colaboração e o desempenho.

As características da abordagem *Project Alliance* que diferem mais da prática tradicional incluem aspectos como: a organização e o contrato da aliança, a tomada de decisão conjunta, a resolução de problemas, a partilha do risco, o sistema de incentivo e o princípio *open-book*. Estes aspectos são também encarados como parte da identidade de *Project Alliance* e potenciam um projecto colaborativo e direccionado ao seu sucesso integral.

Palavras-chave

Project Alliance, Contratação na Construção, Colaboração, Gestão por Desempenho, Avaliação Multicritério, Áreas de Resultado Chave.

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List of abbreviations

BIM, Building Information Modeling

BP, British Petroleum

CCP, Portuguese Public Procurement Codes (*Código dos Contratos Públicos*)

EU, European Union

FAPC, Finnish Act on Public Contracts

FTA, Finnish Transport Agency

HOAS, Foundation for Student Housing in the Helsinki Region

INCI, Construction and Real Estate Institute (*Instituto da Construção e do Imobiliário*)

IPD, Integrated Project Delivery

KPI, Key Performance Indicator

KRA, Key Result Area

PA, Project Alliance

PP, Project Partnering

RTD, Research and Technology Development

SPSS, Statistical Package for Social Sciences

1. Introduction

This thesis is driven by ongoing efforts to focus in more collaborative and performance-based delivery models for contracts celebrated within the construction industry. Recently new concepts have been developed and there are several different types of delivery methods being used all over the globe [1]. The focus of this study is on Project Alliance (PA) and its special features and capabilities by referring to a pioneer public sector construction project in Finland and Europe.

The purpose of this research work is to contribute for a better understanding on new delivery methods and management practices for the construction sector that could be applied more often in the Portuguese and Finnish contexts. This work has been conducted in Finland and Portugal between November 2012 and October 2013 including the establishment of synergies between Instituto Superior Técnico in Portugal and VTT – Technical Research Centre of Finland. In so doing, it is believed the construction sector can progress towards more integrated and innovative procedures, improving its overall competitiveness and enhancing its dynamics.

1.1. Background

Construction industry is typically slow adapting to changes and traditional practice has long been applied, especially when it comes to construction management, organizational and cultural changes [2]. However, due to the increasing demand for more efficient and integrated approaches the traditional practice is finally being modernized. Barnes [3] supports this saying that:

‘Civil engineering management in the next century will be dramatically different from the last, thanks to a growing and long-overdue realization that the traditional forms of contract have had their day.’

Having this in mind collaborative and performance-based delivery models started being applied in Finland, in particular PA in 2010, which had as background the Australian practice where it has been a successful approach for many years in infrastructure projects [4].

This research work will center in this innovative delivery model, particularly in the case of a pioneer public sector project in Finnish context, which is believed to be also interesting to Portuguese context, given similarities in both construction industry and legal frameworks. Additionally, this study is believed to be of interest since it will focus on a building renovation and construction project unlike most common use of PA. Special attention will be devoted not only to selection and contract models, but also to adequate practices and guidelines that might promote a more collaborative approach.

Collaboration and performance throughout construction projects have long been discussed and studied by both academics and practitioners. In that regard, and before any further progress, it is essential to properly define what a collaborative and performance-based delivery model is. It consists in an approach to procurement focusing on the outcomes of a specific contract. Collaboration consists in having people or organizations working with each other to carry out a task and to achieve common goals. It differs from cooperation in that cooperation consists of people or organizations working together for mutual benefits, which are not necessarily the same as those needed in collaboration [5]. Performance is the result of a specific task or the characteristics of a product measured according to existing standards such as accuracy, quality, cost, time and satisfaction. It is an obligation fulfilled typically by the contractor, or as it will be seen in this study by an alliance. Incentives and penalties are mechanisms to reward or penalize eventual performance deviations [6].

The construction sector has been focusing more and more on efficiency and performance issues, and implementation of technological advances and methodologies such as Building Information Modeling (BIM) could be fostered by more integrated delivery models [7]. This might require certain pre-requisites and adaptations both from public procurement authorities and from typical stakeholders such as contractors, designers and subcontractors. These parties shall adapt to changes and gain management and organizational skills in order to successfully commit into demanding projects where integration of several different parties into a common organization might occur. This requires a natural cultural change towards a more collaborative and open environment, not only in terms of communication, but also in joint decision-making, risk sharing, and open book and best-for-project principles.

In short, the core of this research work will center in projects in which individual success shall be replaced by project's success and transactional environment shall be replaced by a relational atmosphere. Power and conflict relationships should be replaced by trust and commitment toward project's success. To make these collaborative features work, proper structural features must be defined. That might include establishing an appropriate organization and measuring performance by setting an adequate incentive system to motivate all parties reach best-for-project results.

1.2. Research questions

The construction industry is still a non-innovative sector with high levels of fragmentation and typically performing on a project-by-project basis. This leads to high levels of skepticism towards changes in procedures, especially management and cultural ones. In that regard, the author adopted a neutral inquiring posture and tried to understand at different levels how PA actually differs from traditional delivery models.

The core of the research questions is to confront PA features with the collaboration and performance levels registered at a specific construction project and also understand PA positioning in the construction industry and public procurement contexts. Research questions include understanding in which levels PA differs from traditional practice and its potential. The research questions also covered the selection phase and its relation with the implementation phase. The last research question intended to understand what reasons and conditions would make sense for PA use.

The questions were formulated in an iterative process that included a deep study of existing specific literature and case study data collection along with project representatives' discussion. At chapter 3 this process will become clear after describing the methodology process. Given the aforementioned framework, three major research questions were formulated, and can be seen in Table 1.

Table 1. Research questions

1.	How alliance projects differ most from traditional practice and in what extent they allow achieving better results?
2.	How alliance partners are selected and how the considered selection criteria reflect the requirements of the project implementation phase?
3.	Which reasons and conditions would make sense for alliance use?

These research questions will be answered across this research study. Best strategies to answer them were set at research methodology chapter and according to case study constraints, as it can be observed at chapter 3. In the discussion section (see chapter 5) the answers will be given and finally at conclusions (see chapter 6) they will be directly exposed.

1.3. Thesis structure

The structure of the present thesis was dependent on the nature of its research methodology, which will deserve its own chapter later in this work. Sequence of chapters in this thesis does not necessarily match research approach sequence, since chapters have mutual interdependencies and research process had an iterative nature itself. Following in the Table 2 there is a short description of each thesis chapter.

Table 2. Thesis structure

1. Introduction	This chapter explains the context of the thesis and the relevance for the study. Background and major research questions are introduced and thesis structure is described.
2. Literature review	Literature review focus in defining traditional and collaborative delivery models and introduces some concepts on public procurement codes in Finland and Portugal.
3. Research methodology	Research approach and design are defined. Data collection and analysis method are described.
4. Case study: the Vuolukiventie 1b project	Case project is introduced and its motivation, nature and selection phase are studied in depth. Alliance organization and agreement are defined.
5. Findings and discussion	This chapter examines conducted interviews through case study participants' perspectives. Results on project's survey are analyzed. Cross comparison and discussion are conducted.
6. Conclusions	Last chapter focuses in major conclusions of the research study. Considerations on research limitations are pointed out and further developments are suggested.

2. Literature review

2.1. Traditional delivery models

Traditional practice can be characterized by models in which the owner and the contractor have a relationship without any degree of objectives alignment, efficiency or any sort of improvement in work processes [8]. Basically, this is the way many of the construction projects are still executed. This kind of environment can also be described as highly fragmented and individualistic, as the involved parties are focused on achieving individual objectives and maximizing their profit margins, without a sense for others or the consequences that might advent from this adversarial behavior.

As Naoum [2] describes, most of the traditional procurement systems are adversarial by design and still rely much on contractually explicit procedures rather than on mutually agreed methods to achieve financially sound objectives for all the team. Also, this kind of arrangements and projects develop in a transactional and competitive environment that includes the following characteristics [8] that can be seen in Table 3.

Table 3. Typical adversarial environment characteristics

<ul style="list-style-type: none">▪ No common objectives; they may actually conflict▪ Success coming at the expense of others; win/lose mentality▪ Short-term focus▪ No common project measures between organizations	<ul style="list-style-type: none">▪ Little or no continuous improvement▪ Single point of contact between organizations▪ Little trust, with no shared risk▪ Competitive relationship maintained by coercive environment
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Often, this type of mind-set leads to conflict, litigation and eventually, disastrous projects [8]. In this context, companies started looking for an alternative to the traditional adversarial roles. Relational delivery models intend to respond against to inefficient procedures and flaws at traditional delivery models. This relation and partnership among parties has different degrees of cooperation, collaboration and coalescence that are appropriate for specific situations. Though, it shall be noted that the benefits that come from the use of these approaches, also carry impacts and require high levels of commitment, additional resources and objectives alignment as it will be further described in more detail [8].

Another fact about traditional delivery models is related to the inflexibility of its contracts and clauses. That happens because these contracts try to reduce uncertainty, minimize opportunism, and predict and specify every possible contingency by assigning responsibilities and liabilities for each specific project participant in case that change occurs. Knowing that is impossible to predict and plan every possible event, this sort of traditional practices increases transactional costs and leads to adversarial relationships when anomalies

occur emphasizing best-for-individual culture instead of best-for-project culture, and its best example is individuals focusing on protecting their profit and having no interest in collaborate to optimize project performance, with customers and contractors becoming greedy and often assuming a bullying position [2, 9].

Perhaps, one of the main problems in the construction industry lies in the lowest price award criterion which is still the most used and weighted criterion and which should not be the only criterion used for selection and that other factors must be considered as well [2]. Traditional methods of selecting construction contractors use a price-based competitive tendering in which the lowest bidder is still most of the times the awarded one. Giving the example of UK's construction industry, Naoum [2] describes a number of disadvantages and inefficiencies currently affecting the construction sector and its clients:

- It appears that in some cases the lowest bid is often flawed (i.e. estimator errors of measurement and/or price). This, combined with management decisions to exclude profit and even overheads when desperate to win a tender, result in contractors pursuing claims and ad-measurement to recover losses.
- A lack of vision on behalf of the client to take account of factors other than price, such as the caliber of the resources to be employed, methods to be adopted to achieve quality (which will affect operating and running costs), contribution of supply chain alliances, plus safety issues and the treatment of the environment.
- A lack of value management and innovation in design, in methods of construction, in products, in sub-contractor and supplier procurement, when bidders are restricted to pricing a pre-determined solution with specified products.
- Lip service is paid to the cost effect on time. Most Public Sector projects are judged on their ability to hit cost targets.
- An inability to benchmark project performance to client costs.

According to Naoum [2], there is still evidence of a significant distrust of clients to their suppliers for the European construction sector that makes the lowest cost tendering being seen as the best practice for valuing money and prevailing to new practices and procedures.

For complex and risky projects the result of applying traditional contracts is likely to be a disaster in terms of project outcomes. Once again, this happens because these sorts of contracts are written in a biased manner protecting the drafter and working as a legal shield, ignoring project outcomes and the creation of a good framework alongside the development of a collaborative environment between the project participants [9].

The causes for abovementioned greedy and individualistic behavior rely on levels of trust and collaboration between project participants. This makes project owners writing exculpatory contract clauses that transfer unbearable risk to contractors and, subsequently, these contractors passing the risk to smaller subcontractors which are often the more financially fragile participants in the process. Owners intend to reduce the number of claims and disputes by acting this way, but the fact is that precisely the opposite ends up happening, causing antagonistic relations between owners and contractors, which will clearly work against the best interest of any project [10]. As McGuinn [11] referred, risk allocation is one of the

principal causes of many of the unsatisfactory project outcomes and the general confusion characterizing the construction industry.

These kind of rigid clauses also discourage responsible bidders and instead attract those bidders that want to win by any chance and expect to make profit via claims [12]. As stated by Rubin *et al* [12]: 'Long before men and machines reach the jobsite, conditions for claims and disputes have often been signed by both parties.' It is not hard to believe that this often ends up in adversarial relationships and costly litigious battles.

The traditional practice and its compensation models are also focused on individual party's performance instead of the overall success of a project. Once again, this leads to individualistic and opportunistic sorts of behavior. These traditional models might be suitable for slow, simple and fixed scope projects, but the same is not likely to happen for risky, complex, innovative and flexible projects.

New approaches and models are already in use, and they emphasize an environment of trust, communication and collaboration between parties, which work as partners or as a team. The central topics to work on are essentially related to building trust among stakeholders, and improving the efficiency and performance of projects by sharing risk among all projects participants and making an incentive model that works based on the project's overall success instead of individual success of participants, and intends among other things to stimulate a broader collaboration and cooperation between stakeholders in a long-term view.

2.2. Collaborative and relational delivery models

2.2.1. Overview

Collaborative and relational delivery models are a powerful tool to fight against inefficiencies of traditional delivery models [13, 14]. By using both formal and informal measures, these approaches intend, most of all, to achieve a more collaborative and joint-development environment among all the participants of a construction project, ideally, involving sub-contractors and suppliers, which are still, unfortunately, often ignored [1]. Partnering and relational contracts encourage a greater integration of all the project participants, often making them work as a team and therefore creating competitive advantages to all the team members [2].

As it has been previously mentioned there are two sorts of measures in relational delivery models. The formal ones include all the clauses and structure of contracts and the structure of teams and all the procedures related to decision-making. The informal ones include more subjective aspects, such as how do entities communicate (e.g. through requests for information and eliminating communication barriers between participants [15]), how committed they are to achieve overall project success and how do they trust and understand in each other's individual expectations and values. Nevertheless, it should be noted that open communication in early stages of project development might be too time-consuming, even though communication is a key element for partnering and relational projects [15].

As it is easy to comprehend, the implementation of informal measures can be extremely hard. The subjective nature of these kinds of features and the difficulty measuring them help explain its complexity. Also, these collaborative or cultural features take time to be understood and their success is directly related to formal measures and overall success of a construction project. It would be interesting to understand how formal and informal measures are linked and how they stimulate and work together.

There will not be any party interested in working collaboratively if they see their profits and benefits reduced. On the other hand there might be parties interested in working together if their own success depends on overall project success. Opportunistic behavior can also be avoided or reduced if parties trust each other, which will naturally improve chances of a long-term relationship between participants and induce multi-project relationships.

This last topic, involving long-term relationships is already a reality in public sector in the US. However, in particular in Portugal and Finland, long-term relationships can be a challenging topic under current procurement directives and local codes.

Despite the obvious contractual clauses on a gain-pain share principle¹, there is no connection between incentive systems and consolidation of trust and commitment between

¹ A gain-pain share mechanism is in essence a system where financial rewards and penalties are in the same pot for all project participants. It is a joint risk mechanism intended to eliminate individualistic behavior by enhancing a best-for-project spirit (see more at [16]).

participants. However, it is accepted that a high level of trust and commitment among the participants promotes an open cooperative and joint problem-solving environment. These positive attitudes will naturally lead to project and partnerships' success [15]. Moreover, the willingness for sharing risks among partners will naturally improve if they see their effort rewarded, and in this context, it is also important to assess partners' satisfaction during and at the end of a project [15]. It is believed that the experience and past-performance will induce quality and willingness and commitment to share risks in future projects, stimulating a long-term relationship, regardless of public procurement restrictions of doing so. That means these sorts of arrangements intend to be a trade-off between risks and reward [8], where budget leftovers are shared between client and contractor [17].

There are several points in which these kinds of contracts focus. Common ones in projects intend to establish trust, respect, confidence and communication, risk-sharing and common goals among involved parties. According to Gadde *et al* [18] the implementation of partnering can be achieved through the application of techniques such as routine-based selection procedures, formalized team-building processes and financial incentive systems. Accordingly, Gadde *et al* [18] mentions a study that was conducted involving 280 construction projects and in which it could be concluded that projects involving relational and partnering principles reached higher performance than projects managed in other ways, including 'traditional projects'. Superior performance was evident especially in costs control, technical performance and client satisfaction.

Literature refers several types of delivery models, methods, approaches and contracts but there is no consensus among authors. There were found several mixed approaches among recent research works. For example, Cheung [19] described that partnering, strategic partnering (see [21]), project alliance, strategic alliance (see definition on [20]), public-private partnership (see [22]) and joint venture (see [23]) are the six major types of relational and collaborative contracting methods. Though, in the last 20 years there has been an evolution towards a more convergent terminology. These approaches differ sometimes in nature, other times they just differ in the context and country they are applied.

For this thesis, it was decided to emphasize collaborative single project approaches. Given that, and thanks to the contribution of recent research works [24], the following three project-by-project relational delivery methods will be considered:

- Project Partnering;
- Project Alliance;
- Integrated Project Delivery.

Further in this chapter, these three approaches will be defined and described in more detail. It will be necessary to understand their basic nature and principles in order to improve construction project delivery through collaborative and integrated teams. These teams are established with main goals such as project outcome and its efficiency, performance and overall success. Also, it is fundamental to identify a proper type of partnering and relational arrangement that fits the objectives of a particular project [8].

It should be noted that there are sorts of arrangements that mix concepts between approaches. Therefore, more important than giving an accurate terminology to a construction project delivery model, it is of vital interest to understand that all three different arrangements are flexible, evolve and adapt over different projects, and there is no suit-for-all method that applies to every project. In the same line of thinking, traditional approach can be in many projects still a valid delivery model to be applied to, depending on a wide range of factors and circumstances.

This research work will focus in more detail on PA, given the chance of studying a renovation project in Finland, which will be introduced and described later in this thesis. Also, it is found relevant studying Project Partnering as well, as it has interesting features that might be already in use in recent and current projects, and might work as a case study providing useful data and feedback.

On the other hand, Integrated Project Delivery will not be treated in detail, as it is an approach that includes non-price criteria and that are not likely to be feasible in most EU countries, due to existing legal barriers on public procurement framework level. That does not mean that it could not be applied in EU, but it is believed, that first there is an entire group of legal and administrative questions concerning its feasibility, that are clearly not within the scope of this study.

It is expected that collaborative and relational contracts in general will, and Project Alliance, Project Partnering and Integrated Project Delivery will soon start being widely discussed in Europe and these approaches can turn into competitive business advantages for all the actors involved in suitable projects. Experience and preparation to commit into these kinds of contracting could undoubtedly differentiate the most innovative companies from the most traditional and slower competitors, once public procurement authorities, academics, and practitioners in general recognize the potential benefits of such delivery methods.

2.2.2. Project Partnering

Project partnering (PP) is the oldest of relational project delivery arrangements and it is the only relational delivery model that does not cut all the principles from traditional approach, having initially been applied to traditional contractual frameworks [25, 26]. Instead, it focuses on optimizing and correcting flagrant flaws of old approaches. This approach is a single project application (differs from long-term strategic partnering, see [1]) and it is a management method based on a multi-party approach, used at least by two organizations that intend to achieve specific business objectives integrating the team. It focuses on mutual objectives, an agreed method of problem resolution and an active search for continuous improvements [27]. Project partnering intends to reverse the negative effects of adversarial relationships in construction such as disputes, improving productivity, lowering costs and providing satisfactory standards and saving time at the project [2, 18].

As it has been said before, project partnering is a project-by-project basis approach. The first projects date back to 1988 when PP was launched by the US Army Corps of Engineers with the objective to avoid construction disputes using dispute resolution procedures, and it was based on joint workshop practice. Also, this was a voluntary arrangement between the owner and contractor and was applied only after the low-bid selection of the contractor to the project [24]. Since then, PP approach gained popularity over the USA and spread around the world with a significant number of projects benefiting from this approach [24].

The involvement of the designer in this partnering arrangement is an aspect that also differentiates this approach from the traditional one, that normally only involves directly the owner and the contractor. This approach has been applied especially to building construction [24] which is easily understandable as buildings are by its uniqueness, traditionally the most fragmented and non-innovative environments in the construction sector, surrounded with parties that are not typically willing to change and often attempt to resist to all kinds of change.

As a characteristic of all relational delivery methods, once again trust and commitment play an essential role in this approach and tools like the partnering charter and the decision ladder were important to improve cooperation, reduce the occurrence of disputes and disagreements, and clarify all the decision making process and its actors. The partnering charter is non-binding document signed by the partnering parties stating the agreed main principles of cooperation and defining the relational mechanism. The decision ladder describes the decision-making levels of the project, time and unsolved issues can be allowed to remain at a certain level, and, moreover, the representatives of the parties allocated to each level [24]. Also playing an important role, there are features as continuous feedback, evaluation and improvement that are part of this sort of approach.

2.2.3. Project Alliance

An alliance is an agreement between actors and has the purpose to integrate goals and operations. As defined by Lahdenperä [28], PA is a project delivery method based on a joint contract between key parties to a project whereby the parties assume joint responsibility for the design and construction of the project to be implemented through a joint organization, and where the parties share both positive and negative project's risks and observe the principles of openness in cost monitoring and information accessibility in pursuing close cooperation. It shall be mentioned, that an alliance has been commonly described in the European context as a general concept used to describe collaborative arrangements in general, and not PA in particular and its characteristics [29]. PA in particular can be defined as an approach comparable with design-bid-build, design-build and construction management into some extent, which has a contractual structure forming a virtual organization, differing from traditional risk-allocating frameworks [24]. The key goals intend to enhance levels of efficiency and foster collaboration and innovation. Lahdenperä [28] defined three main structural features for alliance which are presented in Table 4.

Table 4. Alliance's structural features

Feature	Description
Joint agreement	Tasks of an alliance include project planning and implementation tasks and eventually ones related to them and to the promotion of the project traditionally performed by the owner, which parties are now jointly responsible for. The parties enter into a single joint multi-participant contract instead of several bilateral contracts.
Joint organization	Alliance organization includes people from all partner organizations, including the owner's. Decisions on project implementation are taken jointly by the parties. The cost estimate covers all related tasks and people. The project target cost is normally defined correspondingly and is consequently the total cost of the project.
Risk sharing	Alliance partners share the risk of project implementation including both positive and negative risks. Therefore, the reward of service providers is also based on the success of overall project implementation, not on their performance of their own tasks. The practice requires observing the principles of openness in cost monitoring.

There are also collaborative features in alliance that involve subjective concepts such as trust, commitment and cooperation. High levels of innovation at management and joint risk can be reached by having project's participants working together since an early stage, as an integrated collaborative team, in good faith, acting with integrity and making unanimous best-for-project decisions. This is made using a joint agreement and a joint organization which are basically a single joint multi-actor contract and team, differing from the traditional several bilateral contracts and independent actors. It incorporates organizational concepts aiming to reduce project costs and enhancing profits for all projects participants [15].

The basic idea is that risk is borne jointly and reward is shared on the basis of the success of the entire project. Also, parties take into account each other's views and collaborate more efficiently for the benefit of the project. PA is commonly used for risky, complex and innovative projects, and that way an early selection of the players makes offering services at a fixed price very challenging. A possible solution can be a selection process aiming at team performance and capacity.

It is not difficult to understand that the implementation of PA requires high ethical standards such as high levels of commitment, trust, mutual understanding, respect, and cooperation between all involved parties. These are intrinsic features that must naturally evolve and grow, that can however be stimulated and aided by contractual measures such as incentives and risk-sharing clauses regarding objective alignment and overall project success. Teambuilding expertise can help enhance commitment and collaboration between participants, as it can help the implementation of certain processes, procedures and ground rules, which can in turn help to support the application of PA in different contexts [18, 24, 28]. These principles are implemented and take place since team selection workshops. These workshops are work as negotiations where participants discuss project specific issues. According to Sakal [9], general principles in alliance contracting include:

- Collective responsibility and unanimous decisions;
- Alignment of each project participant's interests to the actual project outcome;
- Sharing all "uninsurable" risk between all project members;
- Setting an initial target cost generated by the whole project team;
- Compensation models;
- No-blame culture, open and honest communication;
- Encouragement of innovative thinking;
- Complete open-book accounting.

PA is considered to be a delivery approach that suits large, complex and risky projects [28]. The first project was launched by British Petroleum (BP) in 1992 and it was a collaboration process for an oil project in the North Sea, which is considered to be the pioneer for project alliance evolution. This project was based on parallel, individual, relatively standard commercial contracts with well-defined scopes of work and the alliance agreement was separate from the works contract [24]. Main innovations of this contract included special treatment given to risk and gain-share principle that was considered in order to achieve an economically more efficient practice for such a risky project, which was at the time highly uncertain and new.

After the first project, and thanks to its success, the PA model was introduced in Australia in 1994 in oil and gas projects, being widely diffused and adopted on the entire continent afterwards, dating from 1997 the first construction project that took place in Australia [9, 30]. The contribute of project partnering was also found essential in the success of project alliance implementation, and that fact, enables PA to be seen as an evolution of PP where traditional arrangements and transactional culture is finally abandoned and replaced by an independent new approach.

First PA construction projects took place in the late 1900s but the actual breakthrough of PA took place in the second half of the 2000s in which hundreds of projects were implemented by PA. Alliance approach has been evolving and developing significantly from project to project. Characteristics that distinguish PA from other kinds of arrangements include a multi-party contract with joint liability and a co-location arrangement which expects to have the team working at the same place [31]. Projects using this approach include mainly road, rail and water infrastructure projects, with only few exceptions including construction of buildings [24].

PA is a single project approach, differing from strategic alliances which cover several projects or long-term activity [28]. The PA approach aims to improve the implementation of demanding and risky investment projects involving high levels of uncertainty in terms of project solution and unpredictable implementation stage risks [24]. This uncertainty is often related to the unique nature of project, new technology to be applied, project conditions and interfaces, the risk premiums, and/or adversarial behavior characteristics of traditional contracting that would lead to uneconomical result from owner's viewpoint. Also, alignment of parties' objectives by joint risk-sharing in PA arrangement, supplemented by transparent financials, a joint organization and joint decision-making, are supposed to improve performance [24]. In order to answer these demands, PA includes a collaborative arrangement

and a shared savings agreement in the contract as well as management practices established by the alliance team during the project in order to reach its objectives [24].

Several selection models and criteria have been developed, but only recently, the first general models for PA have been published [see 31] as well as alternate selection procedures and practices [see 32 and 33]. Suitability of alliance relationships is best for projects in which services are hard to define or are foreseeable to change substantially over time, critical to the performance or either requires innovative solutions or creative management.

Selection of PA as the delivery method to be used requires full understanding of the principles behind it and it must be mentioned that until quite recently non-cost criteria has prevailed awarding this sort of projects [24]. Projects participants are carefully chosen, risk is shared and participants are selected before the target cost for the project is defined [1].

This approach might naturally cause some oddness for EU public procurement standards and in particular in Portugal and Finland given their conservative laws and codes. Nevertheless, there are three ongoing PA projects in Finland, all of them different, and adapting alliance in their own way, using different procurement procedures such as competitive dialogue or negotiated procedure, and all of them setting a written agreement to establish a set of principles and structure for the alliance. Some general information on those projects is available in Table 5. There are also two more ongoing projects in Finland adapting PA features, which are though hybrid and not pure alliances. In Portugal there was not found any evidence of PA implementation or existing efforts in studying said approach.

Table 5. Current alliance projects in Finland

Project	Progress	Budget	Description	Conclusion
Lielähti-Kokemäki	Implementation phase	100 M €	Rail infrastructure renovation	2015
Tampere lakeshore	Development phase	200 M €	Road tunnel	2016
Vuolukiventie 1b	Implementation phase	18.3 M €	Renovation and building construction	2014

At section 4, further attention will be given to PA with a practical description of an alliance for a renovation project in Finland. As it will be understandable, alliance projects are different and adapt given local circumstances. That is, the abovementioned description of PA is theoretical and represents how it was applied in previous projects that happened outside of Europe and most of them for infrastructure projects. Following this line of thought, the research for this thesis is considered doubly pertinent since it focuses on a construction PA project that took place in Finland leaving an important background for possible use in Portugal.

2.2.4. Integrated Project Delivery

Integrated project delivery (IPD) is a project delivery method that is distinguished from other sorts of contracts, as it involves at least owner, designer and contractor, where risk and reward are shared and stakeholder success is dependent on project success [34]. Also, quite often subcontractors, manufacturers and fabricators are also included in IPD, giving insight into the most cost-effective construction solutions, and feeling an active part for project [35].

IPD's first project was launched in 2003 when a group of complementary enterprises bounded themselves. The arrangement involved a lot from a design-build contract for construction of utilities with one of the enterprises from owner's viewpoint, but also involved adhering to early involvement practices so that the price was set later and companies could share the financial gain or pain from the project [24].

These practices, involving early involvement and integration of versatile expertise, systems and business practices for the best of the project are, in fact, at the core of IPD according to existing general guidelines [7]. Also, co-location of teams' principle is present in IPD and it is closely related to lean management practices and the use of BIM. In the same way as PA, IPD also has teambuilding events that take place during team selection workshops [24].

IPD can be seen as a 'philosophy' or a project delivery system that includes both formal and informal practices and clauses that together intend to lead to trustful, cooperative and intense early design between the key participants as an 'integrated practice' [24].

This approach has been used essentially in building construction, especially the construction of healthcare facilities and hospitals. In fact, there is a project by Sutter Health in 2005 that is described as a pioneer of the current IPD era, and it is said that previous experience from project alliancing and project partnering was taken into account by experts before the implementation of this project. This way, IPD can be seen as a delivery model approach that adapted previous experiences and practices to the US culture and used it to exploit the beneficial features and ideas that came out of those previous successful projects. Most of all, IPD intends to implement advanced information and communication tools such as BIM and which will be used by multiple parties during projects. [24].

2.3. Legal framework

2.3.1. General scope

The main objective of this thesis is not to deeply study law-concerned questions that arise in this kind of collaborative contracts. However it was found opportune to establish synergies with the Finnish experience and its know-how in the use of alliance contracting which is pioneering in Europe and that way contribute for more efficient and economic-driven construction projects.

One of the purposes of this research work aims to study contracts celebrated in Finland, since its case study is a construction PA project, but also try to apply the resulting knowledge to the Portuguese context. In that sense, it was considered opportune to introduce some details on Directive 2004/18/EC and on Finnish Public Contracts Code and major differences with the Portuguese Public Contracts Code. Also, EU members' local procurement regulations are in harmony with EU directives, which leads to most EU's local contracting procedures extension to the EU context, with a few adaptations and possible exceptions.

Main emphasis will be made on procurement procedures that have been chosen by PA. These procedures include competitive dialogue and negotiated procedure. Next sections will introduce public procurement procedures in general and emphasize the selection of candidates and evaluation of tenders of the aforementioned procedures. The author considered that a good understanding of such procedures is vital for a better knowledge on PA implementation.

Essentially, PA as it has been used in Australia might be challenging in EU, since two considered aspects might not be of easy application under all EU public procurement procedures. Australian PA practice often presents awarding procedures with:

- No need to use price in comparison;
- No need to write out verbal comparison about every comparison criteria.

Given those limitations, some adaptations were made to apply PA in Finland and it was found relevant to define and introduce some legal aspects in this section, and later define at chapter 4 how the selection phase of case study project actually took place.

The following three subchapters will focus on some aspects of the European Directive 2004/18/EC that affects both countries, Portugal and Finland, and then it will be given a short emphasis to some aspects of the Finnish public procurement legal framework and a collection of major differences with the Portuguese public procurement code. Again, it shall be noted that it is not the intention of this thesis and this section in particular, to raise purely legal questions: that is reserved for law professionals.

The scope of this study will focus only in public works contracts and what are the key factors and rules that apply and might influence or condition public works, in particular the PA delivery model and its selection phase.

2.3.2. Directive 2004/18/EC

The Directive 2004/18/EC of the European Parliament of the Council of 31 March 2004 focus on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts. Aimed mainly to guarantee transparent, non-discriminatory procedures and that economic operators completely fulfill fundamental freedoms in the competition, this directive applies to public contracts concluded by a contracting authority in sectors other than the water, energy, transport and postal services sectors for [36]:

- Supplies;
- Services;
- Works.

Some general rules and procedures apply when awarding public contracts. Contracting authorities can only apply one of the following two different contract award criteria for public contracts [36]:

- Either the lowest price only;
- Or, where the contract is awarded to the most economically advantageous tender, various criteria linked to the subject-matter of the contract in question (quality, price, technical merit, aesthetic and functional characteristics, environmental characteristics, etc.). The contracting authority should specify the relative weighting it gives to each of the criteria.

European public procurement legislation provides the required conditions for the purposes of participation in public procurement, which aim to check the suitability of economic operators tendering for contracts on the basis of criteria relating to their economic and financial capacity, and their technical and professional knowledge or abilities [36].

The conditions for participation also aim to effectively combat fraud and corruption. For instance, exclusion from public procurement contracts of any economic operators who have been found guilty of participating in a criminal organization or of corruption, fraud or money laundering is obligatory. Moreover, a contracting authority may ask tenderers for any document testifying to their professional conduct and/or economic situation. To obtain this information, it may turn to the competent national authorities or those of another Member State [36].

Any economic operator may be excluded from participation in a public contract where that economic operator [36]:

- is bankrupt (or the subject of proceedings for a declaration of bankruptcy), is being wound up, has suspended business activities or his/her affairs are being administered by the court;
- has been convicted of any offence concerning his/her professional conduct;
- has been guilty of grave professional misconduct;
- has not paid social security contributions or taxes;

- has made a false declaration to the contracting authority.

According to the aforementioned directive, there are the following four different public procurement procedures [36]:

- Open procedure;
- Restricted procedure;
- Negotiated procedure;
- Competitive dialogue.

Below, it is presented a description of the four procedures. It should be noted that there are exceptions applying to each of those procedures. However, the aim of the description is to give a general introduction to those procedures that allow distinguishing them from each other.

Open procedure

In an open procedure, any interested economic operator may submit a tender. The minimum time limit for the receipt of tenders is 52 days from the date on which the contract notice was published. If a prior information notice has been published, this time limit can be cut to 36 days. In no case may the time limit for the receipt of tenders be less than 22 days [36].

Restricted procedure

In the case of restricted procedures, any economic operator may request to participate and only candidates invited to do so may submit a tender [36].

The time limit for the receipt of requests to participate is 37 days from the date of the contract notice. The contracting authority then, simultaneously and in writing, invites the selected candidates to submit their tenders. There should be a minimum of five candidates, except if there are not enough with the required capabilities. The minimum time limit for the receipt of tenders shall be 40 days from the date on which the invitation is sent. If a prior information notice has been published, this may be shortened to 36 days. The minimum time limit for the receipt of tenders may not be less than 22 days. Exceptionally and when urgency requires, the contracting authority may set a minimum time limit of 15 days (10 days if the notice is sent electronically) for requests to participate and of 10 days for the receipt of tenders [36].

Negotiated procedure

In a negotiated procedure, the contracting authority consults the economic operators of its choice and negotiates the terms of the contract with them [36].

The following cases justify the use of the negotiated procedure with prior publication of a contract notice [36]:

- following another procedure which revealed the presence of irregular tenders, insofar as this new procedure does not substantially alter the original terms of the contract;
- in exceptional cases, when the nature of the contracts or the risks attaching thereto prevent prior pricing;
- in the field of services, for intellectual services which do not permit the use of an open or restricted procedure;
- for works which are performed solely for purposes of research or testing.

The following cases justify the use of the negotiated procedure without prior publication of a contract notice [36]:

- for all types of contract: when no tenders have been submitted in response to an open procedure or a restricted procedure;
- when, for technical or artistic reasons, or for reasons connected with the protection of exclusive rights, the contract may be executed only by a particular economic operator; in cases of extreme urgency brought about by unforeseeable events;
- for supply contracts: when the products involved are manufactured purely for the purposes of RTD (Research and Technology Development);
- for additional deliveries over a maximum period of three years where a change of supplier would oblige the contracting authority to acquire material having different technical characteristics; for supplies quoted and purchased on a commodity market;
- for purchases of supplies under particularly advantageous conditions from an economic operator definitively winding up his business activities or in receivership;
- for public service contracts, when the contract should, according to the rules of the contest, be awarded to the successful candidate in the design contest;
- for works and service contracts: up to 50% of the amount of the original contract, for additional works or services which are not included in the initial project and have become necessary through unforeseen circumstances;
- for new works or services consisting in the repetition of similar works or services entrusted to the initial economic operator for a maximum of three years.

In negotiated procedures with prior publication of a contract notice, the minimum time limit for receipt of requests to participate is 37 days from the date of the contract notice. In cases of extreme urgency, the contracting authority may set a minimum time limit of 15 days (10 days if the notice is sent electronically). The contracting authority, simultaneously and in writing, invites the selected candidates (a minimum of three) to negotiate. The invitation comprises all the contract documents, the deadline for the receipt of the tenders, the address to which the tenders must be sent and the language or languages in which the tenders must be drawn up. The relative weighting of criteria for the award of the contract is also included [36].

Competitive dialogue

A contracting authority may make use of the competitive dialogue for complex contracts if it is not able to define by itself the technical solutions to satisfy its needs or is not able to specify the legal and/or financial make-up of a project. Large infrastructure projects would seem to lend themselves to this type of dialogue [36].

The contracting authority publishes a contract notice that includes the award criteria. The minimum time limit for receipt of requests to participate is 37 days. The contracting authority then, simultaneously and in writing, invites the selected candidates (a minimum of three) to conduct a dialogue. The discussion commences, may take place in stages and continues until the (technical and/or economic and legal) solutions have been defined. The contracting authority ensures equal treatment of all tenderers and protects the confidentiality of the information. At the end of the dialogue, the candidates submit their final tenders. These tenders may be specified, but without changing the basic features of the contract. The contracting authority awards the contract in accordance with the award criteria set and on the basis of the most economically advantageous tender [36].

2.3.3. Finnish public contracts

The Finnish Act on Public Contracts (FAPC, *Laki Julkisista Hankinnoista*) regulates the awarding of public contracts and is based on two key principles: all contracts should be subjected to an open bid and all bidders should be treated impartially [37]. It follows the principles of Directive 2004/18/EC and has transparency as a fundamental principle throughout the procurement process and its objective is to provide information to tenderers on tendering procedures and on the criteria on which the awarding of contracts is based in each particular project [38]. This means all tenderers must have access to the same information, which means all tenderers shall be given equal opportunities. The abovementioned principles ensure that non-awarded tenderers have a chance to verify the equality and fairness of the tendering process and the acts made by the contracting entities.

The procurement procedures are regulated by the Act on Public Contracts. A public contract must be put out to tender if its estimated value exceeds the national threshold value laid down in the procurement legislation. Among other things, the procurement notice includes the object of procurement, the procurement procedure to be used, any possibilities for submitting partial bids, and the deadline for submitting bids. A call for tenders may also be attached to the notice.

Public procurement contracts must be concluded in accordance with procurement contract law and its purpose is to make sure that public funds are used efficiently. According to FAPC, there are the following procurement procedures:

- Open procedure – procedures whereby any interested tenderer may submit a tender;

- Negotiated procedure – procedures whereby the contracting authorities consult the economic operators of their choosing and negotiate the terms of contract with one or more of these;
- Competitive dialogue – relatively new procedure for awarding contracts. It is suitable for particularly complex procurements where the unit finds it objectively impossible to define the legal or financial terms of the contract, or the technical means beforehand, without negotiations with the tenderers;
- Framework agreement – procedure leading to the reaching of an agreement between procuring entity and three or more suppliers. As a main rule, the duration of the framework agreement may not exceed four years;
- Direct assignment – procurement done without the tender stipulated by the Procurement Act and for which no procurement notice is published, may occur in exceptional situations and circumstances defined in separate legislation;
- Design contest – design competition organized as a public procurement procedure restricted or not to a limited number of participants.

Following, restricted procedure will be introduced and defined. Competitive dialogue will also be described in detail. These procurement procedures are the ones more commonly used in PA and that is why they were found pertinent to be described into some extent.

According to Section 5 (11) of *Laki 348/2007*, a restricted procedure is negotiated procedure with previous qualification of tenderers. It is a procurement procedure in which the contracting authority publishes a contract notice and any supplier may request to participate; only those suppliers invited by the contracting authority may submit a tender. According to Section 24 (3) of the same Code, in the restricted procedure, a minimum of five candidates shall be invited to tender, unless there are fewer than five suitable candidates. In the negotiated procedure and the competitive dialogue, a minimum of three candidates shall be invited to tender, unless there are fewer than three suitable candidates.

In line with Section 5 (14) of *Laki 348/2007*, a competitive dialogue is a procurement procedure in which the contracting authority publishes a contract notice and any supplier may request to participate; the contracting authority conducts a dialogue with the candidates admitted to that procedure, with the aim of developing one or more suitable alternatives capable of meeting its requirements, and on the basis of which the selected candidates are invited to tender. Taking into account that the case study had a competitive dialogue as contracting procedure, some more information on that procedure is available in the Appendix A.

In the contract notice, invitation to tender or project description, it must be presented the criteria based on which the contract will be awarded. The selection criterion is either the lowest price or the most economically advantageous tender. In cases where no selection criteria or requirements were mentioned in the tender dossier, the lowest price is assumed to be the decisive factor [37]. There are two levels of criteria evaluating tenders [37]:

- Minimum requirement – assessed only as pass or fail;
- Comparison requirement – for the assessment of the most economically advantageous tenders must be linked to the contract target and enable the impartial assessment of

tenders. They cannot act in favor of a certain tenderer, product or region. The comparison criteria must be sufficiently defined. Tenderers must be able to identify which aspects are important in the comparison.

Only tenderers fulfilling the set minimum criteria will be included in the comparison of tenders. The comparison must consider the selection criterion for tenders determined in the invitation to tender. If the selection criterion is the lowest price, a price comparison must be conducted between all tenders fulfilling the minimum criteria [37].

Details on the admission of candidates and tenderers and for selection of tenders is available in Appendix A.

During the tenderers' evaluation, it is important to cite Section 56 – Requirements and references relating to the suitability of candidates and tenderers:

'Contracting authorities may set requirements relating to the candidates' or tenderers' financial and economic standing, technical capacity and professional ability and quality and request that the candidates or tenderers submit the related references.'

In order to verify the requirements and that the requirements are satisfied, the requested references shall relate to the candidate's or tenderer's ability to perform the contract. Requirements shall be in proportion to the subject-matter, purpose and scope of the contract. Requirements and references shall be indicated in the contract notice. Candidates or tenderers failing to satisfy the minimum requirements set by the contracting authority shall be excluded from participation in competitive bidding.

Contracting authorities shall indicate in the contract notice any objective and non-discriminatory criteria and rules, which they shall apply in restricted procedures, negotiated procedures or in the competitive dialogue to admit candidates and tenderers to the tendering procedure or negotiations. Contracting authorities shall state the minimum number of candidates and, where appropriate, the maximum number of candidates.

Contracting authorities may invite candidates or tenderers to supplement or clarify the references and other documents.'

Selection of tenders is made according to Section 62 as transcribed below:

'The awarded contract shall be either the economically most advantageous tender from the point of view of the contracting authority in accordance with the comparison criteria linked to the object of the contract, or the lowest price. When the award is made to the economically most advantageous tender, the criteria may include, for example, quality, price, technical merit, aesthetic and functional characteristics, environmental characteristics, running costs, cost effectiveness, after-sales service and technical assistance, delivery date and delivery period or period of completion or life cycle costs.'

In addition to the provisions laid down in subsection 1, while assessing the economically most advantageous tender, the contracting authority may take account of economic and qualitative criteria to meet the needs of the public concerned, and environmental

requirements, provided that these criteria are measurable and linked to the object of the contract. Under the same conditions, the contracting authority may use criteria aiming to meet the needs of particularly disadvantaged groups of people using the object of the contract, provided that these factors are defined in the technical specifications.

The contracting authority shall specify in the contract notice or in the documents relating to the invitation to tender the comparison criteria and the relative weighting which it gives to each of the criteria chosen to determine the economically most advantageous tender. In the competitive dialogue, the equivalent information shall be specified in the contract notice or the project description. The weighting may also be specified by a reasonable range. If the relative weighting of the comparison criteria is justifiably not possible, the comparison criteria shall be specified in the order of importance.'

If the selection criterion is the most economically advantageous tender, the comparison must take account of all criteria relating to economical advantageousness. It is prohibited to use other than stated comparison criteria and to leave a stated criterion out of actual comparison. In the comparison stage, no information other than that stated in the tenders may be acknowledged [37].

The price subject to comparison must be determined in the invitation to tender, and can be one of the following [37]:

- Competitive Component, including all compensations and expenses;
- Competitive component which is subject to price evaluation and Non-Competitive Component, which includes compensations, reimbursables which are expenses arising for the consultant in accordance with the State Travel Regulations and Standard Terms of Payment.

When comparing economical advantageousness, each tender is compared separately against each comparison criteria, after which the tenders are compared against each other. Justifications must be presented for the results relating to each requirement. If weightings and scoring are used, separate justifications must be entered in a comparison memorandum for each point given to a tender for each comparison criterion. Following this, the points given to each tender are summed up, and the tender with the highest score will win the comparison. In order to realize the comparison work, the unit must determine the criteria for awarding points [37]. The general method to evaluate tenders consists in the following formulas presented below (see formulas 2.1, 2.2 and 2.3).

$$\text{Technical score comparison value} = \frac{\text{Tenderer's score}}{\text{Best tenderer's score}} \times \text{weighting} \quad (2.1)$$

$$\text{Price comparison value} = \frac{\text{Lowest tenderer's price}}{\text{Tenderer's quoted price}} \times \text{weighting} \quad (2.2)$$

$$\begin{aligned} & \text{Technical score comparison value} + \text{Price comparison value} \\ & = \text{basis for procurement decision} \end{aligned} \quad (2.3)$$

According to FAPC [37] only the original decision-making criteria can be used as selection criteria. Every criterion must be evaluated independently and every difference must be justified and documented in a publicly available written document.

It is possible to write a shorter memo to be included in the procurement decision, but this shorter memo itself is not sufficient. The procurement decision is based on written grounds and once it is published it shall be sent in writing to all tenderers that took part in the competitive tendering. Also, it should be noted that just an evaluation grid is not enough since an evaluation must be documented, and every difference in every criterion must be properly justified in writing [37].

According to FAPC [37] a written procurement decision shall be drawn for approval to a person with decision-making power in the matter. The evaluation team does not take a decision on the project implementer, but instead makes recommendation to the decision maker. A procurement decision constitutes the prerequisite for drawing up the contract: by signing the procurement proposal, the person approving the proposal, i.e. the person using his or her decision-making power, also grants the right to implement the contract within the scope of the proposal.

Further details on the competitive dialogue tendering procedure will be presented along with the case study alliance project at chapter 4.

2.3.4. Comparison on Portuguese and Finnish procurement

The procurement procedures are essentially the same in both countries since they are regulated by the European Directives that regulate public procurement and its local regulation for the EU members.

The intention of this section is not to raise all the questions related to differences between the Finnish and Portuguese procurement, but to discuss some minor differences that were found in the selection of candidates and evaluation of tenders. This is relevant topic for the research since a good understanding of procurement procedure will allow a full understanding of PA delivery approach and a later comparison of selection criteria with implementation phase practices.

Other questions, related more closely to limitations on the procurement directives and local codes were left out of this research work. Regardless of their importance and interest, their inherent legal nature shall be left to legal experts' analysis.

In Portuguese Public Procurement Codes (CCP: *Código dos Contratos Públicos*) [39], articles 74.^o and 75.^o refer that the two main contracting criteria are either the lowest price or

the most economically advantageous offer, in the same way as EU directives and FAPC. Under the most economically advantageous criterion there should be no factors or sub-factors, directly or indirectly, related to situations, qualities, characteristics or other elements related to the tenderers. Also evaluation model criteria should include weighting coefficients, a scoring scale and rules on how to rate each criterion [40].

The article 139.º of CCP defines guidelines for evaluation model of proposals. In case the adopted criteria is the most economically advantageous offer, it shall be defined a scale of scoring scale through a mathematical expression or a function of an ordered series of different attributes susceptible of being proposed for the outline of contract's execution submitted to competitors. Also, sub-actors might include aspects related to the execution of contract and shall be available to all tenderers on tender documents. Evaluation model shall not have any information, directly or indirectly, related to attributes of proposals, with exception of the one being evaluated.

In Portuguese CCP, whenever the most economically advantageous proposal criterion is adopted, it shall be established an evaluation model for proposals based on a global scoring of each proposal and consisting in the sum of the partial scorings of the defined criteria the function or expression can also be designed scoring scale. Apparently, by comparing this aspect in both Portuguese and Finnish codes there are no significant differences. However, FAPC [37] refers a reasonable range, which can be interpreted as similar to a scoring scale, although it is not mandatory (see Section 62, Appendix A). Regarding this matter, it becomes clear that Portuguese CCP is more rigorous in this topic since a real function always implies a scoring scale, but the inverse is not always valid [40].

Article 164.º of CCP, refers evaluation model for candidates should include clearly all factors and sub-factors that are part of each qualification criterion, its weighting coefficients, a scoring scale, a mathematical expression or a ordinated scale of different capacity levels that allows to partially rate each candidates' submitted applications.

Concerning the technical capacity of tenderers, the article 165.º refers that it should describe conditions, qualities, characteristics or other relevant elements, namely:

- Curricular experience of candidates;
- Human, technical, equipment or other resources used by candidates;
- Organizational model of candidates, namely regarding steering and integration of capabilities, information systems and quality management systems;
- Candidates' ability to adopt environmental management measures to the extent of the contract;
- Information available at Construction and Real Estate Institute (INCI: *Instituto da Construção e do Imobiliário*) database regarding contractors, when the contract concerns public works or concessions.

Other differences were noticeable, namely regarding evaluation and comparison of tenders and the inclusion of subjective criteria at tenders' evaluation. As it was described in FAPC's general method for evaluating tenders, scoring of each criterion is made comparing to the maximum score obtained by any of the tenders at that criterion. This means that

evaluation process is based on a relative scale dependent on other tenders' score. This procedure is different than the one at Portuguese CCP that requires an independent evaluation of tenders and its scoring, without any comparison and relative scoring dependent on other tenders. At chapter 4, a brief comment will be made on these topics.

Additionally, the selection process of case study will be described and some of the questions raised here will help understand how Finnish practitioners applied PA, leaving an excellent background and experience to study and apply it further in Portugal. Again, it should be taken into account that application of procurement methods requires adaptations from country to country given their local culture, business and legal environment. This shall include processes, procedures and ground rules to support the use of PA in particular.

3. Research methodology

3.1. Research approach

The undertaken research took place both in Portugal and Finland, and included a case study project, interviews and survey analysis. The case study research began in January 2013 and was completed in September 2013. It was selected in January 2013 by the author with VTT's Pertti Lahdenperä advice and taking into account the research questions formulated. The development of the interviews was based on literature review, case study project's documentation and its participants' feedback. The interviews were developed during February 2013 and interviewees were chosen by the author with project's owner collaboration and contacted by e-mail or telephone in the same period. A total of six interviews were conducted between February and March 2013 and included owner's, contractor's and designer's representatives. Interviewees' name was kept confidential in the research work.

In between February and September 2013, project's survey results were provided by project's representatives and were statistically and descriptively analyzed along with interview results. Interviews were developed to investigate characteristics of the first alliance construction project in Finland, such as its general experience, features and in particular project's performance and collaboration levels. In that way, interviews were semi-structured, flexible to allow free comments and merely followed pre-established guidelines.

On the other hand, surveys were developed by project's representatives to measure and assess levels of project's performance and satisfaction. The intention was to determine key result areas (KRAs) of which an incentive system was dependent of at project's commercial model. KRAs refer to areas of outcomes or outputs for which the project participants are responsible for. They can be seen as a tool similar to Key Performance Indicators (KPIs). Survey results were used to make a descriptive and a statistically significant analysis to support possible findings. Some feedback was given from project's representatives to complement and validate results. At last, results were analyzed from author's critical perspective and some key findings were reported. It shall be referred methodology's development was not purely sequential, since research approach and research questions were developed simultaneously taking into account each other's constraints. Research conduction and results' analysis and discussion were the last steps of the research work (see Fig. 1).

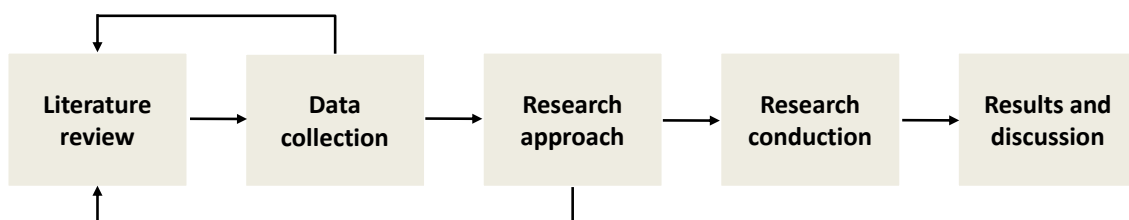


Fig. 1. Research sequence

3.2. Research design

The research design consists of the approach used for collection, measurement and analysis of data [41]. By specifying the structure and necessary procedures of the research design it was possible to obtain the required information to answer the research questions. Chosen research design consisted of a qualitative research approach which will be conveniently described in more detail. In fact, design of qualitative studies allowed a description of the interaction of context and actors in specific settings. According to Chism [42], for many research questions in engineering, it is in fact the ideal research approach. As it is a recent tool in some disciplines, it is important to demystify the qualitative approach and inherent suspicion surrounding it, showing how useful it can be.

The term qualitative research is often associated with non-numerical data or text while quantitative research is related with numerical data, but the fact is that its distinction is only superficial. According to Chism [42], quantitative research is concerned with identifying relationships between variables, and generalizing those results to the world at large. In contrast, qualitative research seeks to understand phenomena in depth and within specific contexts. As Lincoln [43] mentions: 'qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them'. Merriam [44] states: 'qualitative researchers are interested in understanding what those interpretations (of those studied) are at a particular point in time and in a particular context'.

From what was mentioned, it became clear that the most suitable research for this project was the qualitative research, as it allowed in-depth focus in a specific situation with only a few, but representative individuals. The research approach and the epistemological perspective in particular were important since their definition allowed understanding how the researcher looked at the subjects under study, and consequently built research design. By doing this, it was possible to determine which research questions and methods were particularly suitable for the case study.

The epistemological perspective of this research was an interpretivist approach since it tried to state the truth in a contextual way, within a single project and depending on the situation, the interviewed people, and even on the researcher. The recognition of the researcher as an instrument of the study was also an essential aspect to take into account in this research perspective.

After a long iterative process, under a qualitative interpretivist perspective, the research approach was defined as a hybrid between phenomenology and critical approaches. Following definitions for phenomenology and critical perspective can be observed in Table 6.

Table 6. Phenomenology and critical perspectives' definitions

Research approach	Description
Phenomenology	Seeks to provide a description of the key elements of a phenomenon. New meaning can be obtained by laying bare of essential aspects of a particular experience and describing what are the common, key elements that make up that experience. One of the main objectives of this approach is to obtain a 'careful description of ordinary conscious experience of everyday life' [45].
Critical perspective	Argues truth is defined by those in power. This can be compared to the hypothesis that truth within project can be better perceived by its own participants. Thus, critical approach is often associated with action research, which seeks not only to understand, but also to change the structures of society. The main objective of action research is to modify and extend promising theories in light of knowledge gained through experience [46].

Action research was also conducted throughout the research work and intended to have researcher observing and documenting phenomena, but also participating in the subject under study. Action research is especially useful in situations where participation and organizational change in processes might be necessary. In this research, the collected data was used not only for research purposes, but similarly intended to develop and contribute to the subject under study.

The chosen research design was also an exploratory research since it was a non-experimental study, and it tried to generate *a posteriori* hypotheses by examining data from a case study and looking for potential relations between variables. These variables were previously established, and there was already some existing knowledge on the existing relations between them. Thus, the objective was to get more knowledge on those relations between variables and alliance experience in general.

This exploratory research had a flexible design, allowing more freedom during the data collecting process (e.g. semi-structured interviews). Another reason to justify the use of this approach was the fact that the variables that were about to be studied and its relation was neither quantitatively measurable nor significant, since data is from one single project. Also supporting the flexible research design is the fact that some theoretical information was not available from research start, which supported opting for a flexible approach that could adapt over time during the research, being less rigid than predesigned oriented research approaches.

Since this was a pioneer project in its context, the exploratory research had the particular advantage of allowing making new findings due to less strict methodological restrictions. That way, potentially interesting relations were less likely to be missed. Concepts such as collaboration, collaborative features and performance within the alliance contracting approach were studied and ultimately correlated.

A case study research strategy is characterized by in-depth study of a bounded system, and it was found particularly suitable for this thesis, since it was found interesting to study in depth specific aspects of a construction project. Eisenhardt [47] refers, case studies can be used to accomplish three different aims: to provide description, to test theory, or to generate

new theory. Case study approach was also expected to provide more details on some qualitative variables of the project. Reinforcing the previous content, Bell [48] refers: ‘The case study approach can be particularly appropriate for individual researchers because it provides an opportunity for one aspect of a problem to be studied in some depth’.

The selected project was an intrinsic case study, since it had as its focus an in-depth understanding in previously identified aspects of that case. The project was not chosen because it was representative of a more general phenomenon, but simply because it was pioneer and interesting itself. By conducting a case study research it was possible to absorb a multiplicity of real-life data from which concepts could be formed and theory can eventually be tried [49].

Typically, a case study research approach is quite flexible, and it includes multiple data collection methods such as documentation, interviews, questionnaires, and observations. The resulting data can be both qualitative and quantitative [47]. In this case, the resulting data was qualitative and the data collection methods included gathering documental material, analyzing project satisfaction questionnaires and conducting interviews. The case study will be described in detail in chapter 4.

The nature of a qualitative research demanded rigor. Quite often, qualitative studies are seen in a more skeptical way than more typical kinds of research. That is why it was found so important to prove and demonstrate that the research method could be trusted, and its results were in fact believed to be useful. Examples of concerns taken into account by researcher covered research validity, reliability, objectivity and generalizability. Also the impact of research on the people involved and its contribution to the scientific community and society were taken into consideration. Different authors mention several steps that can be taken to ensure the methodological validity. In this research there were taken some control recommendations included in Lincoln and Guba [50] that can be seen below (see Table 7).

Table 7. Research control recommendations

Reflexivity	Describing the bias to potential users of the research. Trying to either suspend researcher’s own perspective or articulate assumptions and position in a commentary or prologue to the research
Member checks	Asking participants in the study to confirm the accuracy of the recorded data or to respond to the resulting interpretations
Thick description	Using details to describe context and people in the study so that the reader can have as much information as possible to understand the findings. Illustrate the narrative of a qualitative study with images, quotations, and colorful descriptions
Collaboration	Work with research participants as co-researchers through generating research questions or research design together, by teaming to collect data, or by jointly interpreting data

There were also responsibility and ethical issues taken into account. Responsibility on a quality test is put into stake if the study is conducted in a trivial way or if it has little potential to generate new knowledge, enable deeper understanding of the subject or if it fails to be

useful informing or changing human behavior. In this study there were some ethical issues involving concepts defined at [51] such as informed consent, confidentiality, avoiding harmful consequences, genuine reasons for conducting research, honesty and reciprocity.

In short, the research design for this thesis was an exploratory and flexible case-study research design that intended to assess project's features such as collaboration and performance within a PA and its overall experience in its unique context.

3.3. Data collection

Data collection did not only consist in mechanically gathering data and analyzing it. In fact it was a process articulated with research design which was closely connected with interviews' guidelines and case study characteristics. This process gathered resources through project's documentation, project's survey results and technical papers provided by project participants and also through informal ways such as meetings, media or email. After first data was collected and analyzed, the case study was defined in detail (see chapter 4), further information was requested and collected by setting together with project participants meetings and collecting information through informal ways. It shall be referred that there were some privacy issues regarding availability of project's documentation and information, mostly linked to sensitive on-going project issues. Most of documentation was provided in January and February 2013, however there was a constant process of feedback and clarifications over those documents when needed. Provided documentation can be seen in Table 8. Having that in mind, research questions were set and interviews were developed taking into account those constraints. Subsequently, semi-structured interviews were developed and a total of 6 interviews were conducted between February and March 2013. Project's survey results were provided between February and September 2013

Table 8. Project's documentation

Documentation	
Selection and development phases	Meeting invitation – Annual general meeting Evaluation of candidates Shortlisting of candidates General discussion and appeals Request for tenders Tenderer's and tender's scoring Evaluation of tenders Alliance agreement resolution Tenders' relative weight calculation Tenders' scoring justification Commercial model Project description Project plan
Alliance	Reimbursement costs of the project for consultant Reimbursement costs of the project for contractor Alliance agreement
Implementation phase	Project's satisfaction survey

3.3.1. Interviews' development

Interviews are a common method for collecting data in qualitative research. The use of interviews was found particularly useful since it allowed accessing participants' experiences

and own perceptions of certain subjects. Given the fact information from interviews was crucial for this research, it was considered important to justify the pertinence of the interview method used, the type of questions to ask, and how to conduct the process.

Interviewees were selected according to the importance they represent in the alliance and in the research target. These criteria led to choose interviewees from owner, contractor and designer representatives. The number of representatives from each side was chosen to allow sufficient representativeness (see Table 9). The objective was to assess their insights, perspectives and expectations over several aspects on the ongoing project. The interviews were expected to be face-to-face with the project participants, but later on, eventually some questions were made via email or telephone, given the distance between author in Tampere and project's location in Helsinki.

Table 9. Number of interviewees

Interviewees	Number of participants
Owner	2
Contractor	2
Designer	2

Interviews were developed and conducted as semi-structured interviews. This method of research is mostly used in the social sciences, however it was found adequate to this research since study target relates to qualitative and subjective aspects and their relation with each other. While a structured interview is by its nature formalized, with a limited set of questions, a semi-structured interview is flexible allowing new questions to emerge during the interview depending on what interviewees might be willing to share. Interviews' guidelines and main questions can be seen in Appendix B.

The developed interviews had a limited number of questions that were made in such a way to allow discussion on certain themes leaving space for new insights that were not initially foreseeable. The interview framework was developed after establishing the methodology and some new insights were also taken into account from literature review. Finally a preliminary version of the interview framework was sent to project's client representatives in order to get their feedback and get an optimized guideline for interviews.

Conducting semi-structured interviews was a process involving substantial planning. Interviews were flexible and guided in order to allow the interview to take the desired direction and information. The development of a checklist was useful during the interviews. Finally, probing questions were asked when previous responses were not clear enough or when either the interviewee showed some difficulties responding or the interviewer needed deeper understanding on the asked aspects.

It was crucial to keep in mind that the specific questions must be answered, and that way the interviewer had to remain focused and objective, having an important role conducting the interview and obtaining the information that was previously established in the interview

questions. At the same time, it is fundamental to ensure that the questions are open-ended and will not lead to limited responses.

The quality of interviews had a fundamental role in the overall quality and trustworthiness of the outcomes of the research. Kvale [52] listed some criteria that were found useful to guarantee the quality of conducted interviews:

- The extent of spontaneous, rich, specific, and relevant answers from the interviewee;
- The degree to which the interviewer's questions are shorter than the subject's answers;
- The degree to which the interviewer follows up and clarifies the meanings of the relevant aspects of the answers;
- The extent to which the interview is interpreted throughout the interview;
- The frequency with which the interviewer attempts to verify his or her interpretations of the subject's answers in the course of the interview;
- The degree to which the interview is self-containing – it is a story contained in itself that hardly requires many extra descriptions and explanations.

After conducting interviews between February and March 2013, recorded interviews were transcribed. A complete transcription was not found necessary. Interviews lasted between 50 and 60 min, and as a general rule, one hour of tape took about three to four hours to transcribe. However that varied depending on the complexity of data from each interview and the incremental experience gained by the author over transcription process's course.

3.3.2. Survey results

Over project's course, information on project's survey was given along with feedback from main participants and also deserved attention for analysis and discussion. Data collection from project's survey results was a long process that began in February 2013 where first round results were provided and finished in September 2013 where results on the fourth round were released.

The survey results were a tool to help validate interviews' findings. These results were analyzed both descriptively and statistically recurring to Pearson's correlation test and Kruskal-Wallis ANOVA test. It was found appropriate to describe survey and its analysis *in loco* at chapter 5. At last, main results were validated and left for author's discussion later in the aforesaid chapter.

3.4. Analysis method

Analysis process was from the beginning an iterative process, since research questions, conduction of interviews and data analysis happened at the same time and depended on each other. In terms of literature review it is relevant to refer that the data from documentation was analyzed taking into account the scope of the study, which suffered some adjustments during the process and focus was refined.

The interviews conducted also adapted over time. That happened since early interviews influenced questions and content of subsequent interviews. After interviews, its content was transcribed and analysis process started. Since interviews were semi-structured, information was organized according to those topics and transcription only included complete thoughts and relevant information. In the middle of this process, some old topics were found irrelevant and eliminated while a few new topics were added due to relevant information that was shared during interviews.

While analyzing interviews' data some suggestions from Bogdan and Biklin [51] were followed including ordering data according to some criteria. Certain category codes were developed and they helped labeling related data. Repeated ideas were also taken into account within each interview and among interviews. Moreover, the way respondents emphasized or used particular expressions, was also taken into account to perceive the importance of topics and eliminate possible biased information. After analyzing each interview separately, some feedback was given from interviews' participants and a general analysis was then made where some findings emerged.

Project survey was developed by project's responsible participants to assess its performance and satisfaction among involved participants, and later connect it with an incentive system dependent on KRAs. Nonetheless, the researcher found this survey useful to assist and support possible findings from case study and its interviews.

The survey will have a total of 7 rounds, but only 4 were released by the end of this research in October 2013. Answers were given in accordance to a Likert scale from 1 to 5 (where 1 equals totally disagree to 5 meaning totally agree) and there were a total of 6 areas with a total of 26 fields under evaluation. Results were analyzed using a descriptive analysis and statistical tests. The goal was to find effects and correlations with interviews' findings and establish any trends over project's implementation phase.

Statistical tests consisted of a Pearson's correlation test and Kruskal-Wallis ANOVA test. Below there is a short description of each method and later at chapter 5 the analysis of each method will be done in detail. These tests were conducted using the Statistical Package for Social Sciences (IBM SPSS) software. The significance level for the tests was set at 0.05.

Pearson's test is normally used as a measure of linear correlation between two variables, giving a value between +1 and -1 inclusive, in which +1 is total positive correlation, 0 is no correlation, and -1 is negative correlation.

Kruskal-Wallis ANOVA test is a non-parametric method that does not assume both a normal distribution and equal variances. It is suitable for ordinal variables and to test whether samples originate from same distribution. It can be used to compare two or more independent or not related samples. When the test leads to significant results, then at least one of the samples is different from other ones. However, the test does not identify where the differences occur or how many differences actually occur.

4. Case project: the Vuolukiventie 1b

4.1. Motivation

As it was previously mentioned, PA and its use have been growing and developing especially in Australia, from where the method recently found its way to Finland [24]. The interest towards PA for this project came both from the fact that hundreds of projects have already been successfully applying the approach in Australia, and also from The Finnish Transport Agency (FTA; *Liikennevirasto*) that has been studying the method and its application in Finland, adopting it recently to two ongoing projects. The first one is the renovation of the Lielähti-Kokemäki railway section and the second one the Tampere lakeshore road tunnel estimated in 100 M € and 200 M €, respectively.

In 2011, the University of Helsinki showed interest in testing PA at a suitable project. That led them in finding a suitable project that was found to be the renovation and construction of their new blocks of dormitories at Vuolukiventie 1b (see Fig. 2). The project by itself is not different from others in general, but precisely because of that, it was considered a good opportunity to test a new procurement approach and agreement model that is intended to maximize the performance and efficiency through collaboration and innovation. Another reported motivation consisted of owner's desire in improving designer-contractor cooperation achieved through early involvement of parties in the project.

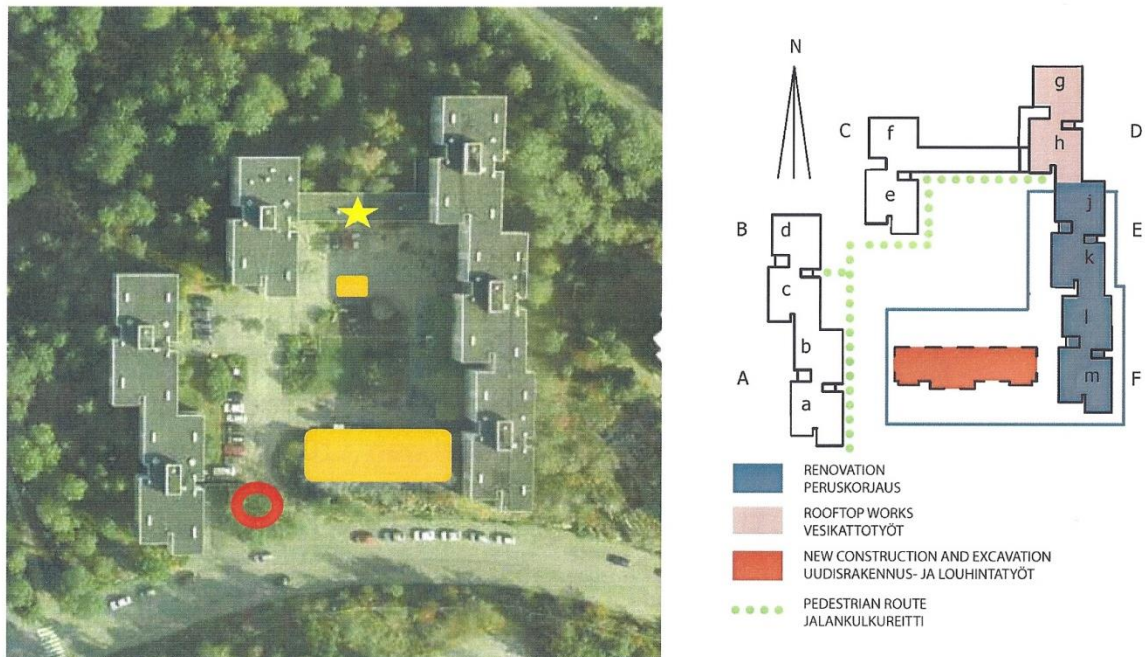


Fig. 2. Project's intervention area

Owner's main objective towards this project was to achieve a result that best serves the final use of the facilities that involve renovation and change of use of 6 blocks of buildings and also the construction of a new building. The aim is also to improve the economic use of the property by also involving project's parties in the warranty period of the project. In that regard, the alliance will be responsible for the design and construction of project, and also their liabilities extend for a 5 year warranty phase. All the contractual parties in the project have joint project-related risks and benefits. It was referred by the owner that main challenges and targets for the project and alliance in particular include:

- Bindings on collaboration, commitment and performance already settled at selection phase;
- Creation of a solid design team and combine it with a creative construction team;
- An alliance agreement;
- Same team for all project phases: development, implementation and warranty phases;
- Collaboration, organizational and professional skills of parties to form an alliance;
- Definition of tasks and roles for all the parties: designers, contractor and owner;
- A fixed fee of 18.3 M €;
- Participation in PA tendering and agreement negotiations;
- Flexible working drawings and production plans should be developed jointly with contractor;
- Take part in the inspection of works and installations at the construction site;
- The open account principle, common objectives, and shared goals should be principles present in the alliance and according to the project's goals;
- The alliance to allow the development of new procedures regarding the selection of subcontractors;
- Energy economy and efficiency improvements;
- Ensure safety and satisfaction of users during implementation and warranty phases;
- Risk and liabilities shared across alliance's participants;
- Implement an incentive system with rewards and penalties based on KRAs and a project survey.

Substantial time and effort was spent by owner's side developing the contracting approach since it was a new delivery model for owner side. From author's view, owner side had good knowledge of both technical and market factors from previous experience and wanted to have a more active and broader role in this project than traditionally. That led to experiment a new contracting approach such as PA that could efficiently deliver a successful project and at the same time provide experience and insights on a pioneering delivery model for building sector.

4.2. Description

The Vuolukiventie 1b was built in 1968 in the Pihlajamäki neighborhood in northeastern Helsinki and it is owned by the University of Helsinki. The initial design works in Pihlajamäki began in 1959 when the Helsinki City Council assigned the task of drawing up the town plan to architect Olli Kivinen. The building was initially designed as a retirement home and had no major renovations since its construction.



Fig. 3. Project's area overview

Pihlajamäki neighborhood intended to be a demonstration of the enthusiasm and effort exhibited by Finnish architects of that time as they were part of building country's welfare society. In that context, it was one of the first mass production housing areas in Finland and it was the first construction site where an entire prefabricated system was implemented. Reportedly, prefabrication was seen as an economical method to produce modern apartments while Finland was facing a period of rapid urbanization.

Recently, in 2007, it became the first protected '60s suburb in Finland listed at National Board of Antiquities. The preservation guidelines were set by the Helsinki City Planning Office and include maintaining each building in order to preserve the uniform appearance of the white, low maisonettes and few taller buildings (see Fig. 3). Also, new buildings in Pihlajamäki must follow the architectural spirit of the '60s. Currently, the building is ran by HOAS – Foundation for Student Housing in the Helsinki Region, and consists of studio apartments rented out for students at University of Helsinki.

This project consists of a renovation of a protected building and construction of an additional building. The project has 4 phases as illustrated in the Fig. 4. Considerations on each phase will be made across this chapter. Analysis and discussion is reserved at chapter 5.

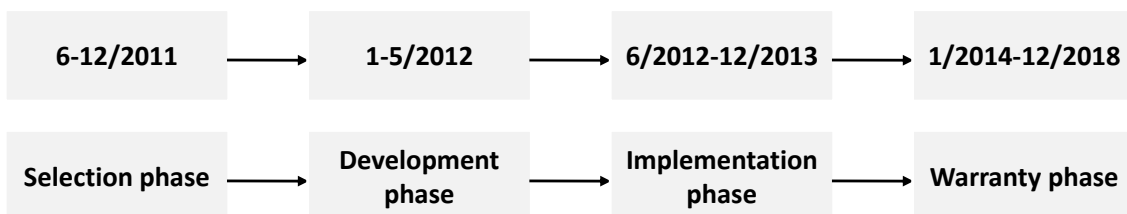


Fig. 4. Project's phases

During the years 2012 and 2013 there have been renovation works going on. These works caused noise during the working days but did not affect the living in the building since most of the apartments were in use during the renovation period. Project consisted of rehabilitating and adding apartments on previously unused space on basement floors and also building a new block. It is a pioneer alliance project for the building sector in Finland. The objective is to provide 256 small apartments for international students and researchers at University of Helsinki. Project's target cost is 18.3 million Euros.

Existing facilities have a gross area of 14770 m² and garage for 59 cars. The new block will have an implementation area of about 1000 m², and its use will serve for accommodation and services (see Fig. 5).



Fig. 5. New building preview

The project's operational targets consist mainly of adding new rooms in the previous unused space at the basements, while renovating all of the existing apartments, completely renovating all the apartments and facades, and improving the energy efficiency and overall facilities' economy. The project has a 5 year guarantee period and service life goal is estimated in 30 to 40 years and the alliance will be responsible for warranty phase and for maintenance service.

4.3. Selection phase

4.3.1. Tendering process overview and timeline

The objective of the tender was to establish a competitive dialogue procedure to gather the best possible organization to form an alliance with the client for the Vuolukiventie 1b renovation project. Main goal of the selection process was to select the most economically advantageous offer. The selected procurement procedure was the competitive dialogue. This kind of procedure was found appropriate given the complexity of the contract, and the specific requirements for an alliance project. In order to select the most capable tenderer, the ability to collaborate and problem-solving skills were assessed during negotiations and workshops. Cooperation during selection phase resulted in project's content for design, construction and warranty phases.

The competition for designers and contractor was made at the same time. Traditionally, the designers would be chosen first, and after the design was made then the contractors were chosen. This project selection phase had 2 stages. In first stage subscriber (owner) called for candidates and evaluated the 3 most suitable tenderers. After that, the second stage consisted of inviting those 3 candidates to make their offers and later evaluate and select the awarded offer.

A procurement notice has been published in the EU contract notice no. 2011-016409, on 23.6.2011 by the Ministry of Employment and the Economy, under the Finnish e-procurement portal HILMA.

Invitation to tender consisted of instructions to tenderers and its annexes normally consist of: terms of reference, general terms of public procurement, price tender sheet, curriculum vitae, company reference sheet, minimum requirements and standard terms for payment.

Within the contract notice, there was also information on the application's deadline which was set to 19.8.2011 at 15:00². By that time, there were registered 6 applications of which 3³ were later selected after a scoring-based assessment made by the jury from Tiedepuiston Asunnot Ltd, and made public on 6.9.2011. Received applications were made in accordance with the contract notice, and they all met the eligibility criteria and minimum requirements.

On 8.9.2011, an invitation to negotiate was sent along with a preliminary contract including appendices with project's description, alliance agreement, commercial model, drafts for reimbursable expenses and a preliminary project plan.

² In accordance with the European Directive which establishes a minimum time-limit of 37 days between the contract notice and the receipt of requests to participate;

³ According to European directives on public procurement the minimum selected candidates shall be 3.

Negotiations resulted in a final contract that was later sent to all tenderers on 3.11.2011. The deadline for submission of tenders was set to 21.11.2011 at 14:00, and by that time all the 3 tenderers had submitted their offers. All offers were according to the terms of the procurement procedure. Therefore, all the 3 offers were included in the comparison of offers stage.

Tenders were opened at 15.00 on 21.11.2011 in a not public event, in accordance to common practice in Finland. The subscriber made a purchase decision on 29.11.2011, and the awarded tenderer was notified. The contractual relationship started only after the written alliance agreement was signed. In Fig. 6 it is possible to see an overview of selection's phase steps.

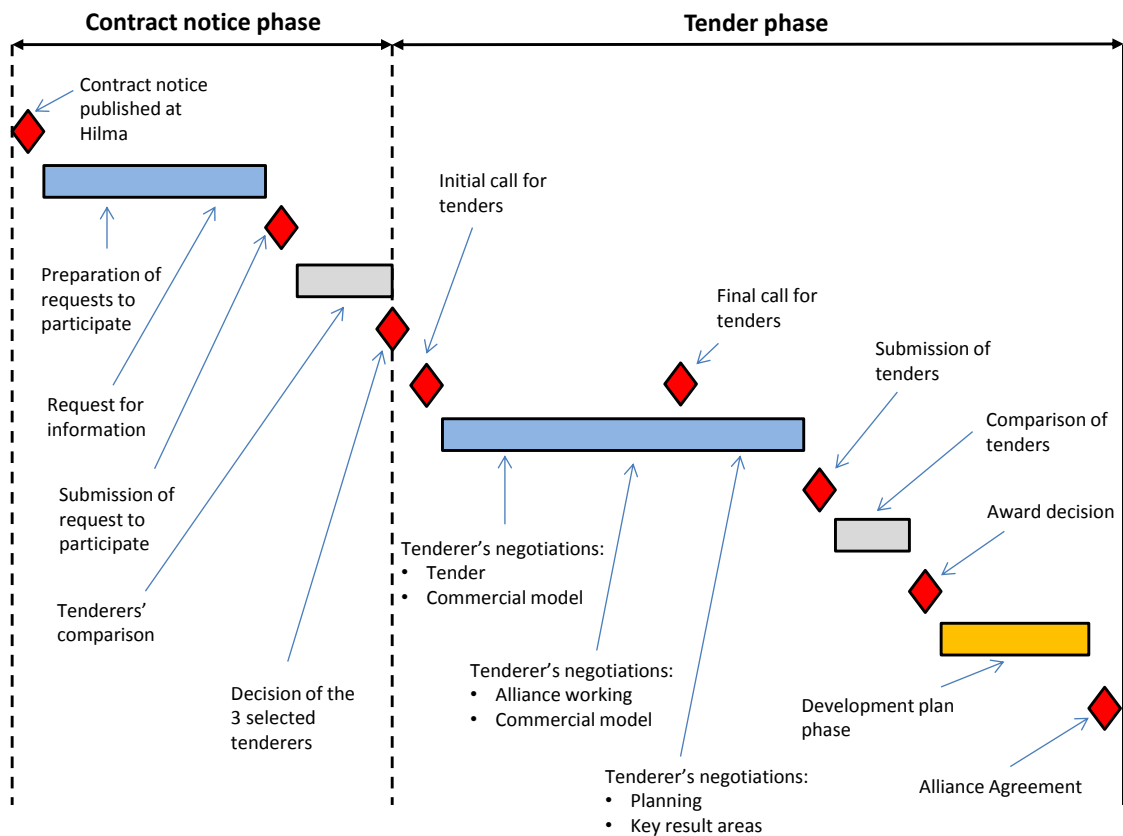


Fig. 6. Selection phase overview

4.3.2. Candidates' selection process

As presented in the competition program, if candidates meet the minimum requirements and if there is a minimum number of 3, then the candidates would be ranked by the following criteria presented in Table 10.

Table 10. Candidates' weighting criteria

Criteria	Weight
Project supervisor references	30 %
Main and design architect references	20 %
Project manager references	20 %
Main planning designer references	20 %
Project plan	10 %

Evaluation of candidates took into account candidates' references. In that regard, subscriber intended to estimate candidates' experience by assessing the number of projects, their nature and compliance with evidence on collaborative and renovation projects. Project plan criterion is estimated as a whole. Project plan criterion focused in subjective organizational aspects, which is considered by the author as an uncertain topic at tenderer's evaluation phase in terms of procurement codes interpretation and practicability. From the understanding of Finnish procurement codes it was considered provided at law, as can be seen at section 2.3. However, it is not clear whether this criterion could be applied under Portuguese procurement codes.

The evaluation team was set by Tiedepuiston Asunnot Ltd board of directors. A panel of judges was responsible to evaluate scoring of the candidates, consisting of the following parties present in Table 11.

Table 11. Panel of judges for candidates' evaluation phase

Member	Entity
Teppo Salmikivi	University of Helsinki
Pirkko Varila	University of Helsinki
Mari Randell	City of Helsinki
Jaana Ihalainen	University of Helsinki
Henri Jyrkkäranta	HTJ Ltd - Rakennuttajatoimisto ⁴

In the Appendix C there can be seen the rating scale from 0-5 and reasoning used to rate the 6 consortium candidates. On 6.9.2001 the notification of the 3 selected candidates was published. The 3 selected candidates were the consortia presented in Table 12.

Table 12. Selected consortia

Contractor	Designer
SRV Rakennus Ltd	Arkkitehtitoimisto SARC Ltd
Skanska Talonrakennus Ltd	Arkkitehtiryhmä A6 Ltd
NCC Rakennus Ltd	Optiplan Ltd

⁴Rakennuttajatoimisto HTJ Oy is a Finnish consulting group specialized in project and construction management.

4.3.3. Tenders' selection process

The tender was based on the invitation to tender and its annexes. It was also mandatory that the tender must contain all the information and materials required for the delivery of the tender. The offer consists of the following three parts:

- Alliance skills;
- Value for money;
- Reward.

In the reward part of the tender, candidates must take into account the “open book” principle. This leads to prompt information available regarding the designing process specifications and financial aspects such as premiums for alliance contractors and other designers' fees. Additionally, the reward distribution among service providers must be presented in the tender.

The tender must include all the information regarding evaluation criteria, and all the information concerning the commercial model with detailed information on reimbursable expenses and its percentage of project costs, in order to make that criteria assessable by financial experts. Below, Table 13 presents tenders' evaluation criteria, its description and partial weighting.

Table 13. Tender's evaluation criteria, description and weighting

1. Alliance skills (30%)	Criteria	Partial weight
1.1. Development and implementation phase project plan, including the following issues: <ul style="list-style-type: none"> ▪ Alliance model and its specifications ▪ Detailed project schedule, including milestones and critical points ▪ Identification of 5 main risks and preparedness ▪ Prevention and control of economic crime 	A panel of judges evaluates the realism on the quality of the management, risk management, and provider's ability to highlight the model with ideas and solutions. The availability of housing during the repair will also be evaluated in the plan, the duration of the different construction phases and the delivery time for project.	30%
1.2. Negotiation works	A panel of judges evaluates provider's professional skills, such as collaboration and capacity for innovation.	30%
1.3. Alliance Organization, including: <ul style="list-style-type: none"> ▪ Description of the development and implementation phases for the Alliance Organization and working model, figuring proposals for the management team and project team members and their representatives 	A panel of judges evaluates how the provider identified the organizational requirements for different phases in the project including the main functions and roles, as well as the skills to work in an alliance.	40%

2. Value for money (40%)	Criteria	Partial weight
2.1. Proposed plans for the renovation and content of the new part	Proposed plans are evaluated and particular attention is given to the functionality, the scope, level of quality, building construction and architect solutions, including the functionality of common areas and the sustainability of the facilities.	50%
2.2. Client's cost estimate calculated by expert's for the proposed plans	Client's cost estimate of the proposal. Ratio between the estimate and 18M €. If the ratio is superior to 10%, then the client has the option to reject the offer.	20%
2.3. Maintenance costs:		
<ul style="list-style-type: none"> ▪ Written explanations of the measures on how energy consumption is reduced and the maintenance of the facilities are preferred. Estimate for the design solution for heat, water and electricity consumption. 	A panel of judges evaluates the measures for innovation, the realism, variety and different solutions presented and which achieved improvements.	30%
3. Reward (30%)	Criteria	Partial weight
3.1. Reward in euros and its distribution between actors	Indicated in the offer in euros.	100%

It can be observed that value for money was the most important selection criterion, since it had a weighting of 40% when compared to alliance skills or reward with a weighting of 30% each. This shows a clear emphasis in project's quality and aspects such as maintenance and energy efficiency. Also, it shall be noted the particularly low weighting of reward, which can be seen as a natural consequence of emphasizing value for money and alliance skills. It was understood that by attributing a high importance in setting a proper alliance organization it would become more likely to reach most advantageous offer which is believed to have more chances of delivering a successful project. It must be mentioned that particular attention was given to identify differences between the Project Plan criteria at candidates evaluation and alliance skills at tenders' evaluation. Both are subjective criteria and from what has been reported they shall not evaluate same aspects twice as anticipated in both Finnish and Portuguese procurement codes (i.e. tenderer's and tender's evaluation criteria must be different). From author's perspective there were no signs of irregularities.

The tenderer was allowed to make its own technical alternatives for development, implementation and warranty phases, and also for the commercial alliance agreement model during the negotiations which took place before the final invitation was sent. Later, the subscriber has the right to decide whether to accept or refuse those presentations in the final tender. After the final invitation to tender, no more alternatives might be accepted.

Each tenderer had 3 individual rounds of negotiations, organized and focusing in the following aspects:

- The first round of negotiations focused on the initial invitation to tender and its appendices and in the description of the selection process;

- The second round discussed on the content of the alliance model agreement, the commercial model and in interiorizing the necessary competences for the alliance organization;
- The third round of negotiations discussed the provider’s development phase plans and the contents of the project plan.

Evaluation of tenders took into consideration both written material and an assessment from the negotiations and workshops with each tenderer. It was required that all tenders and tenderers were treated equally and confidentially. Also, the tenders must be processed in good time, enabling the delivery of a positive reply to the tenderer while the tender remains valid.

Initially, each member of the evaluation team evaluated and scored tenders’ criteria, independently, in a scale of 0-100 and according previously defined selection criteria (see Table 13). After that, there was a common approach for which points for scoring each tender’s criteria were given. For that, the evaluation team gathered in order to reach consensus on the tenders’ assessment.

The evaluation team was set by Tiedepuiston Asunnot Ltd board of directors that appointed a panel of judges responsible to evaluate the scoring of tenders with the following parties in Table 14.

Table 14. Panel of judges for tender’s selection phase

Member	Status	Entity
Teppo Salmikivi	Property director	University of Helsinki
Jaana Ihalainen	Property manager	University of Helsinki
Pirkko Varila	Architect	University of Helsinki
Aimo Hämäläinen	Building services specialist	University of Helsinki
Mari Randell	Housing program manager	City of Helsinki
Henri Jyrkkäranta	Project manager	HTJ Ltd - Rakennuttajatoimisto

Reference point’s calculation was carried out in accordance with the formulas below (see 4.1, 4.2 and 4.3), where the coefficient of the number indicates the number of points that each criteria can possibly get. The final score was given in a scale from 0-100.

$$\text{Alliance skills score} = \frac{\text{Scoring of the proposal in this field}}{\text{Best score in this field of all proposals}} \times 30 \quad (4.1)$$

$$\text{Value for money score} = \frac{\text{Scoring of the proposal in this field}}{\text{Best score in this field of all proposals}} \times 40 \quad (4.2)$$

$$\text{Reward score} = \frac{\text{Lowest reward of the proposals}}{\text{Reward of the proposal}} \times 30 \quad (4.3)$$

The scoring rule was established from 0-5 and the point increment was 0.5. This means that a scoring of 2.5 means a good performance for the renovation project, and a 0 score describes a level of performance for which is not possible to achieve a successful repair. In the same line of thought, a score equal to 5 means that the project has chances to perform exceptionally well. It is interesting to observe that each criterion scoring is adjusted to the best scoring obtained, which ultimately means tenders are compared between each other. This procedure differs from Portuguese practice in which tenders score shall be calculated individually.

Non-awarded offers were given a compensation fee of 30 000 € per tenderer. It shall be mentioned that ideas and content of non-awarded tenders could be used for the project. Information regarding tenderer's business or professional secret, or any other confidential materials will remain secret on previous request. For the chosen provider, the design compensation fee was included in the total project costs covered by the tender stage of works.

After the tenders' assessment, the most economically advantageous offer and the chosen alliance agreement partners led to awarding the project for the consortium formed by the main contractor SRV Rakennus Ltd and the main architect designers Arkkitehtitoimisto SARC Ltd.

4.4. Establishment of alliance

4.4.1. Alliance's members and main principles

Alliance's members were composed by project owner, main designer and main contractor as illustrated in the Fig. 7 and described in the Table 15.

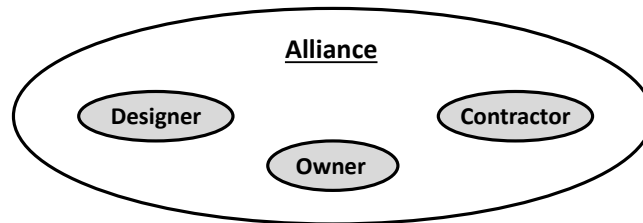


Fig. 7. Alliance members

Table 15. Alliance members

Entity	Status
University of Helsinki	Owner
SRV Rakennus Ltd	Main contractor
Arkkitehtitoimisto SARC Ltd	Main designer

An alliance project is described as being a collaborative and cooperative project by nature. Main principles of the alliance consist of emphasizing trust, defining a set of common objectives and assuring commitment between alliance parties and enhancing project collaboration. The alliance intends to ensure the formation of a joint organization by mutual agreement from all parties, where there are jointly shared positive and negative risks. It is stated that the alliance requires both collaborative and structural features in order to be successfully implemented throughout the project. As described in the alliance agreement the collaborative features are three and they are described in the Table 16.

Table 16. Alliance's collaborative features

Feature	Description
Confidence	An essential principle between the alliance parties. Without confidence and trust it is difficult to bear common risks and implement transparency principles. Confidence between the client and the service providers is born during the negotiations and workshops.
Commitment	A fundamental principle for the alliance since it fosters teamwork and the establishment of a common set of objectives. Once project participants are committed, then it may be possible to internalize common goals and problem-solving efficiently, encouraging innovation and producing "value for money".
Cooperation	Gathers project's partners into the collaborative agreement, establishing the scope and ways to improve and increase the levels at which parties shall cooperate and interact.

The structural features of the alliance model consist of the following three main features described in the Table 17.

Table 17. Alliance's structural features

Feature	Description
Alliance Agreement	A common agreement to all alliance parties covering the development, implementation and warranty phases of the project.
Common organization	Consists of having all alliance parties working under a common organization. The organization will appoint responsible people according to the best-for-project principle. All the alliance decisions must be unanimous and follow organization's principles.
Joint risk-sharing	Mutually agreed upon in advance and it applies to the procedures including both positive and negative risks. The success of the project as a whole (and not own parties success) determines the reward and bonuses received by the parties. The procedure requires all parties to follow the open cost control culture: open-book principle.

4.4.2. Risk sharing

Unlike most forms of traditional contracts, in the alliance model the client and service providers reach common understanding and an agreement on the project costs and KRAs and their objectives were jointly defined and agreed during project's development phase. During the implementation phase, positive and negative risks were common to alliance parties. Risk is jointly shared between parties in accordance with the alliance agreement since one of the

most important features of alliance is the implementation of a “win together or lose together” principle, where overall project success determines the amount of reward and bonuses or penalties parties shall get. The Fig. 8 illustrates alliance’s risk distribution compared to traditional risk distribution.

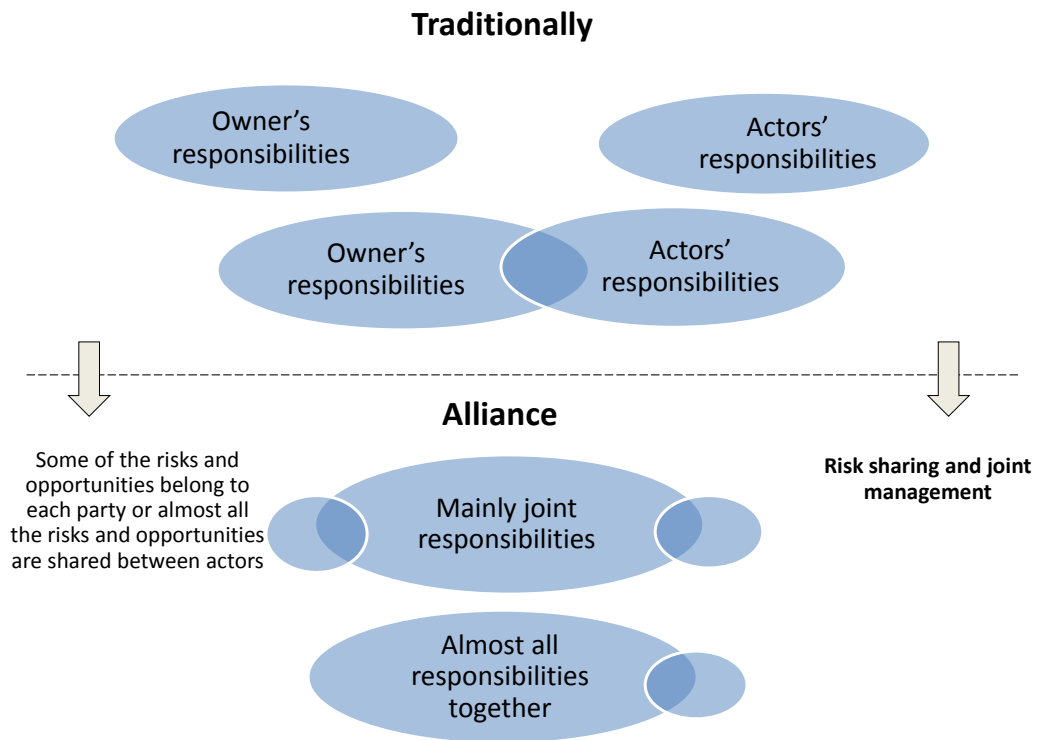


Fig. 8. Alliance's risk distribution

4.4.3. Alliance agreement

Vuolukiventie 1b alliance project had one alliance agreement covering the development, implementation and warranty phases of the project. Alliance agreement contents include the topics present at Appendix D.

The generation of the alliance agreement started with a draft made by the client which worked as the basis for negotiations. The procurement decision was followed by the alliance agreement, together with the commercial model and project plan.

The alliance agreement supplemented development phase at the time when jointly formed alliance set target cost and established KRAs of performance and their objective. The alliance agreement also supports the warranty period plan established during the development phase.

4.4.4. Project's targets

After selection phase, the Vuolukiventie 1b alliance project involved three other phases: the development, implementation and warranty phases as previously introduced earlier in this chapter. Each of these phases had clear targets that will be defined subsequently.

The development phase began after alliance agreement was signed and consequently the alliance started. The development phase ended in May 2012. The objectives for the development phase were the following:

- Set up alliance's organization and establish a management system;
- Developing a set of objectives;
- Defining the project scope, quality and schedule;
- Innovation and development of technical solutions;
- Implementation of the design and setting the basis for the aimed target cost;
- Establish the final incentive to the KRAs.

The development phase included the implementation phase plans, in which the project scope and level of quality were defined. These plans set the final goal of the project's target cost. The development phase ended after the client approved contents of the plan and the alliance parties have agreed to the target cost.

The implementation phase started with client's decision after the client approved the development phase design program and jointly set the target cost estimate. The implementation phase of the project included construction objectives and its required design.

It was a purpose of the alliance to meet or exceed all targets without compromising safety. It shall require, among other things:

- Innovation in building planning;
- Innovation in production management;
- Leadership;
- Focus on the customer;
- High quality standards;
- Good problem-solving skills.

The implementation phase will end when the project receives approval from an inspection, which matches the beginning of warranty period with the approved reception of the project. The alliance is responsible to assure the performance in conformity with the agreement for a period of 5 years. During the warranty phase the alliance is also responsible for all the aspects regarding the warranty period, as well as the agreed obligations for monitoring the success of energy efficiency and savings and corrects their performance if errors occur or agreed goals are not achieved. The warranty phase model was agreed during the development phase.

The alliance prepared the warranty period of the maintenance program and purchased maintenance services for the warranty period. During the warranty period the errors, defects and faults, as well as repair works are included in the warranty period costs and belong within the reimbursable costs and target cost.

4.4.5. Subcontracting

Alliance partners had collective responsibility for all the work required to complete the project and achieve its objectives. The alliance was responsible for the building's functioning during the warranty period. All alliance members were jointly responsible for the necessary materials, services and construction procurement. Alliance's procurement was conducted with the best-for-project principle and decisions were made together. The purchases were made always under an alliance partner name as illustrated in Fig. 9. If the purchaser is the owner, then the procurement shall follow local public procurement code. The procurement options could be one of the following three types:

- Services provided to alliance parties through their own resources;
- Services provided to alliance acquired from external service providers;
- Materials, equipment and goods provided by alliance parties or external sources.

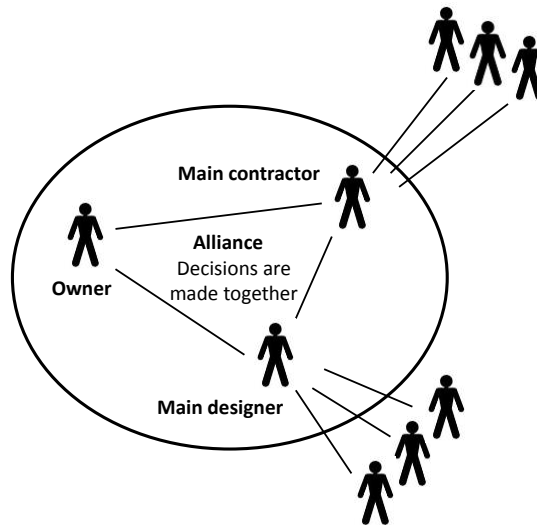


Fig. 9. Alliance's subcontracting

4.4.6. Organizational structure and management

Unlike traditional forms of contract, in this alliance project parties including the owner, must work together, jointly in an organization. The organization nominated its representatives using the best for project principle. The alliance project success relied on finding the right members to form the alliance group, as well as the right placement for the consortium. Owner defined the organization and main tasks of the alliance as described in the Fig. 10.

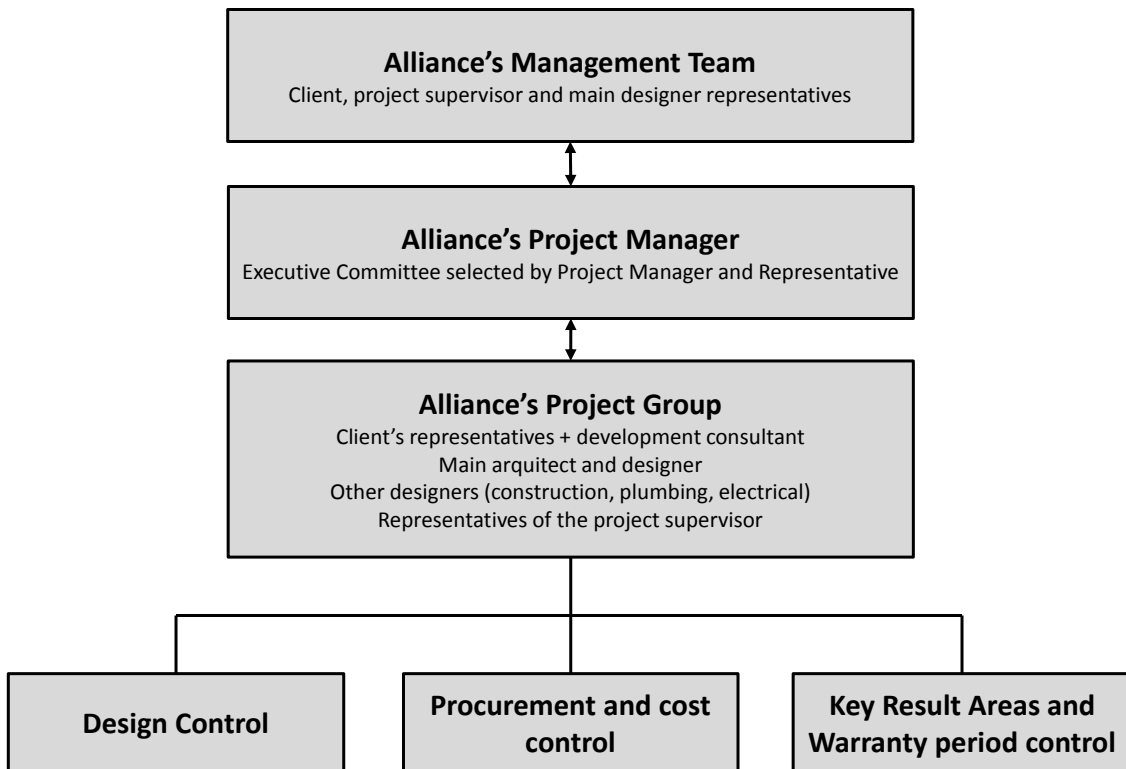


Fig. 10. Alliance's organization

Alliance's Management Team was composed by a maximum number of two members from each alliance party was agreed to, unless otherwise agreed. Management Team's primary role is to respond to the management of the alliance and its performance. The Management Team is also responsible for the fulfillment of established objectives and to ensure alliance partners will fulfill their obligations. All the Management Team members have an equal saying in management and all decisions must be unanimous.

In order to make the Management Team perform their function effectively, team members must have sufficient time to fulfill their role, as well as possess appropriate skills, including:

- Excellent management skills;
- Power to make necessary decisions;
- Ability to lead own organization through cultural change;
- Extensive experience in corporate business objectives and strategies for own organization;
- Respect and appreciation of other parties;
- Alliance's value-added expertise.

Alliance's Project Manager was selected based on the best for project principle and was elected by the alliance's Management Team. The alliance project team handles daily administration and project management. It was suggested that project team should be elected by all members from alliance's parties. That was not an absolute requirement, but all the positions should be distributed with the best for project principle.

4.4.7. Alliance's commercial model

Alliance's commercial model covers development, implementation and warranty phases. The owner's proposal for the commercial model can be seen in Fig. 11 and consisted on three parts:

- Part 1: Project costs – including direct costs and project specific-costs;
- Part 2: Fee – including overhead costs and normal margins;
- Part 3: Gain share/Pain share (or Bonus/Penalty).

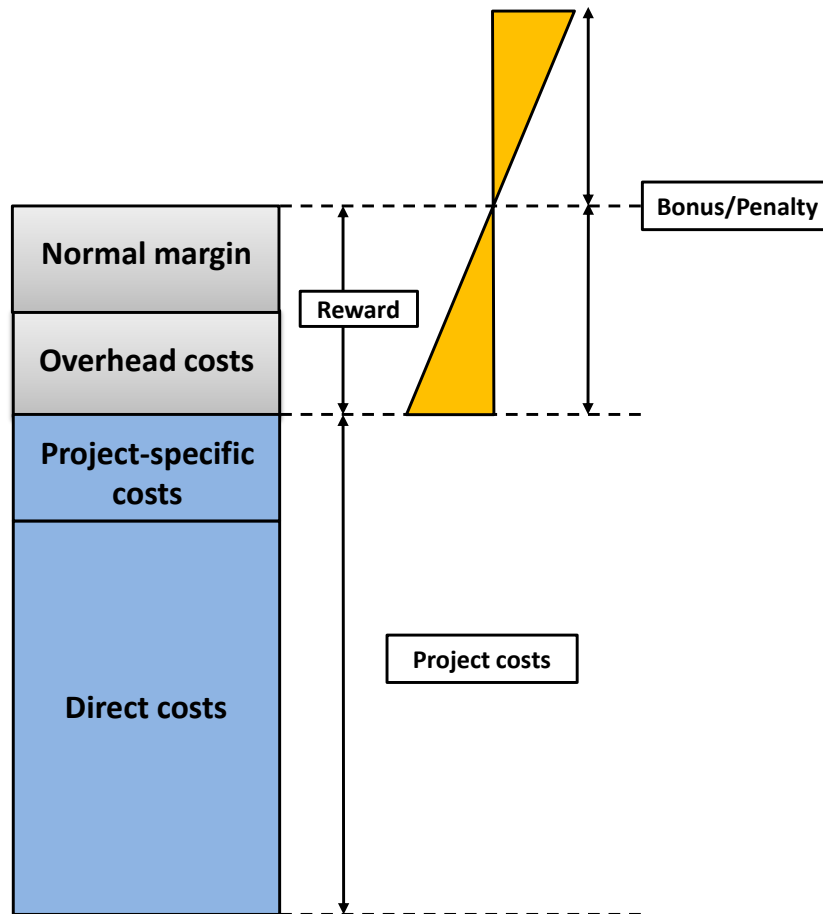


Fig. 11. Project's commercial model

It must be noted that this commercial model description was based on a preliminary document provided at the invitation to tender phase. That means that the presented model was used for discussion purposes during workshops, and deliberated commercial model on the final agreement was not necessarily like the one hereby presented. Unfortunately, commercial's model final version was not provided for this study. That did not dissuade the author from describing commercial model framework. However, next chapters will only focus on KRAs and not directly on project's costs nor incentive system.

In the Table 18 it is possible to see in more detail the general principles of the three different parts of commercial model.

Table 18. General principles for commercial model

Commercial model	General principles
Part 1: Project costs	<ul style="list-style-type: none"> ▪ Project costs are the direct and specific costs sustained at the Alliance Agreement obligations ▪ Project costs are not covered by the service provider and do not cover general expenses ▪ The service provider cannot receive any compensation for any such costs that are not included in the Alliance Agreement obligations. ▪ The service provider can receive up to 100% of the incurred project costs ▪ If the service provider receives any cash receipts from other than the client in relation to tasks performed at the Alliance Agreement, shall these costs be taken into account in the reduction of costs for reimbursement
Part 2: Service provider's reward	<ul style="list-style-type: none"> ▪ Direct and indirect costs associated to meet Alliance Agreement obligations which are not reimbursable by project costs ▪ Overhead costs not reimbursed by project costs ▪ Company's profit margin
Part 3: Bonus/Penalty system	<ul style="list-style-type: none"> ▪ Below/Above target cost objective ▪ Success in the defined KRAs ▪ Tragic events

The project costs are reimbursable expenses and include the costs from necessary work to achieve the alliance's objectives. This includes errors, repairs and unnecessary purchases), and also project-specific overhead costs. After auditing, these costs will be replaced by actual audited expenses.

The reimbursable costs are determined in accordance with the general principles:

- a) Reimbursable expenses are costs incurred exclusively and specifically in the alliance agreement obligations in implementing the project and that have been approved by the Alliance Management Team.
- b) Refunding service provider's costs is not covered by company's general expenses, unless they are expressly stated in recoverable costs). The service provider must not receive unfair advantage over its personnel, machinery and equipment, or use of its resources.
- c) The service provider cannot receive any compensation for any such costs, which are not referred in the alliance agreement and are not directly related with production tasks. The service provider can receive up to 100% of the compensation for the incurred costs. Costs must not have any duplication.
- d) If the service provider receives payments from other than the client respecting the services defined in the alliance agreement, these must be taken into account reducing costs for reimbursement.

If the reimbursement costs are unclear, client's representative should perform an assessment. In the case that the alliance member does not accept the client's representative opinion, then the case is transferred for Alliance's Management Team for decision.

The reward is the fee including the service provider's profit margin and any overhead costs that are not included in the reimbursable expenses.

The service provider fee includes:

- a) The direct and indirect costs for the tasks included in the alliance agreement and to meet the obligations of it, and which are not otherwise reimbursable costs;
- b) General expenses that are not considered reimbursable costs;
- c) Service provider's profit margin.

Service provider's maximum bonus is the one included in the tender in euros. The reward will be paid in accordance with the financial service assignment. For each service provider, the reward is indicated separately in the tenders and it is used for evaluation of tenders calculating the sum of rewards. Service providers and other design agencies that are paid rewards are considered alliance's partners.

The bonus/penalty system offers the service provider an opportunity to benefit from different KRAs performance as well as the performance reward associated from undercutting the target cost. In the same line, service providers bear now the risk of losing part of their reward in case of poor KRAs performance, exceeding the target cost and/or tragic events. During implementation phase, a project survey will be conducted to assess project's performance and participants' satisfaction. Results from survey will reportedly be used to aid calculate KRAs as it has been referred at previous chapter. Also, it has been understood that project survey would also help perception and elimination of potentially biased results. It shall be mentioned that a list of KRAs was not provided for this study due to the susceptibility of financial issues during an ongoing project.

The client is responsible to check each of the economic systems of the service provider before the alliance agreement conclusion, in particular:

- Clarify the basis of calculation for reimbursable costs;
- Clearly distinguish directly reimbursable costs, project-specific costs⁵ and overhead costs.

Data checking and reports are used evaluating the project and to access if the reimbursable costs are in accordance with the commercial model. Those reports are distributed to the client and the service provider, and they are confidential business documents.

Economic experts will check alliance's payments under the contract on behalf of the client. The Alliance Management Team and a group of economic experts will conduct the audits. Also, any Alliance Management Team future updates involving reimbursable costs

⁵Project-specific costs can also be called indirect costs and can be later reimbursable.

according to the accounting principles for resolving ambiguities relating to the payment of compensation.

The target cost is a numeric value in Euros resulting from the cost estimates⁶ and the estimation of the inherent associated risks, including as well the service provider's reward. The target cost can be changed by the alliance and under unanimous agreement, if it happens that the scope of work or other independent alliance's activities happen to change. The target cost is undershot or overshoot by comparing the actual cost with the final cost agreed as a target. If it happens that the actual cost is below the target cost then the service provider gets a bonus, on the other hand, if the actual cost overruns the target cost, then the service provider gets a penalty cost.

The level of performance in different KRAs is the measurement behind the bonus/penalty reward system. Good performance in KRAs results in a bonus to the service provider and a poor performance in KRAs leads to a penalty.

Tragic events are negative events in critical areas for the project, which alliance's partners cannot handle or accept them to occur. Tragic events are unacceptable events by their nature for both client and service providers. A tragic event affects both service provider's reward and bonus. The tragic events mechanism intends to reduce the reward and bonus fees in case those events occur. If the final actual cost exceeds the target cost, then the overrun shall be evenly distributed between the client and the service providers (50% for the client and 50% for the service providers). However, the maximum possible share of each service provider is equal to the premium, i.e. the maximum cost of sanctions is equal to the premium.

Otherwise, if the final actual cost is less than the target cost, then the remaining amount shall be distributed between the client, service providers and the bonus system. The distribution is 40% for the client, 30% for the service providers and 30% for the bonus system. In the bonus system half of the amount is evenly distributed between the implementation and warranty phases. Due to confidentiality of data, the details on the KRAs and its calculation method were not available to study.

In case that the sum of the final result of KRAs is greater than zero, the client shall pay the service provider the equivalent amount of the bonus pool. On the other hand, if the sum of the final result of key performance areas is less than zero, then the service providers must pay the client a penalty which is defined at a maximum of 5% of the target cost.

The performance in the KRAs follows the below mentioned criteria:

- a) Zero is the minimum level for which the performance is considered better than the performance of individual parties in other projects;
- b) A level of performance of -100 at the KRAs means the complete failure of the alliance to meet the minimum requirements;

⁶The cost estimate of the alliance consists of the best possible estimate of alliance's works (the owner and the service provider) and its eligible costs, made by experts for further approval.

- c) A level of performance of +100 at the KRAs means the achievement of an excellent performance or breakthrough results in the selected criteria;
- d) Each KRA is determined by some agreed performance indicators through a value between -100 and +100;
- e) Each KRA component is calculated through a weighted average of the measurements agreed during the development period. The performance level varies between -100 and +100;
- f) The performance of combined KRAs is agreed during the development phase and it is calculated through a weighted average of individual KRAs. The performance level can vary between -100 and +100;
- g) The final result of the KRAs is determined at the end of the project by the performance of key performance areas throughout the different stages of the project.

The basis of client's bonus pool for service providers is to reward situations in which the KRAs results exceeded the minimum requirements (final result of KRAs greater than zero). At the beginning of the project there were reserved 300 000 €. That initial capital is equally split and distributed for the implementation and warranty phases. The corresponding bonuses are paid at the end of the implementation phase, and at the warranty phase they are paid after the second year and at the end of that phase. The client is responsible to pay the bonuses and they are divided between service providers as announced by the allocation ratios. Service providers are responsible to pay penalties concerning cost overruns and underachieving KRAs performance as announced in the allocation ratios.

It is stated that service provider's risk scope involves the possibility of losing the reward and also the bonuses regarding the KRAs and from under reaching the target cost. Moreover, regardless of how badly the project is implemented and the target cost is exceeded, failure of the KRAs or the occurrence of tragic events, the maximum possible penalty is an amount equal to the reward.

The client set the project cost in 18.3M €, which means that the target cost set during the development phase cannot exceed that value. The costs include about 0.7M € that are an estimate for client's costs.

5. Findings and discussion

This chapter is organized in three major sections. The first section starts by revealing, separately, each participant's views over the case study project as collected from the interviews. Following, there is a section reserved for project's survey analysis, which will help validate interviews' findings. Finally, there is a discussion section dividing major findings in separate sections and exploring them in greater detail.

5.1. Interviews' analysis

5.1.1. Owner's views

In the alliance approach it stands out that the owner does not have the final word in all the decisions, since designer architects and main contractor are also listened. Traditionally, the owner and designer would agree on project's specifications and then the contractor would submit their solution and cost. In this alliance, during selection phase and development phases, several solutions were developed by contractor and designer and that led to jointly agreed best-for-project solutions. Reportedly, designers and main contractor had a closer interaction between each other.

The establishment of common goals and proper alliance organization were seen as key factors leading to high levels of commitment and collaboration along with clear and honest communication. Therefore, the atmosphere in the alliance project was more open than in a traditional project. Reportedly, levels of collaboration slightly decreased from selection and development phases to implementation phase. However, implementation phase had a growing problem-solving ability.

Traditionally, discussion during the design phase happens through email and playing the typical "extra costs game". However in this alliance project communication was more face-to-face and the solutions were discussed under the paradigm of a fixed budget. Reportedly the decision-making process was not significantly slow comparing to owner's side previous experience at other projects. Also, the schedule was set together and changes were flexible. For example, if the contractor needed something earlier than planned and if that seemed to be good for the project, then these changes might be accepted and implemented.

From the owner side, it was referred that the costs were still necessarily the most important concerned criterion. Having that in mind and other's participants interests, reaching an optimal solution might be utopian, but good solutions could be reached with trade-offs that all participants shall agree.

Time and costs spent during the selection phase concerning the organization, the amount of work and preparation. It was a heavy and slow process, and one company argued

that the compensation they received was not enough, since it did not cover bidding costs. However it was stated that the loss was not bigger than in traditional tendering. All designers agreed that selection phase was more expensive than traditionally. It was suggested that the selection phase should have had fewer meetings and less workshops, since the amount of interviews was considered excessive comparing to the reduced number of benefits that came out of them. Also, sometimes participants' roles were unclear and more time should be invested developing alliance organization.

In early implementation stages, it was stated that some project workers forgot there was an established alliance, since they kept "doing things" in traditional way. In order to change the aforementioned practices, there was a need to continuously learn and slowly adapt to the new standards of alliance. The fact that many solutions were studied took too much time sometimes and even small decisions had to be unanimously made, which revealed to be an obstacle to surpass in the beginning of the project. As weaknesses, it was referred that this project in particular did not allow as many opportunities in terms of cooperation as a broader alliance project could eventually deliver. Therefore, the designers were working in their own offices and went to the site once in a while, since they were working in other projects as well.

Reportedly, the alliance organization has shown to be more prepared to respond to unpredictable events. When problems occurred, typical "blaming culture" was replaced by a responsible and collaborative attitude by project's parties leading to efficient ways to surpass obstacles. As an example, problem-solving resulted in meeting with all the alliance representatives to quickly figure out and discuss on how to solve problems in a positive and enthusiastic atmosphere at each project phase.

As strengths for the alliance, it was mentioned that people are working as a group what allowed developing the best possible solutions for project. The contractual clauses were not enough to make people reach common decisions and each party had their own views on what is best for project. However, there are no hidden interests, and since alliance members are working and designing together it becomes more foreseeable that optimal solutions can be reached, having in mind that each party has their own preferences and liabilities (e.g. designer seeks quality while contractor runs for economy). The fact information on costs had been promptly provided by the contractor improved designing with economy in mind making it an open and efficient process. The open and collaborative environment of the alliance model, made its participants work more closely to subcontractors, since they have an important role in project's success. Accordingly, subcontractors were also committed on improving their work, since they had an incentive system for their own performance.

Workshops were seen as necessary and positive features promoting discussion and problem-solving of certain project's aspects among alliance partners. Old-fashioned designing meetings were replaced by smaller meetings in which certain details were discussed and unanimously accepted decisions were made. Referred changes should consider the introduction of workshops in the beginning of design procedures. Thereby, the process of defining certain specifications could be enhanced making it easier to understand requirements and opportunities of possible solutions and getting clearer particular pros and cons for the project.

KRAs played an important role in project's performance assessment. Although, too much effort and money should not be included in that pot, since the incentive system was dependent on KRAs. It was important that proper attention would be given to KRAs by project's participants, but more than that, making things right and in time. If too much attention would be given to KRAs while the project was undergoing there was a risk of losing sense to make things actually work and focus only in the areas under evaluation.

It was stated that the KRAs were correctly developed since participants were focusing in every project constraint and not obsessively in getting bonuses by the end of project. Also, there was not a possible way to maximize all KRAs since some of them were inversely proportional (e.g. cost vs. efficient energy use). Changes in KRAs could focus more in project's risks, reducing KRAs in number and inclusion of subcontractors. Reportedly, there were also some questions in the survey for which some respondents are not able to answer (e.g. subcontractors, as non-alliance participants, answering procurement related questions).

5.1.2. Contractor's views

Contractor side considered Vuolukiventie 1b project as a unique and definitely different from other projects that they have previously been part of.

As strengths of the alliance model and agreement, it figures the fact that participants of the project were committed to common goals and all the project specific issues were decided together. High levels of commitment in top-level management resulted in an efficient development of best-for-project solutions that according to participants' experience were better than any other traditional agreements.

On the other hand, weaknesses of alliance model point "heaviness" of tendering process and difficulties achieving mutual agreement. It was suggested that a collaborative environment and a good chemistry between participants are required to successfully match different participants' views and wishes.

From the construction company point of view most decisions were also described as heavy. As an example, allegedly, independently of the importance of the decision process had been considerably slow since there was the need to reach unanimous decisions requiring discussion with all participants, which often revealed to be too time-consuming. It was stated that more frequent informal discussion and tight interaction could help solve the aforementioned issues, such as joint decision-making and problem solving.

The success of an alliance project can be much more than just an alliance agreement and a commercial model. An incentive system by itself was not seen as the major feature to make people work more collaboratively. However it contributed for job satisfaction since it increased the motivation levels of with appropriately set rewards. The fact that project's team already had worked together before in some projects also improved the implementation and therefore project's success. This fact and early involvement were reportedly the major reasons for high levels of collaboration and commitment.

It was claimed that KRAs and incentives were correctly defined since they kept encouraging better project results. Even though there was a common incentive system and a common organization, main goals of the participants remained different and their behavior was often quite obstinate. Allegedly, construction and site management levels were quite reluctant in changing old habits, and that contributed for making the decision process heavy and inefficient as it was previously mentioned.

There were still challenges to surpass concerning goals and incentives of the project, but in general, project's participants agreed that over time the implementation of alliance might get more efficient and natural, what left an optimistic feedback towards project's future and future projects.

Including subcontractors and suppliers with a more important role in the alliance was referred as a challenge that could reveal valuable in the future since it could perhaps enhance its efficiency in terms of costs, quality and time. In fact, some subcontractors and suppliers were disappointed to be outsiders at the alliance agreement and model, since not participating in any relevant for project decisions made them feel relegated as 3rd parties.

The basis for collaboration has been reported as a good and professional project group inherently collaborating and knowing how to spread a collaborative spirit in all project levels with right and realistic goals and incentives. Culture within the alliance parties and its people was sometimes seen as an obstacle to be surpassed in the project. Supposedly, working people were not previously prepared to the alliance before the implementation phase actually took place. At that time, not enough time and resources were allocated to develop competencies and gain new skills. Time and resources would be required to implement the alliance successfully since there were procedures in the construction phase that should change from the traditional approach.

To improve collaboration levels and participants' morale some important changes should include seeing project participants together more often in order to get to know each other better and cooperate more by discussing topics regularly. There were informal teambuilding events such as Christmas dinner, going out together and theatre, but happenings such as workshops could potentially strengthen the alliance in a more work-oriented environment that could leverage defining goals for the project and helping follow its progress. It was stated that there was still a bit of a blaming culture going on as the parties remain acting individualistically in some extent, which is against the collaborative nature of the alliance agreement. Another experienced problem happened with the joint IT-database due to a possible lack of know-how and commitment from some participants. In short, it was suggested that the agreement itself was failing to make collaboration a reality.

Soft skills and social aspects such as trust, confidence and cooperation still have room to improve in practice. However some good practices were highlighted. For example, a simple collaborative enhancer consisted in having coffee-breaks together. Also, small working groups in an active and open alliance project group and the existence of an alliance group leader were seen as assets for project's success.

On continuous improvement it was stated that costs were coming down and the decision-making process got better over time along with project's design and quality. Over time, it gets easier among participants to understand each other needs and expectations and that helped the aforementioned aspects. The fact that the design group is often working together with the site group helped improve the project's design as some design specifications were made during the implementation phase.

Reportedly, people at the construction site were not guiding their work based on the incentive system. People discussed about the rewards and on how to take into account certain features of the incentive system, but that was not the core of their concerns. Therefore, it was emphasized the positive impact of such incentive model since it made people working into project's success and not consciously thinking too much on their possible rewards or penalties. Checking levels of collaboration and conducting a periodic survey contributed to develop the project's overall collaboration and provided valuable feedback for further developments within the project.

5.1.3. Designers' views

As for other participants, this was also the first alliance project for SARC design architect's office. The involved designers had a large experience in renovations and new building projects and hence the majority of project work remained the same as usual.

Most of the differences were considered positive and happened in organizational context. The decision-making process differed from the traditional delivery methods since all decisions were widely discussed in an open communication's environment. All the designing solutions were discussed and jointly agreed within the alliance, which had more client representatives than usual. That led to higher levels of collaboration between participants when compared to traditional projects.

It was stated that the alliance agreement gave important guidelines to set high levels of trust that were naturally created within the working atmosphere from selection and development phases. People had a better understanding with each other's leading to increasing levels of consciousness over each other's concerns and perspectives. As an example, it was stated that designers were more involved on discussing cost issues and that led to a clear view on the impact of chosen design solutions.

Some positive features include the fact that the alliance model has been developed to avoid legal disputes and other complicated issues. That was in part made by setting subjective criteria to establish a capable team and a trusting work atmosphere. However, it was recognized on how hard it was to officially put in paper and select someone capable and having the necessary skills to be part of an alliance organization.

The negative side of alliance's decision-making process is notorious with the extra time it required. It was a heavy process since the group making decisions was wider than

traditionally. On the other hand, there was flexibility between all the alliance participants and that was certainly different from traditional projects.

Reportedly, some important owner's decisions made during the selection phase were later changed and that led to new design solutions. Therefore, there was the idea that some ideas and objectives of the client for the project were unclear, and that led to project inefficiencies. Some of these issues made designers think that they were chosen for project mainly because of their team, and less because of their technical project proposals. It was suggested that the competition phase should have had certain aspects clarified such as the possibility of later changing proposals and specifications, since the estimate of work was made considering the first proposal which sometimes ended up differing from the final chosen solution. It was recognized that maybe expectations were too high in the beginning, leading to some disappointment in the aforementioned aspects.

Renovation projects always include unpredictable problems and questions coming from the construction site which end up being discussed during project's implementation phase leading to new decisions. However, the collaborative spirit among the alliance project by solving together issues at the construction site contributed to efficiently solve these problems since alliance members were working together from an early stage.

In this project, the alliance model allowed participants to trust each other more and make some minor decisions on their own, without the risk of losing confidence from others. Though, it was stated that some minor aspects were still decided by the entire Alliance, and that could eventually be transferred to individual participants, assigning broader issues to the alliance decision-making group. It should be added that some alliance participants already had previous experience working with each other in previous projects and that was an important asset for the collaborative environment in the project. This fact was a plus for collaboration and trust as it helped reduce some suspicion towards how alliance model could actually work as it increased the enthusiasm over the new approach. Events such as informal meetings, evening happenings and doing things together have enhanced levels of trust and collaboration in this project. A joint IT-database was positive concerning cooperation and efficient working. However, these stated features were not new things for this project in particular.

Furthermore, it was referred that most of designer's discussion was open and productive and it occurred with electrical and HVAC designing teams. Also, collaboration with the main contractor was particularly better for this project, comparing to previous experience in traditional projects.

Feedback meetings were a powerful tool to enhance the decision-making process as it helped people to know each other better and also created the right atmosphere for the project. Notwithstanding, in this project some minor issues were discussed by telephone or email. Face-to-face communication every time would be too time-consuming. If the project nature was bigger it could make sense to have a joint project office.

The existence of an alliance counselor (alliance guru) helped parties by sharing his experiences on projects and setting a proper agenda for the project. The aforementioned feature was not a complex innovative feature, although it strengthened the commitment

among the alliance and highlighted the advantages of joint decision-making and how to take the most out of an alliance.

More solutions were studied in this project than traditionally, since they were developed and studied by all the alliance participants, having in mind their different perspectives and concerns such as quality, design, economy and time. The final decisions were never the initially expected ones by each party. Nevertheless in the end these decisions turned out to be agreed as the best-for-project in most of the cases. As a con, even though most technical solutions turned out to be adequate they required in general too much time.

From designers' side, quality was a top priority for the project. Discussing about roles and basing decisions balancing costs and economy with other criteria such as quality and time often led to good decisions. Definitely, the alliance brought into the table aspects such as the financial one which would not be taken into account by designers in traditional projects. Therefore, the alliance helped people see and openly discuss the project from a wider angle than usual. Consequently, the abovementioned features were valuable assets to reach best-for-project decisions in which everyone within the alliance had opportunity to share their ideas and perspectives.

Continuous improvements were expected to happen over the implementation phases of the project specifically in terms of quality and time since routines were learned and procedures optimized. The modular nature of the project required that most solutions were studied and defined in the first module. Also, reportedly, subcontractors were collaborating better over time and the construction and site managers were able to optimize schedules. However, there was no obvious correlation between the aforementioned improvements and the alliance model or agreement.

Apparently there were no technically significant innovative procedures or solutions, however the alliance model and its features and structure were considered as innovations at this project. Yet, it was affirmed some people were following their own agenda and schedules, and not really caring about others' or best-for-project interests.

The existence of KRAs affecting all the alliance participants made designers' more willing to make compromises and flexible as the financial bonuses were important and affected participants' attitude towards the project. Questionnaires were considered positive since it allowed evaluating own and each other's performance enhancing levels of commitment and willingness to improve in further stages.

Project's dimension revealed that alliance might be more suitable for bigger projects in which the financial interest of participants could be higher, since that way more opportunities could arise. A renovation project might also not be the ideal nature for an alliance project since it is difficult to detach the development and implementation phases.

The fact that some people were not part of the alliance such as subcontractors and facilities operator, might affect the levels of commitment towards the project, ignoring some potentially good ideas that they could have. As it was perceived subcontractors and facilities operator were not pleased with some decisions that were made and in which they had no

opportunity to discuss beforehand on technical procedures or defining their own schedules. Integration of subcontractors and facilities operator in the alliance was definitely something challenging that should be studied in a future alliance project.

According, it was difficult to understand where the limits of alliance should go since the benefits of alliance were not quite clear during the implementation phase in particular. Good working routines and a collaborative atmosphere grew from early stages of the project, since levels did not significantly improve from selection to implementation phases. It was expected that the alliance model will continue growing enthusiasm in the construction sector and expectations are high to see how it will develop in Finland and Europe.

5.2. Project's survey analysis and feedback

This section has two separate analyses for project's survey. The first one is a pure descriptive analysis which is believed to support the understanding of project's experiences as reported from the interviews. This is believed to the fact that a significant part of project's participants took part on the survey, assuring a proper representativeness of total project's population. The second analysis was based on statistical tests that were conducted in order to test significance levels of different variables and facilitate possible statistical inferences, as it will be further described.

5.2.1. Descriptive analysis and feedback

Project survey intended to measure levels of performance throughout implementation stages. The purpose of the survey was to stimulate improvements in between rounds as the areas under assessment are directly connected with the KRAs. These performance areas focused in six main fields with a total of 26 questions. In the Table 19 it is included the list of complete survey questions with average ratings by round and by question, field and total.

There were a total of 26 questions distributed among 6 fields that can be seen again at Appendix E by respondent group. There will be a total of 7 survey rounds during the project: 6 for renovation works and 1 for new building. It was mentioned that in the end of the project the results will be used to calculate the KRAs and bonuses. During the project, when results were published, there was discussion with project participants in order to improve and optimize performance in areas that were lowly rated and to keep the good work in areas that were well rated. It was also one objective of the survey to instigate high levels of collaboration and interaction by openly discussing and controlling the abovementioned result areas.

Project survey made project participants' evaluate themselves and each other. That has reportedly made participants more critical on their and others work giving place to enhancing improvements on performance and on collaboration levels. After survey results were published, after each round there were around 20 people discussing on what went well and wrong and those regular discussion events certainly helped improve and correct certain aspects of project's implementation.

Table 19. Survey's questions and average ratings

	Round			
	1	2	3	4
1. Schedule				
1.1. Design plans were made and available on schedule	3,3	3,9	3,9	4,2
1.2. Construction plans were made and available on schedule	3,3	3,9	4	4,1
1.3. Electrical plans were made and available on schedule	3,3	4,3	4,3	4,2
1.4. HVAC plans were made and available on schedule	3,3	3,8	3,8	3,6
1.5. Tasks were controlled according to schedule	3,1	3,8	3,9	3,4
1.6. Schedule's design contributed	3,2	3,4	3,4	3,1
1.7. Waiting time has been low	3,1	3,7	3,8	3,4
1.8. Schedule was designed to optimally take into account all parties' views	2,9	3,3	3,5	3
Field Average	3,2	3,8	3,8	3,6
2. Site organization				
2.1. Site was clean and working conditions fit	4,2	4,2	4,1	4,1
2.2. Safety has been assured	4,6	4,6	4,5	4,4
2.3. Work areas have been controlled by assigned entities	3,8	4,0	4,0	3,9
2.4. Site has not expanded out of the construction site area	3,8	3,7	3,9	3,5
2.5. The renovation work has not caused unreasonable inconvenience to residents	3,8	4,1	4,2	4,2
Field Average	4,0	4,1	4,1	4,0
3. Collaboration and interaction				
3.1. Control has been timely and constructive	3,8	4,1	4,1	4
3.2. Collaboration with designers has been flexible	4	4,3	4,3	4,2
3.3. Collaboration with main contractor has been flexible	4	4,0	4,2	4,2
3.4. Collaboration with the client has been flexible	4,2	4,3	4,4	4,5
3.5. Collaboration between different contractors has been flexible	3,8	4,2	4,2	3,9
3.6. Information has been well handled	3,9	4,1	4,2	3,9
Field Average	4,0	4,2	4,2	4,1
4. Design				
4.1. Plans well served the design's implementation	3,9	4,1	4	3,7
4.2. Design well served the customer and end-user needs	4,1	4,2	4,2	4,3
4.3. Project's account information available on time	3,8	4,0	3,6	3,9
Field Average	3,9	4,1	3,9	4,0
5. Procurement and contracting				
5.1. Contract models have been encouraging	3,6	4,0	4,1	3,8
5.2. Contract model has led to innovation	3,1	3,7	3,9	3,8
5.3. Alliance model has brought positive changes further in the project	3,6	3,7	3,9	4
Field Average	3,4	3,8	4,0	3,9
6. Quality				
6.1. Works' performance has been of high quality	4	4,2	4,3	4,2
Round average	3,7	4,0	4,0	3,9

The analysis included 4 rounds of results with the following participation among rounds available in the Table 20. The timing of rounds' answering can be seen at Table 21.

Table 20. Survey's respondents by round

Respondents	Round			
	1	2	3	4
Alliance (Owner, Contractor and Main Designer)	15	14	17	10
Technical Designers/Experts	5	5	4	5
Subcontractors	11	11	8	5
Total	31	30	29	20

Table 21. Rounds' timing

Round	Time period
1	November-December 2012
2	March 2013
3	May-June 2013
4	July-August 2013

The average distribution can be seen in the Fig. 12 and it can be concluded that alliance members represented about half of surveyed population. It is important to refer that during implementation phase, facilities manager was integrated in the alliance. This led to the facilities manager taking part of the survey as an alliance participant. The technical designers and experts include design teams for electrical and HVAC installations. These teams were not alliance members and therefore they were not involved in the incentive system of the alliance.

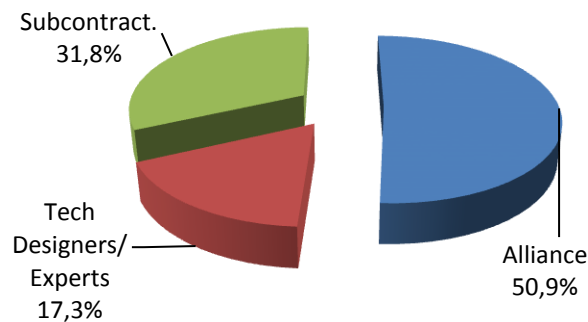


Fig. 12. Survey's average respondents distribution

It is believed some people might end up answering some questions having their own interest in mind, potentially biasing results in their favor. However the fact subcontractors and facilities operator were also answering the questionnaire (more than 30% of total) made them neutral participants assessing project's performance related issues since they were not included in the KRAs incentive system and consequently had no clear interest to reach biased results. Also, some people answering the questionnaire did not have direct sensibility to evaluate certain questions. However, reportedly the aforementioned questionnaire model was used to make it simpler by making it similar to everyone.

There were considerably less respondents in the 4th round since the survey took place during holiday months with fewer people in office and construction site. Another reported reason, is related to time proximity between survey rounds which made survey planners ask different people. On the other hand, it was stated that a lot of people highly involved on site were not filling surveys since they were out of office, which leaves the idea that some important feedback might not been taken into account.

In the first round the lowest rated areas were Schedule and Procurement and contracting with 3.2 and 3.4, correspondingly. It was testified that possible reasons for that came from the fact that decisions often took too much time, since they were widely discussed, and that had consequences both in schedule and also on procurement and contracting, leading to a rise of costs and time. Also, it was mentioned that the schedule was prepared in a rush with lack of reasonability and knowledge. On the other hand, it was stated procurement and contracting was quite lowly rated on the survey, since models for those contracts were old and there was no innovation at all concerning that matter.

It is likely that low performance in the first round was connected with the non-inclusion of sub-contractors in the alliance agreement. They felt somehow left out from important matters such as decision-making and schedule. To reinforce what was previously mentioned, after the first round it was stated on survey's free comment field:

'Records from scheduled meetings were not available to some subcontractors. Review model of decisions did not always go further and alternate decisions took a long time. Schedule was prepared with an excessive hurry and unreasonably.

Now we are trying to get next stage done in 2 months even knowing first stage took 4 months. Probably, construction time should be somewhere in between.'

In short, concerning first round, it was suggested that some working methods could improve, essentially due to inefficient and time-consuming decision-making process. Also, well timed procurement methods and adequate monitoring could help improve project's procurement and more widely improve project's performance in terms of time and costs.

In contrary, the remaining areas had quite positive rates, which were similar between each other (varying only from 3.9 to 4.0). Quality emerged with the higher rate, which must be due to the special attention given to matching work, setting appropriate working methods and spreading the alliance-spirit across all project's level participants. To improve quality in further stages it was suggested that a better operational model and good quality control methods and routines could be developed.

From the 1st to the 2nd round all areas under evaluation showed improvements with the most notorious improvements being registered in terms of schedule which was rated 3.2 in the 1st round and 3.8 in the 2nd round and represents an improvement of 18.0%. These improvements resulted mainly from discussing with subcontractors for demolition, HVAC and electricity works. That led to significant gains in terms of time and schedule planning. As an example, similar demolition works were completed 3-4 weeks quicker from the 1st to the 2nd round. During the 3rd and 4th phase there were also slight improvements that resulted in about 1 week early delivery for demolition works. These gains were partially possible due to an optimized schedule that allowed and early start for these works.

Procurement and contracting also registered a significant improvement from the 1st to 2nd round, from 3.4 to a 3.8 rate that represent an improvement of 10.7%. This improvement is related to the fact of the repetitive nature of the project, with the bigger decisions being made

already in the 1st phase leaving space to optimize the procurement process and also a broader understanding of each project's participants' expectations and views. Remaining KRAs all faced improvements from the 1st to 2nd round between 0.1 and 0.2 and these improvements were in the order of 2.0 to 5.5%.

Even though schedule and time faced a considerable improvement in the 2nd round, it was stated that these improvements made other KRAs decrease or at least not improve as much as they could. The following comment testifies the abovementioned fact:

'Cost pressures tightened schedule which was not always in favour of meeting other KRAs.'

It shall be noted that for the 2nd round it was decided to separate the schedule by project intervenient to understand if there were significant differences and get a more clear view on each other's schedule plans.

From the 2nd to 3rd rounds, all areas had a positive evolution between 0.5 to 4.4%, except for design that decreased 4.1%, from a rate of 4.1 to 3.9. It testified that perhaps, one reason is tightened schedule and because of that the construction workers wanted shorter time to get answers in their questions about designs.

In a reverse order, there was a general decrease of performance from the 3rd to 4th rounds between 2.3 and 5.2%, except for design that slightly recovered 0.8% from a rate of 3.9 in 3rd round to 4.0 in 4th round.

It is foreseeable that the performance decreased to some lack of organization and coordination during summer holiday time, partially due to high expectations that were set and predicted an unrealistic amount of produced work during that time, which might have made decrease levels of satisfaction and cooperation. The following two comments were made during the 4th round and show two different views on what was happening on site at the time:

'Not enough time was left for own work inspections. External inspections were forced to take place in incomplete locations. At new apartments, many contractors were trying to get work done at the same time, but out of their working schedule.'

Other contractors don't care about others' installations, closing some places with disregard. The schedule was poorly developed since it predicted too much work during summer holiday months.'

Some installations and tasks could not be performed. These tasks had an intermittent pace since some places were not in proper condition. The roof was full of stuff during entire work period.'

'C block of apartments had its schedule tightened and the work took place in summer holiday months, which enlightens the excellent work's performance.'

During most surveys it was expressed several times the disregard on how some project participants were dealing with end users and how their needs and views were left out of

consideration. Referred reasons for such behaviour include an agenda that completely ignored residents and facility services company. It was suggested that project participants should communicate and discuss with facilities manager and tenants' beforehand, in order to be able to adjust and meet their requirements in time and to have a more efficient decision-making process. The following statements were given between 1st and 3rd rounds and support the aforementioned point:

'End user needs were not taken into account until the end. Sometimes it felt that progress goes along with designers' plans but if something revealed too difficult or challenging, then it was left out.'

'Speed of decision-making could improve. Facilities management and maintenance company should be timely familiar with local conditions.'

In general, results from survey and feedback indicate an evolution in KRAs (see Fig. 13). The agreement was found appropriate since objectives and costs were set in the same basket by all interested parties. It is also interesting to see how different participants' answered survey. By observing Fig. 14 it becomes clear that technical designers and experts were generally satisfied and alliance's participants generally increased over project's course. However, subcontractors showed a decrease towards overall success of project which is believed to illustrate their higher susceptibilities and marginalization over project's planning and decisions, leading to low levels of satisfaction.

There were still traditional problems on site related to time and costs, and lack of cooperation between participants. As it was referred, not always participants agreed on top priorities for project, with some trying to save time and costs while others were pursuing for quality. That resulted in lower levels of cooperation and satisfaction shown by a slight blaming culture on site. Although, it was mentioned that workshops and recreational activities played an extremely important role as they strengthened alliance parties involvement and fostered its collaborative spirit. The atmosphere during workshops was considered open, and all parties focused on finding out how to reach higher results.

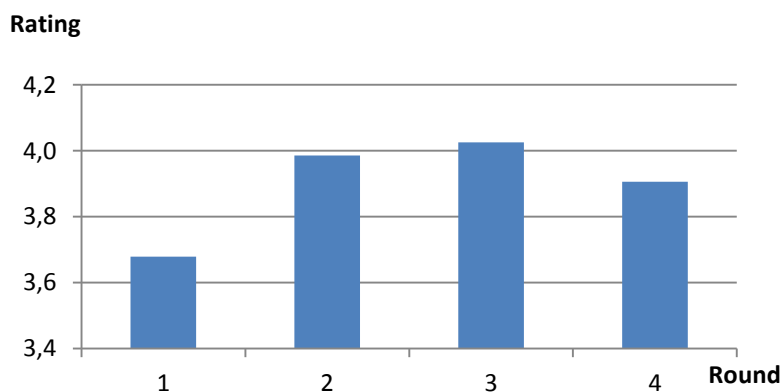


Fig. 13. Project's overall performance

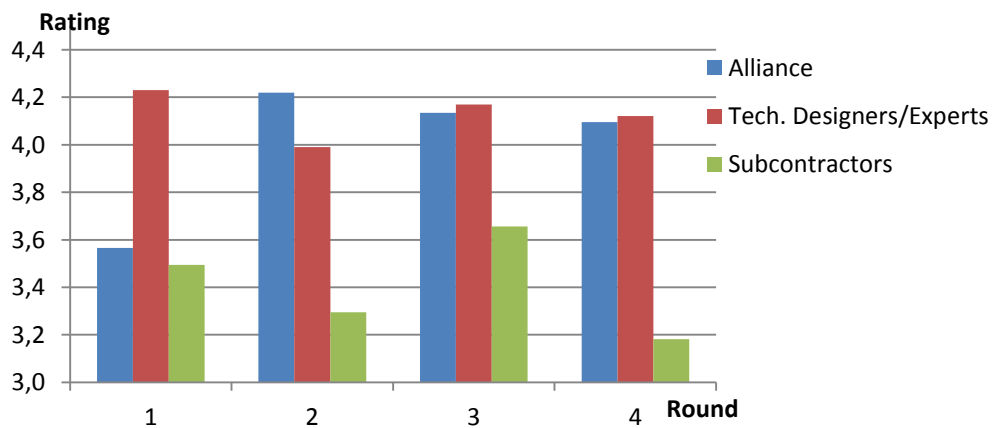


Fig. 14. Project's overall performance by respondent group

Reportedly, decision-making inefficiencies and lack of understanding led to a blaming culture, as it was mentioned before. Although, it is interesting to observe (see Table 22) that under the collaboration and interaction survey field there was a progressive evolution in four out of six sub-areas under assessment. Actually, the remaining two areas only suffered a slight decrease in the last round, and it was likely connected to the reasons involving lack of understanding and interaction between subcontractors and also satisfaction levels from facilities operator, as it has been mentioned before. At Appendix E, there is an additional chart comparing Collaboration and interaction field by respondents' group.

Table 22. Survey's collaboration and interaction rating

3. Collaboration and interaction	Round			
	1	2	3	4
3.1. Control has been timely and constructive	3,8	4,1	4,1	4
3.2. Collaboration with designers has been flexible	4	4,3	4,3	4,2
3.3. Collaboration with main contractor has been flexible	4	4,0	4,2	4,2
3.4. Collaboration with the client has been flexible	4,2	4,3	4,4	4,5
3.5. Collaboration between different contractors has been flexible	3,8	4,2	4,2	3,9
3.6. Information has been well handled	3,9	4,1	4,2	3,9
Average	4,0	4,2	4,2	4,1

Even though, it is difficult to establish any direct correlation between project performance and the chosen delivery method and alliance agreement, project representatives' feedback and survey results indicate that alliance has been positive since it was a more flexible approach and allowed positive changes during the implementation phase, as it was evidenced by a continuous improvement on sub-area 5.3 (see Fig. 15) under assessment. In the same line as general project's performance, by observing Fig. 16 it becomes clear again that Technical Designers/Experts are generally satisfied with alliance model features and in a contrary way, subcontractors remain skeptical on the positive features of alliance. Alliance members had a distinct behavior since they registered a continuous improvement in their perceptions of

alliance’s positive features over project’s course. Survey’s comments are available in the Appendix F.

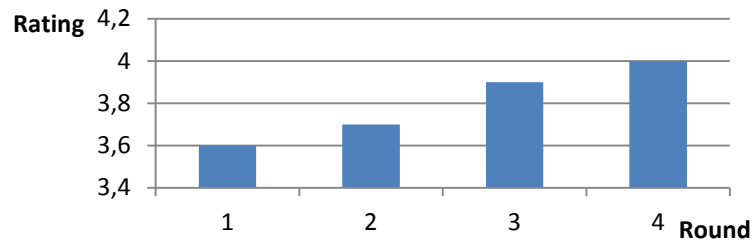


Fig. 15. Survey’s rating on “Alliance model brought positive changes further in project” field

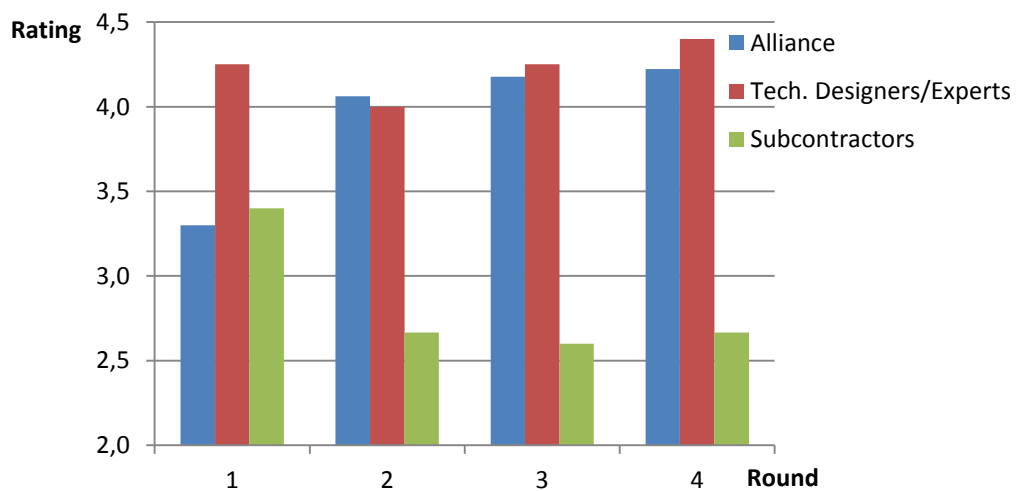


Fig. 16. Survey’s rating on “Alliance model brought positive changes further in project” by respondent group

5.2.2. Statistical tests

As it has been described before, the following statistical analysis will consist of analyzing significance levels of each question individually using descriptive statistics and later checking any significant correlations between questions using Pearson’s product-moment correlation coefficient. After there will be an analysis of the significance of each single question over each round using Kruskal-Wallis ANOVA tests. In that regard, each question’s answers will be analyzed by respondent’s group using again Kruskal-Wallis test. It shall be added that it was conducted a factor analysis as well, but the results were not significant and consequently no considerations will be made on that. At last, it shall be referred this statistical analysis is made to support the descriptive analysis and most of all the interviews which were considered the major and most reliable source of information for this study.

Pearson's correlation test

After conducting a Pearson's correlation test over questions for a total of 4 rounds together it was possible to establish some correlations between questions. Before that, it is important to refer that the number of respondents (N) in total was equal to 110 which is quite a large number already, and makes correlations (r) of 0.15 to 0.25 already relevant depending on the significance level for two-tailed test. However, it was considered by the author appropriate to make a more conservative analysis given the nature and availability of provided information. In that regard, correlation will be interpreted using Table 23 as suggested by Evans [53].

Table 23. Correlation strength

Strength	Correlation (r)
Very weak	0 to 0.19
Weak	0.20 to 0.39
Moderate	0.40 to 0.59
Strong	0.60 to 0.79
Very strong	0.80 to 1.00

After obtaining a matrix of correlations (see Appendix G) between questions it was possible to observe there was a total of 325 relations between questions of which there were 67 relations with a correlation equal or superior to 0.40, which according to Evans [53] is the threshold for a moderate correlation. Of these 67 observed relations, only 41 occurred between different fields (e.g. Schedule vs. Quality). The other 26 relations were considered naturally correlated since they belong to the same field under evaluation (e.g. question 1.2 and question 1.3 with a correlation of 0.605).

It is interesting to see most fields have at least one question with a moderate correlation. Also, it is possible to observe that Schedule and Collaboration and interaction fields are the ones correlating more with other questions. That can be partially explained by the number of different questions under each of those fields and also by the general qualitative importance topics such as Schedule and Collaboration include and relate to others such as Design. However, there is no clear pattern in Pearson's correlation matrix which means no further analysis and discussion will be made regarding each question correlation between each other.

Kruskal-Wallis ANOVA test

As referred before, Kruskal-Wallis tests were conducted for two different purposes. At first, the tests were conducted to test questions individually in between rounds. Afterwards, tests were made to analyze questions between groups of respondents. These tests were made to verify the statistical significance of the inferences made based on the collected data.

There are two ways to analyze Kruskal-Wallis results. Either it can be used the chi-square value or the p-value. In this case, the p-value was the parameter used to check if the null hypothesis is valid or not. For significance values (α) below or equal to 0.05 the null hypotheses is rejected. Otherwise, the alternate hypothesis is rejected. Both hypotheses are defined as it follows:

- H_0 – Null hypothesis: *There is no difference between variables;*
- H_1 – Alternate hypothesis: *Variables are different.*

According to Forza [54] required sample sizes, with desired statistical powers of 0.8 and 0.6, can be seen in the Table 24 as a function of effect size and significance levels.

Table 24. Effect size, statistical power and sample size

	Stat. power = 0.6		Stat. power = 0.8	
	$\alpha=0.05$	$\alpha=0.01$	$\alpha=0.05$	$\alpha=0.01$
Large effect	12	18	17	24
Medium effect	30	45	44	62
Small effect	179	274	271	385

Number of survey respondents among rounds is enough to ensure statistical inferences with a statistical power (β) of 0.6 and a statistical power of 0.8 at a significance level of 0.05 for large effects and medium effects since number of respondents varies from 20 to 31 between rounds, respectively. The aforementioned effect size was referred to help understand the limitations behind the effects and findings that can be observed from this survey. In that regard, it was found adequate to assume a conservative approach focusing only on findings over large size effects. Therefore, detailed findings were left out of statistical analysis scope.

Results from test between rounds showed there were only 2 questions in which there was difference between rounds. This means the rest of questions accept the null hypothesis, which means the rounds are statistically equal for 24 out of 26 questions (see Fig. 17). The questions that were considered different between rounds were questions 1.5 and 5.2: Tasks were controlled according to schedule and contract model has led to innovation, respectively. One possible explanation for this phenomenon might be the fact that most answers behaved in the same way between rounds, since they are believed to be consensual topics. It was not found a feasible assumption for 1.5 and 5.2 answers both being considered statistically different. However, one possible hypothesis might be the fact these are sensitive and subjective areas that differ in between rounds according to respondents perceptions.

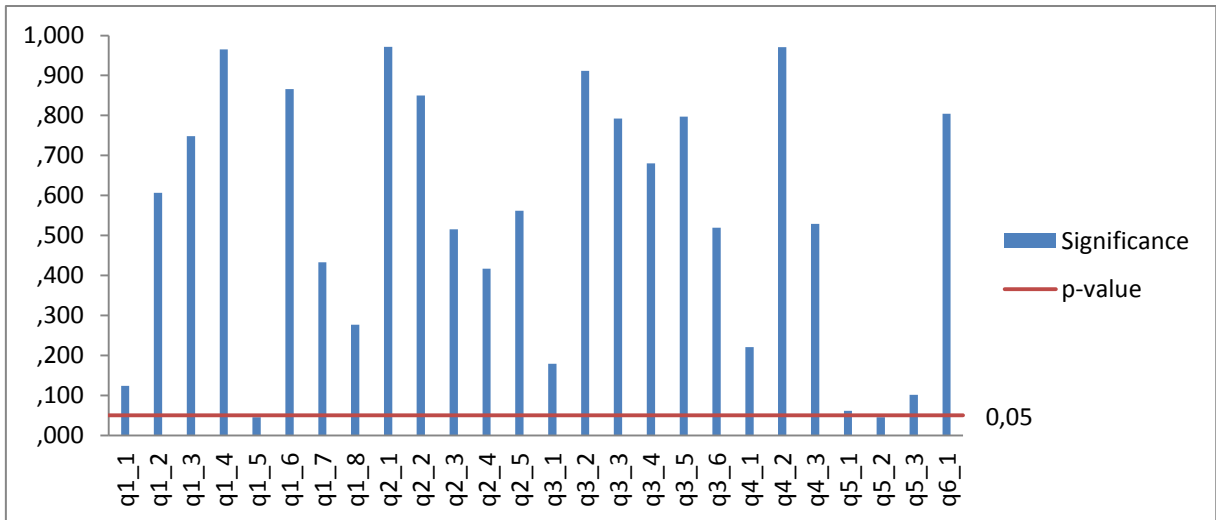


Fig. 17. Significance levels for questions in between rounds

Results from testing total answers for all 3 groups of respondents separately showed there were only 3 questions that accept null hypothesis, which means these 3 questions are considered do not have differences between respondents, 2.2, 2.4 and 6.1 accordingly as can be seen in the Fig. 18. Remaining questions were considered different between respondents. One possible reason is believed to the fact respondents had different perspectives and opinions on most of fields and areas under assessment. These questions are respectively: Safety has been assured, Site has not expanded out of the construction site area and Works' performance has been of high quality.

Observing mean ranks for each question, it was evident highest values occurred for rounds 2 to 4 at a total of 25 out of 26 questions. Additionally, most of lowest mean ranks were observed at the first round, more specifically at 17 out of 26 questions. It should be mentioned as well that 6 mean ranks were the lowest at 4th round which leaves the suspicion that survey's ratings might have slightly decreased at 4th round.

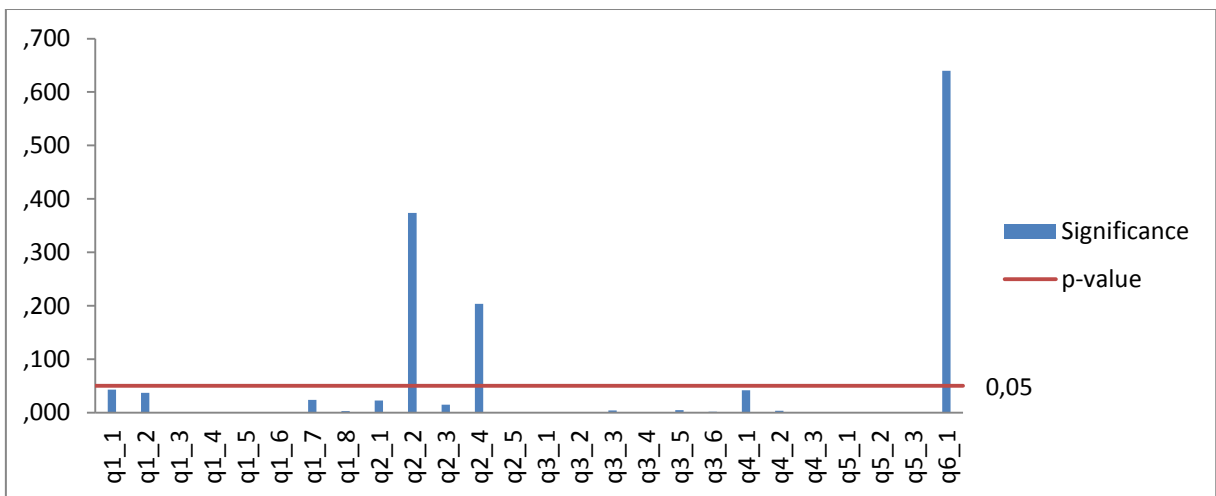


Fig. 18. Significance levels for questions between 3 groups of respondents

In order to get a clearer view on the aforementioned topic, it was found appropriate to compare each group of respondents against each other. In that regard, 3 tests were conducted using the groups presented in the Table 25.

Table 25. Groups' numbering

Group of respondents	Group number
Alliance	1
Technical Designers / Experts	2
Subcontractors	3

Comparing Alliance and Technical Designers/Experts respondents it is notorious that most questions accept the null hypothesis which is believed by the author to traduce certain proximity of answers between Alliance and Technical Designers/Experts groups. Comparing Alliance and Subcontractors groups and Technical Designers/Experts and Subcontractors groups it is notorious that they have a different behavior in most questions, showed by the fact most questions reject the null hypothesis, meaning most questions are statistically different. In part, it is believed that such fact can be understood since subcontractors in general were outsiders at this project and clearly reported levels of satisfaction below average which could eventually be biased. It is possible that some consensus existed among questions of field 2 for groups 2 and 3 and more slightly between groups 1 and 2, and 1 and 3. At last, groups were considered equal on what respects for field 6. Results of the 3 tests are displayed at Fig. 19, Fig. 20 and Fig. 21.

After analyzing mean ranks for 3 groups of respondents tested at same time it was possible to see Technical Designers/Experts group had most of highest values of mean ranks for 16 out of 26 questions. Alliance group had the highest value of mean rank for 9 questions and Subcontractors only for 1 out of 26 questions. Most of lowest mean ranks were at Subcontractors group for 25 out of 26 questions. The only remaining lowest mean rank was for Alliance group.

From previous analysis it became clear Subcontractors group is the one differing more from the other ones. In that regard, it was found relevant to distinguish mean ranks between Alliance and Technical Designers/Experts. Comparing mean ranks between these 2 groups, it could be observed Technical Designers/Experts had the highest mean rank for 18 out of 26 questions.

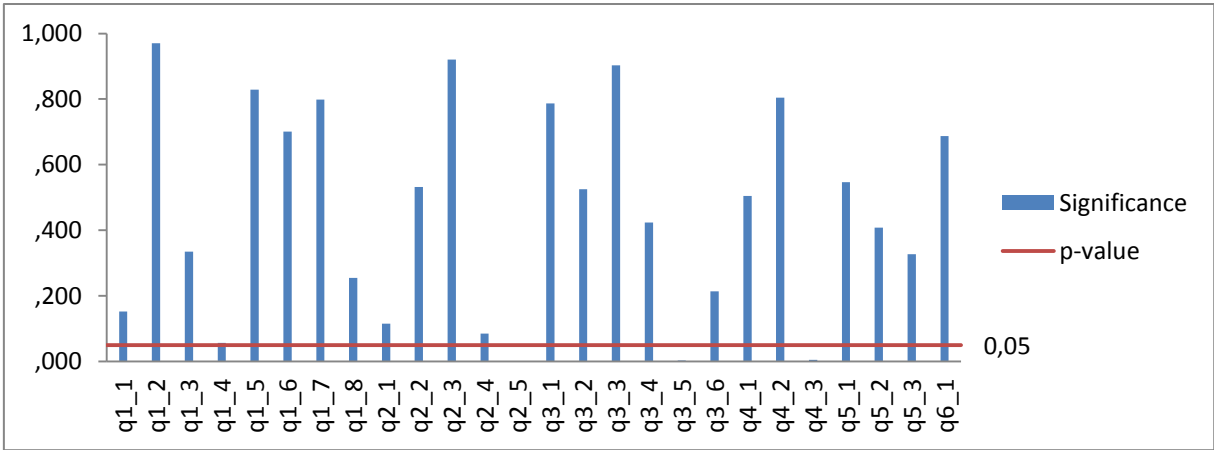


Fig. 19. Significance levels for questions between group 1 and 2

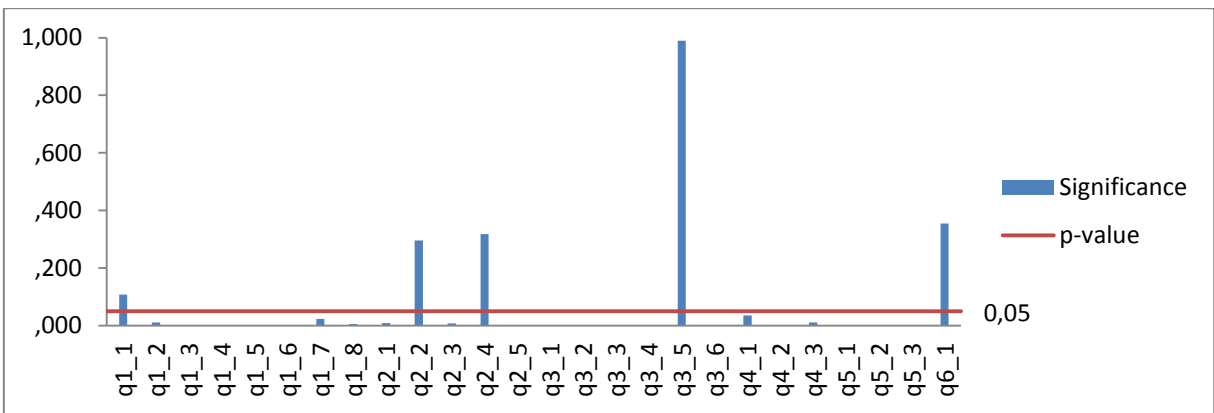


Fig. 20. Significance levels for questions between group 1 and 3

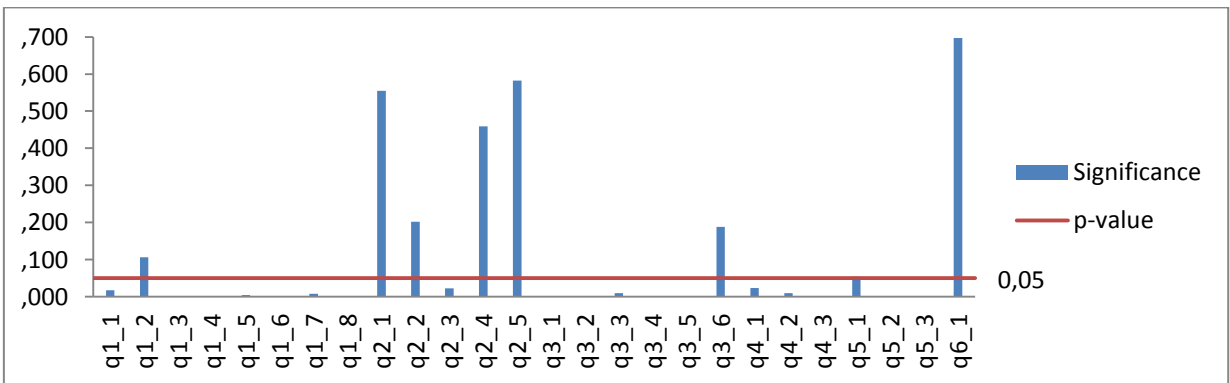


Fig. 21. Significance levels for questions between group 2 and 3

5.3. Discussion

The experience at the Vuolukiventie 1b project has been globally positive. However, in the last sections it became clear that participants did not always share the same views on project related issues. In that regard, some important findings will be discussed in greater detail in this section.

The interviews and survey's results will be discussed taking into account the project documentation along with the alliance experience during implementation phase. After analyzing interviews, the most mentioned and relevant topics will be discussed. At first, the discussion will cover general alliance characteristics that contributed for PA implementation as collected from literature review and the reported expectations before and during project's course. Following there will be some discussion over alliance's external parties positioning towards the alliance and the project, based on interviews and survey results. Next, the discussion will center on the project phases, in particular on the selection and implementation phases. Finally, the discussion will approach most important findings and acknowledgments of this research.

5.3.1. Project's features

The next topics consist of discussion over most relevant case study features as collected from the conducted interviews and supported by project's survey comments. These features were the most significant, since different participants constantly referred them, and possess a multitude of aspects worthy of further discussion. As each of these features is naturally correlated and dependent on each other, no effort will be made here to define them exhaustively. Instead, their characteristics will be discussed and linked to the alliance approach. The major project features to be individually discussed in the sequel are outlined below:

- Alliance agreement and organization;
- Joint-decision making and problem-solving;
- Open-book principle and communication;
- Team-building: meetings and workshops;
- Monitoring performance and satisfaction.

The aforementioned features can be complemented by some project's participants experiences that included aspects such as the ones included in the Table 26. These experiences emphasize essentially the aforementioned features and the importance of early involvement at selection phase.

Table 26. Additional experiences on alliance

Synthesis of additional participants' perspectives on PA
<ul style="list-style-type: none">▪ Time and resources spent during a heavy selection phase by both owner side and tenderers;▪ Selection and development phases had a lot of workshops and meetings;▪ Existence of an alliance organization and agreement with particular collaborative and structural features;▪ Early levels of collaboration were raised from selection and development phases of project;▪ Broader roles for all participants, including the owner;▪ Importance of adequate professionals and experts;▪ Participants' roles were flexible and sometimes changed through project's phases;▪ Solutions were discussed with best-for-project principle aided by open-book principle and a fixed budget;▪ High levels of collaboration and involvement of alliance members and external participants such as technical designers and subcontractors;▪ Existence of project's survey during implementation phase with all participants' taking part of it;▪ Performance and results of survey linked to KRAs which are linked to an incentive system;▪ A non-risky project was good as a first project to experiment PA;▪ Time, costs and effort were too big compared to the financial and economic opportunities that could come out of a renovation/construction project such as this one;▪ PA might suit large, risky and complex projects with space for significant innovation and opportunities;▪ Efforts applying PA will likely decrease over time and cultural changes will become natural.

Alliance agreement and organization

The alliance organization and agreement were the very first start and were considered the most innovative feature of the project's identity. Initially, it was responsible to set proper selection criteria to ensure a professional and capable project group. Later, it was responsible to set a joint risk approach in which common goals and guidelines were established to ensure high levels of commitment and collaboration between participants.

The alliance structure and agreement were also responsible to spread collaboration along all project levels and to foster a clear, honest and open communication atmosphere between project's participants. The structure had clear roles for participants and its nature was developed to avoid legal disputes and other complex issues such as prompt responsiveness to unpredictable events. As it will be referred, the alliance was responsible for the decision-making process, which intended to be an integrated process with all participants discussing topics with best-for-project intentions. This discussion group was defined by the alliance and there was an alliance group leader responsible for this process.

Some weaknesses were considered relevant, and they include the fact that alliance contractual clauses proved insufficient to guarantee unanimous decisions in all situations. Additionally, the agreement itself failed to make collaboration a reality and participants' roles were sometimes unclear. Also some expectations were too high in the beginning and that contributed negatively to some suspicion under the project approach. In this regard it is suggested more time should be invested in alliance development and organization. At last, the alliance should consider all people that directly or indirectly depend on the project such as technical designers, subcontractors and facilities operator. These last groups will deserve special discussion further in this chapter.

Joint decision-making and problem-solving

Decision-making was a well-structured process in which owner did not had the final word deciding on what is best-for-project. That can be seen as a strength or weakness, but given the active role of participants under an alliance, that is mostly considered a positive feature. All decisions were highly discussed and owner side had more representatives than in a traditional project. This requires high levels of preparation, since owner role is not limited to client and supervisor, but also an active participant deciding and taking part of all project issues. That requires time and resources to spend in order to gain competencies and skills to work under alliance.

Project's decisions and solutions were jointly agreed by alliance members and that was possible working as a group in an open communication environment. This was possible due to high levels of commitment and collaboration that grew from early involvement since selection phase and by selecting a suitable team during that stage. Some suggestions over decision-making process include relegating minor issues to individual parties, instead of being jointly agreed.

In this project, more solutions were studied than traditionally and that led to best-for-project solutions, taking into account all participants opinions and ideas. That showed up by having participants with a flexible attitude taking into account each other's concerns. Also, the schedule was set together in a flexible way. For instance designers were more concerned about cost issues as they would be typically, and in part that is believed due to open-book principle that made all financial criteria readily available to participants. As an example, there was a model unit in which several solutions were tested such as replacing old windows or simply fixing them. This testifies how considering costs and quality together led to good or optimal solutions with higher quality than average since all perspectives and factors were taken into account by each single party and more solutions were studied. However, these optimized solutions came sometimes with higher costs and more time spent than initially expected. Also, these discussions had in mind KRAs such as energy efficiency, being more complex than it could look at first sight.

On the negative side, quite often decisions took too much time since each party had different views on what was best-for project giving birth to difficulties achieving mutual agreement. Also, the group deciding was wider than traditionally and that contributed to the heaviness of decision-making process making it hard to reach unanimous decisions. At last but not least, even small decisions had to be made by entire alliance group which leaves the idea that the organization should relegate minor decisions to individual parties instead. For that the alliance structure shall either define clearly participants' roles or ensure a flexible structure allowing change of roles during the project. As an example, discussion on shower doors led to an expensive solution around 3 times more expensive than an alternate one. On the other hand, initially each apartment was expected to have an oven, however final solution consisted of equipping apartments with simple microwaves, with a possibility to later upgrade to a microwave with oven feature. This example intends to illustrate some inaccuracies in the decision-making process which reveled to be against final user interests.

Problem-solving was an asset at this project since all issues were promptly discussed in an efficient non-blaming way. Discussion to solve those issues included all alliance representatives and it was a process that continuously improved during project's course. At site and office levels, sometimes problems occurred and there were still some problems solving issues. However these problems are believed to be related to communication and culture issues that will be further discussed.

Open-book principle and communication

Clear and promptly available information on financial and technical project specifications are believed to be driving forces for participants' commitment and collaboration as it aided decision-making process and promoted a positive working culture. Information on costs has been promptly available and solutions have been discussed under a fixed budget. These features were believed to contribute for mitigation of hidden financial interests.

Project's communication was clear, honest and open. It was evident that communication between designers and contractor was better. Also, communication with technical designers was higher than traditionally, according to participants' experience. Working environment and communication have been open since everyone took into account each other's expectations and concerns through a clear and honest talkative approach.

Reasons for higher levels of communication can be linked to a more face-to-face interaction and also by informal aspects such as having coffee breaks together, which proved to eliminate communication barriers between people working in office or site while improving levels of trust and confidence between people. There were still some communication barriers between people working in office or site but these issues are believed to be more related to participants culture itself.

Culture and working atmosphere could also be defined as positive and enthusiastic. That led to high levels of collaboration and a responsible attitude towards project success. Roots for a positive culture grew from an early stage. During project's course, events such as informal meetings or evening happenings contributed to foster collaboration and trust between project's participants.

It became clear that participants working together from early stages did not have particular problems concerning commitment and collaboration. However, participants working only at implementation phase were sometimes not prepared to work under alliance principles leading to some communication barriers between people working in office or site. Ultimately, these communication barriers led to "blaming-culture", which could be surpassed if enough time and resource would have been spent to develop new competencies by those participants. From survey analysis and interviews, it can be concluded that trust and confidence still have to improve in practice, especially at implementation phase and between office and site project's participants.

Team-building: meetings and workshops

Project's meetings have been smaller and more efficient and similarly had the aforementioned pros and cons of joint decision-making process. The atmosphere was of strong commitment and everyone participated with own ideas and views. In part, it is believed that the existence of an alliance counselor (a sort of an alliance guru) sharing his experiences on alliance and its virtues were responsible for inspiring and fostering a positive culture within meetings and project.

In the same line as meetings, workshops also promoted discussion and problem-solving since one of its objectives was to enhance understanding of project's requirements, specifications and opportunities.

It is suggested workshops should be introduced in the beginning of design procedures, since it could promote all the opportunities that come out of those events. Also, it is believed reduction of workshops and meetings at selection phase could reduce heaviness at this stage in terms of costs and time. However, it is not clear if the benefits that come from early involvement would vanish with fewer workshops and meetings.

Monitoring performance and satisfaction

Taking into account participants' views, KRAs were considered properly developed. In author's perspective, even though sufficient information on KRAs was not provided, participants' behavior towards them and their relation with the incentive system was found adequate. For that, it contributed the fact that participants were not obsessively thinking in getting rewards or penalties. Instead, they were focusing on global project success and project's constraints. In this regard, an adequate development of KRAs shall positively affect participants' attitude, encouraging better project performance, collaboration and continuous improvements.

Project survey was an important tool to assess performance and job satisfaction in the project. It is directly related with KRAs but the most significant innovation is that participants were an active part of the assessment process. It is believed by the author that participants were more critical on their own and others work and that enhanced continuous improvements and fostered regular discussion after each survey round. Simple fact people were participating on survey left them in a collaborative mood as it increased job satisfaction and provided space for improvements in performance. Feedback meetings after survey rounds also helped reinforce commitment and continuous improvements over project's course. Innovations could also be encouraged even though this project did not have a lot of space for technical or process innovations.

Reportedly, after a getting participants' feedback and analyzing survey's results, it is suggested that the number of survey's questions and KRAs could be reduced in number and focus more in project's risks. An excessive number of questions makes the survey too heavy and increases chances of having redundant and correlated answers, which is clearly not in favor of an accurate performance assessment. Additionally, some answers could be biased

since respondents might have had interest in rating particularly well in certain aspects and somehow there were still participants with different main goals. At last, some participants were not prepared to answer certain questions since they did not have sensibility on some questions. In that way, it is suggested that either a more rigorous selection on survey's participants should be made or a simpler survey model could be developed to avoid the aforementioned issues.

5.3.2. Alliance's external parties

Alliance's external parties were seen as crucial participants for project success and their insights and positioning towards project were valuable for better understanding this first alliance experience. The most relevant external parties were facilities operator, subcontractors and technical designers/Experts. Below, some discussion will be made concerning each of those parties separately.

Facilities operator

Facilities operator role in the project was often relegated to second plan. It is believed interaction and facilities manager opinion was not listened from beginning of project. Even though they were part of the alliance during the implementation phase of the project, their range of action remained limited. That led to problems in understanding and interaction with alliance members further in the project. Despite participating in project's survey taking part as an alliance member, an organizational role was not predicted for this party before implementation phase. That led into solutions that were not always in favor of facilities services and residents (end-users) interest, which could have been avoided if that party had a more active participation in decision-making from early project stages.

Satisfaction levels of facilities operator and residents were not as good as expected, mostly for the reasons mentioned before, which include lack of consideration from Alliance and Subcontractors groups over these parties. It is suggested more communication and discussion with facilities manager should take place beforehand in order to adjust and meet end-users requirements. As it is naturally understandable, these participants might have potentially good ideas for project that can potentially generate interesting solutions.

At last, one important suggestion refers to the speed of decision-making that could be improved. Quite often lack of communication and knowledge over project's constraints led to poor understanding and proved adverse for residents' interests.

Subcontractors

Subcontractors could deserve an entire section at this research. Instead, main considerations on them were made, leaving a deep analysis for a future research work.

From interviews and survey analysis it became clear subcontractors had an important role and different views on project's issues. Subcontractors often felt excluded from project decisions and that is believed to have a relation with their clearly different views on project's survey fields as it has been before at section 5.2. Lack of understanding between subcontractors also occurred in crucial moments. However that is not believed to be a new issue for this project in particular.

Demolition works performance serve as a good example on how important efficiency of subcontractors ended up affecting project's performance. As it was mentioned before, there were significant gains in terms of time at these works which allowed substantial savings in terms of time and an optimization of project's schedule. Yet, there was still a feeling that more improvements could be made if only subcontractors were listened earlier at meetings and their ideas shared. As a consequence of being left out of the alliance, it is believed levels of commitment towards the project might have decreased.

Satisfaction of subcontractors was highly conditioned by reported decisions made against their interests and most of all by the fact of not having an opportunity to discuss beforehand on those issues. These issues included aspects such as technical ones or definition of own schedules. As an example, it was reported that recorded information of meetings was not available to some subcontractors (see Appendix F). Also, it should be added procurement of subcontractors was only based on lowest price criterion and their contractors remain in the same format as traditionally, which again did not contribute for innovations regarding this group of participants. In that regard, it was perceived subcontractors in general did not feel as an active asset for project.

Integration of subcontractors in the alliance is definitely something challenging that should be studied in a future alliance project. In that regard, it is suggested by the author a future research focusing on IPD capabilities since they have a more integrate approach of all project participants, as it has been mentioned before at chapter 2. It is believed development of subcontracting procedures such as new contract models with proper incentives and a closer participation in project planning and decision-making process could be in favor of subcontractors and also foster best-for-project results. The aforementioned integration of subcontractors with a more important role in/with the alliance is certainly challenging but it is believed to enhance project's results in terms of costs, quality and time.

In accordance to what was stated at chapter 2 on traditional delivery models, it is likely subcontractors were still the more fragile participants in the process given the risks they still faced and the low decision-making involvement they had. From alliance participants' interviews and survey's free comments it was clear subcontractors were committed in achieving good results and improving their own work which is understood to the fact they also had an incentive system for their own work. Reinforcing what was previously stated and even with the aforementioned issues, subcontractors collaborated better over time and working atmosphere was generally better than traditionally.

Technical designers/Experts

Technical designers and experts involvement at the project revealed to be generally positive. There was a prompt communication and interaction between designers and technical designers which led to efficient decisions and best-for-project solutions. These improvements were achieved in particular by HVAC and electricity teams and included significant gains in terms of time and schedule planning. Analysis of interviews and survey led to a general belief there were similar views from Alliance members and Technical designers and experts over project's course and performance. Oppositely, subcontractors have a different behavior from technical designer and experts as it was evident from survey analysis and this will still be discussed further in this chapter. Also, statistical analysis showed technical designers and experts had highest mean ranks in most cases. This leaves the author with an idea that this group of participants was generally satisfied with project's course and survey's assessment fields, being even higher than Alliance group ratings.

5.3.3. Project's phases

Regarding project's phases it is interesting to observe the expectations and dynamics of the very first stage and the ongoing stage at the time of the research: selection and implementation phases respectively. Selection phase was extensively described at chapter 4. In this section a brief comparison over selection and implementation phases will be made. This discussion will center in the evolution of alliance's features.

Selection phase was responsible for early involvement between participants which is believed to be one of the main features that allowed good collaboration and commitment from participants as it has already been described before. It is not redundant to reinforce that selection phase allowed good working routines to grow and foster over project and the project also had a better interaction between actors during this phase. This last aspect is believed to be related to particular enthusiasm participants showed to work in an innovative and new delivery method. To make it a reality, proper criteria were set to award tenderers and tenders. In particular, there were subjective criteria regarding the organizational skills of tenderer to work under an alliance organization.

Regarding tendering process it was stated by most interviewed parties it was a heavy and slow process. Early involvement of parties lead to an effective decision-making process, which however was time-consuming, since all decisions were made together and unanimously accepted, requiring a lot of discussion even on smaller issues. On the other hand, flexibility of decisions and solutions was seen as an asset for project. Time and costs were largely responsible for some inefficiency at selection phase. There was a comprehensive work behind all stages and processes which revealed too heavy and slow with an excessive amount of meetings and workshops. In one way, client had difficulties setting criteria to properly select a capable team for project. On the other hand, some tenderers argued compensation received after tendering process was not enough to cover their costs. However, client's intention was to

cover extra costs compared to traditional projects, which looking from that perspective is believed to be a fair way of looking into the compensation in the selection phase.

Later in the development and implementation phases, some mismatches between selection criteria and development requirements were reported. It is believed that the client had more interest in selecting a capable team than concerning too much on the technical specifications during selection phase. It is suggested that a possible way to develop that should either make design and costs specifications more flexible or simply make it clearer on what are the requirements the client is looking for. This project's experience, opened possibilities regarding more work, resources and time spent on team-building during workshops, but less time spent in workshops and meetings during the selection phase, as it has been previously referred.

Implementation phase has been closer to traditional practice than previous project's phases. Alliance was present with participants involved from early stage. Workers involved only at this stage did not feel all the organizational changes and features that alliance introduced. Procedures on site were still the same as traditional ones. There is no clear suggestion on how these procedures should or could change in order to maximize project's performance and alliance's collaboration. Also there were no clear major benefits of alliance in particular during implementation phase, since basis of work were already set and applied from selection and development phases. Reportedly, decision-making process and the existence of a project survey were main innovations comparing to participants' previous experience and that is believed to have contributed for a more collaborative and performance-oriented work.

At high levels of decision levels collaboration was still remarkable during implementation phase. However, it was stated collaboration levels slightly decreased during this phase. Also, there was the perception construction and site management levels were slower to adapt to new standards and acting sometimes still individualistically. In that regard, it is recognized there are still a lot of challenges to surpass which involve change of culture among participants and development of efficient ways to naturally foster collaboration and trust across all project's workers at implementation phase.

Most notorious strengths in performance at implementation phase included continuous improvements in cost-savings, design and quality. There were also improvements in other area, in general, however it was found adequate only to focus in the fields that were more emphasized at interviews rather than giving too much importance on survey results. Drivers for those improvements could be attributed to a better decision-making process over time which is believed to be related with a better mutual understanding between project's participants. As an example, designers were working closely with contractor and some technical designers' teams, improving solutions in terms of final design and quality. Yet, it must be referred there was not found a direct relation between these features and the alliance organization itself.

5.3.4. Project overview

Early in this research it was found particularly important to define generally the concepts behind PA. Later, one of the first concerns centered in understanding how the selection phase could be done and what were the legal constraints and adaptations that might come from this kind of contracting.

Later, by studying a specific project, it was found that there were no substantial obstacles on what it comes to legal issues. Aspects such as subjective criteria during tenderer's and tender's evaluation were described and clarified and a short comparison over Portuguese and Finnish procurement codes was made. It was observed there are no significant differences on critical aspects. However, interpretation over criteria weighting and their scoring scales might differ.

After conducting interviews and getting a broad knowledge of project's conditions, it is believed by the author that alliance projects are more suitable for challenging, complex and risky projects in which financial interests and opportunities for participants could be higher. It became clear that case study's nature is probably not the most suitable for an alliance since it does not meet the aforementioned requirements. Nevertheless, it is recognized that a pioneer project at this kind of model required a certain experimental approach. In that regard, the motivation to select a non-complex and non-risky renovation project was found adequate and recommendable to test the possibilities of alliance and identify its limitations and challenges for future implementation. Also, PA has been more widely used for infrastructure projects, which still leaves a lot of adaptation to building construction projects.

Collaboration and performance were top concerns at this project and a lot of time and resources were invested in alliance organization by all its members. Nonetheless there were reduced opportunities to make significant improvements on efficiency as compared to traditional practice and in terms of innovation as acclaimed for example by the Australian practitioners. In that regard, and taking into consideration there were no technically significant innovative procedures or solutions, the alliance model and its features and structure were considered as the main innovations at this project

It is believed performance is expected to meet with alliance's expectations and collaboration has been significantly higher than participants' previous experience. There is no direct relation between collaboration and performance levels. However, interviews and survey analysis left good evidence for significant correlation between these two concepts within this project's universe.

In short, it was stated by alliance that this project provided solid design and quality combined with good value-for money. This was achieved by high collaboration levels and risk-sharing between parties, a proper planning and organization with the main principles and features as discussed before at section 5.3.1.

At last, it is believed biggest threats for PA are believed to poor understanding on what the model capabilities are and consequently set unrealistic expectations towards a certain

project. A successful alliance requires a lot of preparation especially since it is a new approach in European context. However, it is strongly believed PA approach will get more natural over time, which could only be possible with pioneering projects like this leaving a good background for future practice.

6. Conclusions

6.1. Final considerations and major contributions

At this section, special importance will be given in answering main research questions and emphasizing major findings and their extent. Throughout this research work, a comprehensive study was conducted over collaborative and performance aspects on an alliance case study project. Aspects regarding their potential and limitations were identified and some unexpected findings were made. In order to recall main research questions they are again present below in the Table 27.

Table 27. Research questions

1.	How alliance projects differ most from traditional practice and in what extent they allow achieving better results?
2.	How alliance partners are selected and how the considered selection criteria reflect the requirements of the project implementation phase?
3.	Which reasons and conditions would make sense for alliance use?

The first research question answer can be summarized by highlighting major characteristics of this project. These features are seen as necessary for PA implementation and they differed from traditional approach features and practices. Since these features were already discussed in last chapter, they will not be described in extent again. It is author's belief that major features of alliance contributed for high levels of collaboration between participants and achieving better results as discussed at chapter 5 and listed below in the Table 28.

Table 28. Major alliance's features

▪ Alliance agreement and organization
▪ Joint-decision making and problem solving
▪ Open-book principle
▪ Communication and culture
▪ Meetings and workshops
▪ KRAs and survey

The second question has been answered throughout this thesis. However, some important aspects should be emphasized again. It is especially relevant because choosing the adequate participants is one of the most relevant challenges in alliances. Selection phase was a competitive dialogue with three rounds of negotiations. The project was awarded under the most economically advantageous offer and three main criteria were alliance skills, value for

money and reward, with 30%, 40% and 30% of partial weighting respectively. Alliance skills and value for money were taken into account across all project phases. Alliance organization and its members gave permanent attention on topics such as collaboration and performance levels giving use of the alliance's features mentioned before such as joint-decision making, development of adequate KRAs and conducting a project survey to assess levels of performance. Also, special attention was given to continuous improvements and the working atmosphere tried to be as open as possible in order to allow every single project party to express their ideas and concerns by always taking into account the best-for-project principle. An example for that is proven by follow-up meetings and workshops where project specific issues were openly discussed. Nevertheless it also became clear that selection phase and the amount of work and preparation for it were probably too much compared to the benefits that came out of it. For instance, this fact left the author with the idea that it should not be necessary to conduct so many meetings and workshops with tenderers at selection phase.

Focusing on answering third question, it is believed that alliance might better suit complex, large and risky projects. These projects have more chances for innovation and financial opportunities that might allow for significant improvements compared to traditional practice. This can be proven by alliance organization and its decision-making and collaborative environment through open-book and best-for-project principles. These features are believed to enhance improvements and foster project's performance. To reinforce that, it shall be added that required preparation for an alliance is quite demanding in terms of costs, time and resources and even the selection phase is considerably heavier than traditional delivery approaches.

This research work allows concluding that the alliance was definitely worth applying at this project. First of all, it gave important feedback and insights over PA and its main features and experience in a construction project in Finland. This is from a pure theoretical view. In terms of project's participants' perspectives, key features were unanimously seen as assets and they are believed to have left a decisive impression and preparation towards future involvement and willingness to be part of alliance projects.

In terms of project's performance, satisfaction and overall success this project has been globally positive. Table 29 illustrates general progress of project's performance as obtained from project's survey. Comments on the validity of project's survey results were already made before, but in short they helped validate interviews' results. After analysis of collected data it authors belief that performance has been generally positive and improved across project.

Table 29. Performance according to survey

Area	Round			
	1	2	3	4
1. Schedule	3,2	3,8	3,8	3,6
2. Site organization	4,0	4,1	4,1	4,0
3. Collaboration and interaction	4,0	4,2	4,2	4,1
4. Design	3,9	4,1	3,9	4,0
5. Procurement and contracting	3,4	3,8	4,0	3,9
6. Quality	4,0	4,2	4,3	4,2
Average	3,7	4,1	4,1	3,9

Each participant had different expectations over this project, but most importantly all of them were satisfied to be a part of it. It does not make sense to discuss about individual satisfaction, since project's success should naturally indicate global success. However, interviews tried to access this satisfaction levels together with survey results it was possible to perceive an apparent satisfaction of each party with natural differences in certain topics such as decision-making and effectiveness of some solutions.

Major suggestions for more efficient alliance projects could include a leaner selection phase with less workshops and meetings. Selection and development phases should have clear rules on participants' roles and organizational model. Decision-making process can improve by having fewer meetings and more early workshops where all participants' are included such as subcontractors, technical designers and facilities manager allowing to take into account all views and define project's constraints. Also it should be taken into account minor discussions should be decided by individual parties. Experience showed that even small issues were discussed together contributing for a heavy and time-consuming process against project's best interest of efficiency. Some suggestions include also developing a better KRA list which would focus more in project's risks and which could possibly involve reducing the number of KRAs and survey questions.

The author has strong belief that one of most important findings was the perception that subcontractors should play a more important role in project alliance, both in terms of better contracts with adequate clauses, but more importantly, subcontractors' views should be taken into account in the decision-making process, since they can help improve project's efficiency in terms of costs, schedule and quality by sharing their insights and know-how.

Future PA in EU context should take particular attention to existing limitations in terms of current legal framework which might require adaptation from local agents and stakeholders. Some legal questions concerning public procurement codes were also identified and commented in most cases merely descriptively since it is believed a deeper discussion on these topics should be left out of this study for legal experts' consideration. Not less importantly, it is essential to recognize different countries also have different legal construction industries and legal environments. Cultural aspects shall be understood and might certainly vary from country to country. Implementation of PA in Portugal would require substantial efforts both from legal authorities and the construction sector practitioners in order to fully understand and gain necessary skills for possible use of this delivery model. By doing so, it is author's belief Finnish example could provide an interesting background which

could be used in future in other EU countries. There were some identified differences between Portuguese and Finnish procurement codes namely in terms of consideration of subjective criteria and evaluation of tenders.

PA allowed a deeper role of project owner, which required preparation and proper skills. In this regard, PA can be a positive approach to integrate all participants in an open project environment in which every single party has an active voice on project specific issues accentuated by a joint and unanimous decision-making process and an efficient problem-solving asset. It is believed PA confers good project performance in terms of space for innovation and best for project solutions in terms of good value for money. Risk sharing and collaboration are seen as strong assets for project's success. The first one is a structural feature, which is formally present in a contract model. However, collaborative features such as cooperation, trust and commitment are essential to support the aforementioned features. Naturally, it takes time to implement such cultural features, but early involvement is believed to be a driving force for its fostering.

Also, expectations from PA shall be adequately set since it is not a miraculous approach that eliminates all threats regarding problem-solving and disputes. PA, as understood from the case study project at this work can deliver excellent results if the trade-off between preparation and development of competencies, and project's performance and value-for-money are exceeded by these last. This project clearly worked in this way, even though it shall be once again mentioned that its nature was believed to be the one taking most out of alliance.

It is not expected that interest towards PA would come at first from construction industry. Yet, it is believed that legal authorities and academics should be the ones fostering discussion over new delivery models across practitioners. This project's experience indicates involved parties recognized the benefits and limitations of PA, but most of all they unanimously agreed that it has a huge potential for future projects, under certain circumstances, as defined before.

Limitations at this study include the fact that the research was conducted initially in Tampere, which is about 180 km far from case study project in Helsinki. That was a limitation in terms of availability to visit the site as often as could have been desirable. After that initial period, the research was conducted in Portugal, except in August when the author went to Finland to get more feedback on project's developments. Other limitations include the fact that some project documentation was unavailable at the time of this study, limiting the scope and depth of the research in certain stages. At last, the action research nature of this study might have influenced some results, which allied to the qualitative nature of the study, led only to general findings since minor findings could not be extended out of project's borders.

6.2. Future developments

There is a multitude of further developments that can be done regarding collaborative and performance-based delivery models. One of major developments includes the elaboration of a general framework of procedures for PA in EU. Aspects from selection phase to implementation and warranty models should be considered. Structural features such as decision-making and joint risk could also be studied with examples on ongoing projects. For example, standardized procedures for selection phase could be developed, reducing costs, time and resources usually spent during this stage. Alliance parties individual roles and flexibility their flexibility to change and adapt over time could also be of interest for PA development.

Performance monitoring and incentive systems also have a wide scope of development. Collaboration and performance should be studied out of a single project range and frameworks could come out of such correlating analysis. A set of common KRAs could be developed to fit majority of projects with a deeper focus in projects' risks.

Another major possibility for PA might be the inclusion of subcontractors in the alliance organization. That is seen as a great challenge to be surpassed, and future research could focus on new contract models for subcontractors, incentive systems or by adding them as direct actors in projects' planning and decision-making processes.

Future developments might also focus on understanding in terms of willingness and legal framework the availability of Portuguese public procurement authorities to experiment these kinds of collaborative delivery models. For that, more studies should be conducted by both academics and legal authorities.

Another prospect development could be to study the application and feasibility of alliance contracting in building projects, as most of the current alliances in the construction sector were made for water and transport infrastructures. Also, it should carry out a study of the advantages and disadvantages that might arise from the application of that sort of alliance in the nature of such projects.

In short, optimization of Alliance procedures and challenging ideas for collaborative and performance-based delivery models include:

- Development of a framework of PA procedures for EU;
- Engagement of EU public authorities into discussion over new delivery models;
- Standardization and development of leaner selection procedures;
- More time for big decisions and improve efficiency over small decisions;
- Performance monitoring and development of incentive systems;
- Clearer view on responsibilities over decision-making process;
- Extending PA to external members with common goals and liabilities;
- Development of subcontracting procedures;
- Allowing change of individual roles without organization's growth;
- Development of a general set of KRAs or KPIs for PA.

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Appendices

Appendix A – Finnish Procurement Code

Unofficial translation: Act on Public Contracts 348/2007

PART II PROVISIONS ON PUBLIC SUPPLY CONTRACTS, PRIMARY PUBLIC SERVICE CONTRACTS AS DEFINED IN ANNEX A, PUBLIC WORKS CONCESSIONS AND DESIGN CONTESTS ABOVE THE EU THRESHOLD

Chapter 5 — Contract award procedures

Section 29 — Competitive dialogues

Contracting authorities may award public contracts by a competitive dialogue procedure in particularly complex contracts where:

- (1) the contracting authorities are not objectively able to specify the legal or financial conditions or technical solutions capable of satisfying their needs or objectives in accordance with Section 44, subsection 2, paragraphs 2—4; and
- (2) the criterion for the award is that of the economically most advantageous tender.

During the dialogue, contracting authorities shall ensure the equal treatment of all tenderers. Contracting authorities shall not provide information in a discriminatory manner which may compromise the equal treatment of the participants in competitive bidding.

Contracting authorities may not reveal to the other participants solutions proposed or other confidential information communicated by a candidate participating in the dialogue without the agreement of the candidate or tenderer.

The contracting authorities may specify prices or payments or award prizes to the participants in the dialogue.

Section 30 — Conduct of competitive dialogues

Contracting authorities shall publish a contract notice setting out their needs and requirements for the contract. Contracting authorities may further define the objective and content of the contract in a project description document.

Contracting authorities shall initiate, with the candidates selected in accordance with the provisions of Sections 52—59, a dialogue the aim of which shall be to define one or more solutions to realize the contract. They may discuss all aspects of the contract with the candidates during this dialogue.

By applying the comparison criteria of the tender, contracting authorities may provide for the procedure to take place in successive stages in order to reduce the number of solutions to be discussed during the dialogue stage. The contract notice or the project description shall indicate the recourse to a staged procedure and the applied criteria.

The contracting authority shall conclude the dialogue when it can identify solutions which are capable of realizing the contract. The contracting authority shall inform the participants of the conclusion of the dialogue.

The contracting authority shall ask the candidates to submit their final tenders on the basis of the solutions presented and specified during the dialogue. The tender shall contain all the elements required for the performance of the project in accordance with the invitation to tender.

Contracting authorities shall assess the tenders on the basis of the comparison criteria indicated in the contract notice or the project description. Contracting authorities shall set the comparison criteria and award the contract in accordance with the provisions laid down in Section 62.

The tenders may be clarified and specified at the request of the contracting authorities. However, such clarification or specification may not involve changes to the basic features of the tender or the invitation to tender in a manner that may distort competition or have a discriminatory effect. On the same conditions, the contracting authority may ask the tenderer to clarify or specify aspects of, or confirm commitments contained in, the winning tender.

Chapter 7 — Invitation to tender and defining the object of the contract

Section 40 — Invitation to tender

Invitations to tender shall be submitted in writing and drawn up to be sufficiently clear in order to enable submission of commensurate and mutually comparable tenders. The invitation to tender or the contract notice shall invite suppliers to submit their tenders in writing by the deadline.

In case of discrepancy between the invitation to tender and the contract notice, the contract notice shall apply.

Contracting authorities are entitled, within reason, to charge for obtaining the invitation documentation to recover costs arising from the exceptionally extensive scope, materials of the documentation or similar factors.

Section 41 — Content of the invitation to tender

The invitation to tender or, where applicable, the contract notice shall include:

- (1) a definition of the object of the contract in accordance with the provisions laid down in Sections 44 and 45 concerning technical specification and submitting requests, and any other quality requirements relating to the object of the contract.
- (2) a reference to the contract notice published;
- (3) the deadline for the receipt of the tenders;
- (4) the address to which the tenders must be sent;
- (5) the language or languages in which the tenders must be drawn up;
- (6) proof of satisfying the requirements relating to the candidates' or suppliers' economic and financial standing, technical capacity and professional ability and other requirements and a list of documents which the candidate or supplier must furnish to provide this;
- (7) the award criterion and, where the criterion for the award is that of the economically most advantageous tender, the comparison criteria for the award and the relative weighting given to each of the criteria or a reasonable range or, in exceptional cases, the ranking of the comparison criteria; and
- (8) the period of validity for tenders.

Furthermore, the invitation to tender or the contract notice shall indicate any other information with particular importance to the tendering procedure and submitting tenders.

Section 42 — Sending invitations to tender or making them available for candidates and tenderers

In open procedures, contracting authorities shall send the invitation to tender, within six days of receipt of the request to participate, to the candidate requesting it, provided that the request was made in good time before the deadline for the submission of tenders. Alternatively, contracting authorities may offer full access by electronic means to the invitation to tender from the date of publication of the contract notice at the internet address specified in the notice.

In restricted procedures, negotiated procedures and in the competitive dialogue procedure, the invitation to tender shall be sent only to the candidates which the contracting

authority has admitted to the tendering procedure. The invitation to tender shall be sent simultaneously to all of the candidates.

In open procedures, the contracting unit shall send the supplementary documents of the invitation to tender not later than six days before the deadline fixed for the receipt of tenders. In the event of a restricted or accelerated procedure and a negotiated procedure, the supplementary information shall be sent not less than four days before the deadline fixed for the receipt of tenders, provided that it is requested in good time.

Section 43 — Invitation to negotiate

In negotiated procedures and in the competitive dialogue, the invitation to participate in negotiations shall include the invitation to tender or, if appropriate, a project description or an address from which those documents may be requested, the deadline for requesting such documents and, if applicable, the sum payable for obtaining them and any arrangements for payment.

The invitation to tender shall include the information referred to in Section 41, subsection 1. However, the invitation to negotiate in the competitive dialogue does not have to state the time limit for the receipt of tenders, although it must indicate the start date of the negotiations, the address at which the negotiations will be held and the language in which they will be conducted.

Section 44 — Technical specification of contracts

Technical specifications for the content of the contract shall be stated in the contract notice or the invitation to tender. Technical specifications shall afford equal access for tenderers to participate in the competition. Technical specifications may not have the effect of creating unjustified obstacles to competitive tendering. Whenever possible, technical specifications should be defined so as to take account of the needs of people with disabilities.

Technical specifications shall be formulated:

(1) by reference to a Finnish or other national standard transposing European standards, European technical approvals, official technical specifications, international standards or technical references or, when these do not exist, to national standards, national technical approvals or national designs, calculations or the execution of the works or technical documents relating to the manufacture of products; each reference shall be accompanied by the words "or equivalent".

(2) in terms of the performance of functional requirements, which are sufficiently precise to allow the definition of the subject-matter and award of the contract;

(3) by referring to the technical specifications mentioned in paragraph 1 for certain characteristics and by referring to the requirements mentioned in paragraph 2 for certain characteristics; or

(4) in terms of performance or functional requirements with reference to the specifications mentioned in paragraph 1 as a means of presuming conformity with such performance or if they are in conformity with requirements related to performance, or functional requirements.

(3) Technical specifications shall not refer to a specific make or source of products. Technical specification shall not refer to trade marks, patents, product types, origin, a specific method or production with the effect of favoring, or discriminating against, certain suppliers or products. Such reference shall be permitted on an exceptional basis, where a sufficiently precise and intelligible description of the subject-matter of the contract is not possible. Such reference shall be accompanied by the words "or equivalent".

Section 45 — Technical specifications referring to environmental characteristics

The performance and functional requirements referred to in Section 44, subsection 2, paragraph 2 may include requirements for environmental characteristics. Contracting authorities may use the detailed specifications or, if necessary, parts thereof, as defined by European or multinational eco-labels or by any other eco-label.

Conditions for the use of the specifications, or parts thereof, as defined by eco-labels are that:

(1) those specifications are appropriate to define the characteristics of the supplies or services that are the object of the contract;

(2) the requirements for the label are drawn up on the basis of scientific information;

(3) stakeholders, such as government bodies, consumers, manufacturers, distributors and environmental organizations can participate in the procedure to draw up the label; and

(4) the label is accessible to all interested parties.

Contracting authorities may indicate that the products and services bearing the eco-label are presumed to comply with the requirements for environmental characteristics. However, contracting authorities must accept any other appropriate means of proof submitted by the tenderer, such as a technical dossier of the manufacturer or a test report from a recognized body.

Section 46 — Proving compliance with the requirements of the tender

The tenderer shall prove in his tender that the proposed supplies, services or satisfy the requirements set down in the invitation to tender or for the tendering procedure shall be excluded from the competition.

Where a contracting authority has drawn up the technical specification in accordance with Section 44, subsection 2, paragraph 1 and the tenderer proves in his tender to the satisfaction of the contracting authority, by whatever appropriate means, that the supplies, services or works which he proposes satisfy the requirements defined by the technical specifications, the contracting authority cannot reject a tender on the grounds that the supplies, services or works tendered for do not comply with the specifications to which it has referred. The appropriate means might be constituted by a technical dossier of the manufacturer or a test report from a recognized body in Finland or another European Union member state.

Where a contracting authority has drawn up technical specifications in terms of performance or functional requirements, it may not reject a tender on the grounds that the tender does not comply with the specifications to which it has referred, if the proposed products, services or works comply with a national standard transposing a European standard, with a European technical approval, an official technical specification, an international standard or a technical reference and these specifications address the performance or functional requirements which it has laid down in the invitation to tender. In his tender, the tenderer must prove to the satisfaction of the contracting authority that the product, service or work in compliance with the standard meets the performance or functional requirements of the contracting authority. The appropriate means might be constituted by a technical dossier of the manufacturer or a test report from a recognized body in Finland or another European Union member state.

Section 47 — Alternative tenders

Where the criterion for the award is that of the economically most advantageous tender, contracting authorities may accept alternative tenders, provided that the contract notice indicates that variants are authorized. Furthermore, the alternative tender must satisfy the minimum requirements set in the invitation to tender for the object of tender and the requirements for presenting alternatives.

If the contracting authority has indicated that it shall accept the submission of alternative tenders, it may not reject the alternative on the sole ground that it would lead to a service contract instead of a supply contract or a supply contract instead of a service contract.

Section 48 — Subcontracting

The contracting authority may ask the tenderer to indicate in his tender any share of the contract he may intend to subcontract to third parties and any proposed subcontractors. This indication shall be without prejudice to the question of the principal supplier's liability for performing the contract.

The contracting authority may require the concessionaire to award contracts representing a minimum of 30 % of the total value of the work for which the concession

contract is to be awarded, to a subcontractor, at the same time providing the option for candidates to increase this percentage. This minimum percentage must be specified in the concession contract. The contracting authority may request that candidates specify in their tenders the percentage of the total value of the work for which the concession contract is to be awarded and which they intend to assign to third parties.

Chapter 8 — Admission of candidates and tenderers and selection of tenders

Section 52 — Verification of the suitability of candidates and tenderers

Exclusion from competitive bidding of candidates or tenderers, verification of the suitability of candidates and tenderers and selection of the successful tenders shall be carried out before the tenders are compared. However, in accordance with Section 53 or 54, a candidate or tenderer may be excluded from participation in competitive bidding later during the competition when the contracting authority has been made aware of the criterion for exclusion.

Section 53 — Exclusion from the competition of candidates and tenderers convicted of certain offences

The contracting authority shall exclude a candidate or tenderer from the competitive bidding if it has gained knowledge that the candidate or tenderer or director or any person having powers of representation, decision or control in respect of the candidate or tenderer has been the subject of a conviction by judgment that has obtained the force of *res judicata* and is specified in a criminal record for one or more of the reasons listed below:

- 1) participation in a criminal organization as defined in Chapter 17, Section 1 a of the Penal Code of Finland (Finnish Statute Series No 39/1889);
- 2) bribery as defined in Chapter 16, Section 13; aggravated bribery as defined in Chapter 16, Section 14 or bribery in business as defined in Chapter 30, Section 7 of the Penal Code of Finland.
- 3) tax fraud as defined in Chapter 29, Section 1 or aggravated tax fraud as defined in Chapter 29, Section 2; subsidy fraud as defined in Chapter 29, Section 5; aggravated subsidy fraud as defined in Chapter 29, Section 6; subsidy misuse as defined in Chapter 29, Section 7 of the Penal Code of Finland.
- 4) money laundering as defined in Chapter 32, Section 6 or aggravated money laundering as defined in Chapter 32, Section 7 of the Penal Code of Finland; or
- 5) work discrimination through undue influence as defined in Chapter 47, Section 3 a) of the Penal Code of Finland. Candidates or tenderers sentenced to a corporate fine as defined in

Chapter 9 of the Penal Code of Finland for a reason mentioned in subsection 1 shall be excluded from the competitive bidding.

The contracting authority shall exclude a candidate or tenderer from the competitive bidding if the candidate or tenderer has been the subject of a conviction by judgment that has the force of *res judicata* in another state for a reason analogous to those mentioned in subsection 1. In the European Community member states, the provisions shall apply to the following crimes defined in Community law:

(1) participation in a criminal organization, as defined in Article 2(1) of Council Joint Action 98/733/JHA on making it a criminal offence to participate in a criminal organization in the Member States of the European Union;

(2) corruption, as defined in Article 3 of the Council Act of 26 May 1997 drawing up, on the basis of Article K.3 (2) (c) of the Treaty on European Union, the Convention on the fight against corruption involving officials of the European Communities or officials of Member States of the European Union, and Article 2(1) (a) of Council Framework Decision 2003/568/JHA on combating corruption in the private sector;

(3) fraud within the meaning of Article 1 of the Convention relating to the protection of the financial interests of the European Communities; and

(4) money laundering, as defined in Article 1 of Council Directive 91/308/EEC on prevention of the use of the financial system for the purpose of money laundering.

A derogation from the requirement to exclude from the participation in competitive bidding a candidate or tenderer who has been the subject of a conviction for a reason referred to in this Section may be provided for overriding requirements in the general interest or under the condition that the convicted person no longer holds a responsible position in the undertaking submitting the tender.

Section 54 — Other criteria for exclusion

The contracting authority may exclude from participation in competitive bidding a candidate or tenderer which:

(1) is bankrupt or is being wound up or has ceased operations, where he has entered into an arrangement with creditors or a reorganization plan or is in any analogous situation arising from a similar procedure under the law;

(2) is the subject of proceedings for a declaration of bankruptcy, for an order for compulsory winding up or of proceedings for other procedures referred to in paragraph 1;

(3) has been convicted by judgment that has the force of *res judicata* of any offence concerning his professional conduct;

(4) has been guilty of grave professional misconduct proven by any means which the contracting authorities can demonstrate;

(5) has not fulfilled obligations relating to the payment of taxes or social security contributions in Finland or in the country in which he is established;

(6) is guilty of serious misrepresentation in supplying the information to the contracting authority required to apply the provisions of Chapter 8 or has not supplied such information.

The provisions laid down in subsection 1, paragraphs 3 and 4 shall apply in cases where the person convicted of a mistake or negligence is a director and any person having powers of representation, decision or control in respect of the candidate or tenderer. The decision for the exclusion may take account of other matters, such as the seriousness of the offence or omission, the connection with the object of the contract, the time lapsed, any other implications from the offence and any remedial action taken by the person convicted of the offence or omission.

Section 55 — Verifying the criteria for exclusion

Contracting authorities may request that the candidates and tenderers and the competent authorities of other member states, in accordance with the appropriate regulations, submit evidence and clarifications in order to verify whether the exclusion criterion referred to in Section 53 or 54 applies to the candidate or tenderer.

As regards Section 53 and Section 54, subsection 1, paragraph 3, contracting authorities shall accept as evidence an extract from the criminal record issued by a competent authority in the country in which the tenderer is established. As regards section 54, subsection 1, paragraphs 1, 2 and 5, contracting authorities shall accept as evidence a certificate issued by the competent authority.

Where the country in which the candidate or tenderer is established does not issue such documents they may be replaced by a declaration on oath or by a solemn declaration under the law of the country in which the representative of the candidate or tenderer is established.

Section 56 — Requirements and references relating to the suitability of candidates and tenderers

Contracting authorities may set requirements relating to the candidates' or tenderers' financial and economic standing, technical capacity and professional ability and quality and request that the candidates or tenderers submit the related references.

In order to verify the requirements and that the requirements are satisfied, the requested references shall relate to the candidate's or tenderer's ability to perform the contract. Requirements shall be in proportion to the subject-matter, purpose and scope of the contract. Requirements and references shall be indicated in the contract notice. Candidates or tenderers failing to satisfy the minimum requirements set by the contracting authority shall be excluded from participation in competitive bidding.

Contracting authorities shall indicate in the contract notice any objective and non-discriminatory criteria and rules, which they shall apply in restricted procedures, negotiated procedures or in the competitive dialogue to admit candidates and tenderers to the tendering procedure or negotiations. Contracting authorities shall state the minimum number of candidates and, where appropriate, the maximum number of candidates.

Contracting authorities may invite candidates or tenderers to supplement or clarify the references and other documents.

Section 57 — Register data

Contracting authorities may request that a candidate or tenderer prove under the law of the country in which he is established that:

- (1) he is registered in a professional or trade register, by providing an extract from the register;
- (2) he carries out a trade by providing a declaration on oath or a certificate; and
- (3) he is entitled to provide a service in the country in which he is established by providing a license or a certificate of membership of an organization.

Section 58 — Economic and financial standing

Contracting authorities may request that a candidate or tenderer furnish proof of his financial and economic standing by references such as:

- (1) a statement from bank or credit institution or evidence of professional risk indemnity insurance;
- (2) the presentation of a profit and loss account, annual report, other annual accounts and group annual accounts, if these must be published in the country in which the candidate or tenderer is established; and
- (3) a statement of the undertaking's overall turnover and turnover in the area information on these turnovers is available.

If, for any valid reason, the candidate or tenderer is unable to provide the references requested by the contracting authority, he may prove his economic and financial standing by any other document which the contracting authority considers appropriate.

Section 59 — Technical capacity and professional ability

Contracting authorities may request that a candidate or tenderer furnish proof of his technical capacity and professional ability by the following documents:

- (1) the educational and professional qualifications of the candidate or tenderer or those of the undertaking's managerial staff and, in particular, those of the persons responsible for providing the services or managing the work;
- (2) a list of the works carried out over a period not exceeding the past five years, accompanied by a certificate of satisfactory execution for the most important works; the certificate shall indicate the value, date and site of the works and shall specify whether they were carried out according to the rules of the trade and properly completed; where appropriate, the competent authority shall submit these certificates to the contracting authority directly;
- (3) a list of the principal deliveries effected or the main services provided over a period not exceeding the past three years, with the sums, dates and recipients involved; where the recipient was a public corporation, the list shall be verified by the competent authority; where the recipient was a private purchaser, by the purchaser's certification or, failing this, by a declaration by the candidate or tenderer;
- (4) an indication of the technical experts or bodies involved, whether or not they belong directly to the candidate or tenderer, especially those responsible for quality control and, in the case of public works contracts, those experts and bodies upon whom the contractor can call in order to carry out the work;
- (5) for supply and service contracts, a description provided by the candidate or tenderer of the technical facilities for ensuring quality and the study and research systems;
- (6) where the products or services to be supplied are complex or, exceptionally, are required for a special purpose, a certificate for the check carried out by the candidate or tenderer or on his behalf by a competent official body of the country in which the candidate or tenderer is established on the production capacities of the candidate or tenderer or the technical capacity of the service provider and on the means of study and research which are available to it or the quality control measures it will operate;
- (7) a statement of the average annual manpower of the service provider or contractor and the number of managerial staff for the last three years at a maximum;
- (8) a statement of the tools, plant or technical equipment available to the service provider or contractor for carrying out the contract;
- (9) an indication of the proportion of the contract which the tenderer intends to subcontract;
- (10) with regard to the products to be supplied, samples, descriptions, and photographs, the authenticity of which must be certified if the contracting authority so requests, and certificates drawn up by official quality control institutes or agencies of recognized competence attesting the conformity of the products to be supplied, identified by references to technical specifications or standards; and
- (11) with regard to public contracts having as their object supplies requiring siting or installation work, an indication of professional ability, efficiency, experience and reliability.

If appropriate for the object of the contract, the contracting authority may request that the candidate or tenderer provide an indication of the environmental management measures that can be applied when performing a public works or service contract. Should contracting authorities require the production of certificates drawn up by independent bodies attesting the compliance of the tenderer with environmental management standards, they shall refer to the Community Eco-Management and Audit Scheme (EMAS) or to environmental management standards based on the relevant European or international standards certified by bodies conforming to Community law or the relevant European or international standards concerning certification. Contracting authorities shall accept equivalent certificates from bodies established in other European Union member states and other evidence of equivalent environmental management measures from the suppliers.

If appropriate for the object of the contract, the contracting authority may request that the candidate or tenderer provide an indication of the quality assurance measures. Should they require the production of certificates drawn up by independent bodies attesting to the compliance of the tenderer with quality assurance standards, contracting authorities shall refer to quality assurance systems based on the relevant European standards series certified by bodies conforming to the European standards series concerning certification. Contracting authorities shall accept equivalent certificates from bodies established in other European Union member states and other evidence of equivalent quality assurance measures from the tenderers.

Section 60 — Legal forms of candidates and tenderers and indication of responsible persons

Candidates or tenderers who, under the law of the country in which they are established, are entitled to provide the relevant services, shall not be rejected solely on the ground that, under the law of the European Union member state in which the contract is awarded, they would be required to be either natural or legal persons.

In the case of public service and public works contracts as well as public supply contracts involving siting and installation operations, candidates and tenderers may be required by the contracting authority to indicate in the tender or the request to participate, the names and relevant professional qualifications of the persons responsible for the performance of the contract in question.

Section 61 — Groups participating in the tendering procedure and reliance on the capacities of other entities

Groups of suppliers may submit tenders or put themselves forward as candidates. In order to submit a tender or a request to participate, these groups of candidates or tenderers may not be required by the contracting authorities to assume a specific legal form. However, the group may be required to do so during the term of the contract, to the extent that this change is necessary for the satisfactory performance of the contract.

A candidate or tenderer may rely on the capacities of other entities, regardless of the legal nature of the links which it has with them. A group may rely on the abilities of participants in the group or in other entities in order to perform the contract. The candidate or tenderer or a group thereof shall furnish the contracting authority with proof that the requirements relating to economic and financial standing, technical capacity and professional ability and other requirements are satisfied. This proof may include contracts between companies or other binding documents demonstrating that the capacities satisfy the requirements and are accessible by the candidates or tenderers or the group.

Section 62 — Selecting the tender

The awarded contract shall be either the economically most advantageous tender from the point of view of the contracting authority in accordance with the comparison criteria linked to the object of the contract, or the lowest price. When the award is made to the economically most advantageous tender, the criteria may include, for example, quality, price, technical merit, aesthetic and functional characteristics, environmental characteristics, running costs, cost effectiveness, after-sales service and technical assistance, delivery date and delivery period or period of completion or life cycle costs.

In addition to the provisions laid down in subsection 1, while assessing the economically most advantageous tender, the contracting authority may take account of economic and qualitative criteria to meet the needs of the public concerned, and environmental requirements, provided that these criteria are measurable and linked to the object of the contract. Under the same conditions, the contracting authority may use criteria aiming to meet the needs of particularly disadvantaged groups of people using the object of the contract, provided that these factors are defined in the technical specifications.

The contracting authority shall specify in the contract notice or in the documents relating to the invitation to tender the comparison criteria and the relative weighting which it gives to each of the criteria chosen to determine the economically most advantageous tender. In the competitive dialogue, the equivalent information shall be specified in the contract notice or the project description. The weighting may also be specified by a reasonable range. If the relative weighting of the comparison criteria is justifiably not possible, the comparison criteria shall be specified in the order of importance.

Section 63 — Abnormally low tenders

Contracting authorities may reject tenders that are abnormally low in relation to the quality and scope of the contract. Before it may reject the tender, the contracting authority shall request in writing details of the constituent elements of the tender.

The request referred to in subsection 1 may relate in particular to the economic and technical solutions chosen for the manufacture of the goods, supply of the service or execution of the work, exceptionally favorable conditions for the execution of the contract, the

originality of the proposed solution, employment protection at the place where the contract is executed and compliance with the provisions relating to working conditions or the possibility of the tenderer obtaining state aid. The contracting authority shall verify the constituent elements of the tender, taking account of the evidence supplied.

The contracting authority may reject a tender which is abnormally low because the tenderer has obtained state aid illegally. The tender can be rejected only after a sufficient time limit has been fixed for the tenderer to prove that the state aid in question was granted legally.

Section 64 — Taking account of a subsidy awarded by the contracting authority in the comparison of tenders

Where the tenderer is an entity belonging to the contracting authority's organization or if the contracting authority has granted or will grant the tenderer a financial subsidy which will affect the price of the tender, in the comparison of the tenders the contracting authority shall take into account the factors which shall genuinely affect the price of the tender paid by the contracting authority, such as the financial subsidy in question.

Appendix B – Interview guidelines

1. What are the main strengths/opportunities and weaknesses/threats for Project Alliance Model/Agreement?
2. What features of Project Alliance Model/Agreement explain the listed strengths and weaknesses?
3. Does collaboration as defined in the Agreement and the incentive system by themselves support the implementation of a collaborative spirit and practices in the project?
4. Identify and assess cultural features and collaborative methods and approaches used, and their impact (enabler, hindrance) to actual collaboration, such as:
 - Joint-objectives, joint-decision making, joint-project office, joint specification, joint IT-database, joint risk management approach;
 - Workshops, teamwork and team building activities, follow-up workshops, discussion and dispute resolution;
 - Data sharing and timely information available, problem solving and focus on potential problem areas, face-to-face discussion;
 - Learn from each other and innovation, empowerment of participants in terms of perspectives on service outcomes;
 - Positive and open culture, communication and common language.
5. What is the importance of collaboration as an informal and individual-level activity and its role for successful implementing collaborative features?
6.
 - 6.1. Continuous improvement, estimated performance in general, its means and performance level in areas such as:
 - Cost;
 - Time;
 - Quality;
 - Design;
 - Procurement;
 - Innovation and continuous improvement;
 - Improved morale;
 - Job satisfaction.
 - 6.2. Why such performance?
7. Does performance measurement made by project participants enhance collaboration?
8. Assess reasons for performance results on survey and measures taken and expectations for continuous improvement in further stages.
9. Additional information that was not previously asked.

Appendix C – Reasoning for tenderers' rating

Rating	Reasoning
5	Reference projects are abundant and their content includes wide, large-scale and demanding projects. The reported references are related with the project, and they include housing renovation sites and works with protected buildings, and proved being able to implement a collaborative working form.
4	Described references for projects in similar conditions, but the contents of the references were not found extensively correlated to Vuolukiventie project as it would be desirable to get a higher rate. References' scope, diversity, protected buildings, innovation or cooperation are not as well described as a higher rating would require.
3	Project content is not available and the references reported show no clear correlation or requirements to the project. The given references are not sufficiently described in terms of the various forms of contract models, project variables, working with protected buildings or project schedule. Only a few references.
2	Poorly reported references and poor connection with the project or content is not properly explained.
1	References have do not meet the project.
0	References and details have not been declared.

Appendix D – Alliance agreement contents

1. Objectives, principles and commitment	9. Costs and payments to service providers	17. Confidentiality
2. Acceptance of general plan and transition to implementation phase	10. Changes in the scope and setting goals	18. Dispute resolution
3. Administration and management	11. Insurance	19. Damages/compensation
4. Management team	12. Intangible assets	20. Termination notices
5. Project resources	13. Suspension of duties	21. Other terms and conditions
6. Execution of the tasks of development phase	14. Termination by the client	22. Public agreement and annexes
7. Execution of tasks	15. Termination by the service provider	23. Other laws, decrees and guidelines taken into account
8. Project's implementation phase	16. Obligations and liabilities by application of law	24. Approval of the agreement

Appendix E – Survey results

Alliance participants' survey results

	Rounds			
	1	2	3	4
1. Schedule				
1.1. Design plans were made and available on schedule	3,1	4,0	3,8	4,2
1.2. Construction plans were made and available on schedule	3,1	4,0	3,9	4,2
1.3. Electrical plans were made and available on schedule	3,1	4,5	4,4	4,6
1.4. HVAC plans were made and available on schedule	3,1	3,8	4,0	3,9
1.5. Tasks were controlled according to schedule	2,9	4,3	4,1	3,6
1.6. Schedule's design contributed	3,5	3,9	3,7	3,4
1.7. Waiting time has been low	3,2	4,2	4,2	3,9
1.8. Schedule was designed to optimally take into account all parties' views	2,8	3,6	3,8	3,2
1. Average	3,1	4,0	4,0	3,9
2. Site organization				
2.1. Site was clean and working conditions fit	4,4	4,5	4,2	4,3
2.2. Safety has been assured	4,5	4,7	4,5	4,5
2.3. Work areas have been controlled by assigned entities	3,8	4,2	4,2	4,2
2.4. Site has not expanded out of the construction site area	3,4	3,8	3,9	3,6
2.5. The renovation work has not caused unreasonable inconvenience to residents	3,6	4,2	4,2	4,5
2. Average	3,9	4,3	4,2	4,2
3. Collaboration and interaction				
3.1. Control has been timely and constructive	3,8	4,5	4,3	4,3
3.2. Collaboration with designers has been flexible	4,0	4,4	4,4	4,4
3.3. Collaboration with main contractor has been flexible	3,9	4,5	4,4	4,4
3.4. Collaboration with the client has been flexible	4,1	4,4	4,5	4,7
3.5. Collaboration between different contractors has been flexible	3,7	4,4	4,2	3,9
3.6. Information has been well handled	4,2	4,4	4,3	4,4
3. Average	3,9	4,4	4,3	4,4
4. Design				
4.1. Plans well served the design's implementation	3,8	4,3	4,1	3,9
4.2. Design well served the customer and end-user needs	3,8	4,4	4,3	4,3
4.3. Project's account information available on time	3,3	4,1	3,5	3,9
4. Average	3,6	4,2	4,0	4,0
5. Procurement and contracting				
5.1. Contract models have been encouraging	3,6	4,3	4,1	3,8
5.2. Contract model has led to innovation	3,2	4,1	4,0	3,9
5.3. Alliance model has brought positive changes further in the project	3,3	4,1	4,2	4,2
5. Average	3,4	4,1	4,1	4,0
6. Quality				
6.1. Works' performance has been of high quality	3,9	4,3	4,4	4,2
6. Average	3,9	4,3	4,4	4,2
Round average	3,6	4,2	4,1	4,1

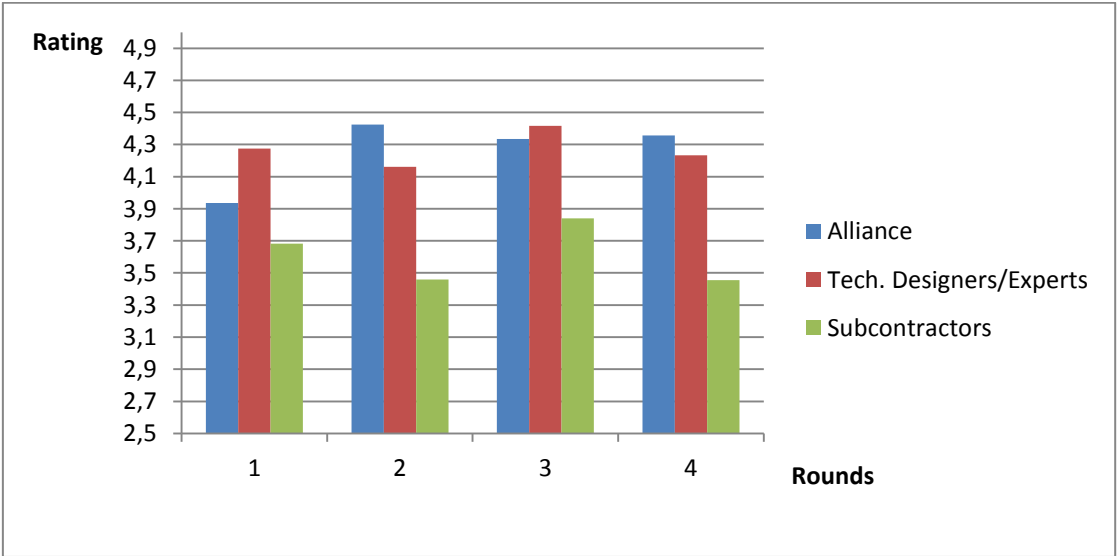
Technical Designers/Experts' survey results

	Rounds			
	1	2	3	4
1. Schedule				
1.1. Design plans were made and available on schedule	4,4	3,4	4,0	4,6
1.2. Construction plans were made and available on schedule	4,4	4,0	4,0	4,3
1.3. Electrical plans were made and available on schedule	4,4	4,6	4,3	4,5
1.4. HVAC plans were made and available on schedule	4,4	4,2	4,0	4,0
1.5. Tasks were controlled according to schedule	4,2	3,6	4,3	4,3
1.6. Schedule's design contributed	3,8	3,2	3,3	3,6
1.7. Waiting time has been low	4,2	3,4	3,7	4,0
1.8. Schedule was designed to optimally take into account all parties' views	4,2	3,4	4,0	3,8
1. Average	4,3	3,7	3,9	4,1
2. Site organization				
2.1. Site was clean and working conditions fit	4,0	4,0	4,7	4,2
2.2. Safety has been assured	4,6	4,8	4,8	4,4
2.3. Work areas have been controlled by assigned entities	4,3	4,4	4,5	4,0
2.4. Site has not expanded out of the construction site area	4,0	3,3	4,0	3,3
2.5. The renovation work has not caused unreasonable inconvenience to residents	3,5	3,7	3,0	3,3
2. Average	4,1	4,0	4,2	3,9
3. Collaboration and interaction				
3.1. Control has been timely and constructive	4,4	4,0	4,5	4,2
3.2. Collaboration with designers has been flexible	4,4	4,2	4,5	4,4
3.3. Collaboration with main contractor has been flexible	4,2	4,2	4,5	4,4
3.4. Collaboration with the client has been flexible	4,4	4,4	4,5	4,4
3.5. Collaboration between different contractors has been flexible	4,0	3,7	4,0	4,0
3.6. Information has been well handled	4,3	4,5	4,5	4,0
3. Average	4,3	4,2	4,4	4,2
4. Design				
4.1. Plans well served the design's implementation	4,4	4,4	4,3	4,3
4.2. Design well served the customer and end-user needs	4,4	4,8	4,3	4,3
4.3. Project's account information available on time	4,6	4,0	3,5	4,0
4. Average	4,5	4,4	4,1	4,2
5. Procurement and contracting				
5.1. Contract models have been encouraging	4,3	4,0	4,5	4,3
5.2. Contract model has led to innovation	4,0	3,5	4,3	4,0
5.3. Alliance model has brought positive changes further in the project	4,3	4,0	4,3	4,4
5. Average	4,2	3,8	4,3	4,2
6. Quality				
6.1. Works' performance has been of high quality	4,0	4,2	4,3	4,2
6. Average	4,0	4,2	4,3	4,2
Round average	4,2	4,0	4,2	4,1

Subcontractors' survey results

	Rounds			
	1	2	3	4
1. Schedule				
1.1. Design plans were made and available on schedule	3,1	3,8	4,1	3,7
1.2. Construction plans were made and available on schedule	3,1	3,5	4,4	3,7
1.3. Electrical plans were made and available on schedule	3,1	3,3	4,0	2,7
1.4. HVAC plans were made and available on schedule	3,1	3,0	2,7	2,5
1.5. Tasks were controlled according to schedule	2,7	2,6	3,3	2,0
1.6. Schedule's design contributed	2,6	2,3	2,7	1,8
1.7. Waiting time has been low	2,6	2,8	3,1	2,0
1.8. Schedule was designed to optimally take into account all parties' views	2,3	2,6	2,8	1,8
1. Average	2,8	3,0	3,4	2,5
2. Site organization				
2.1. Site was clean and working conditions fit	4,2	3,4	3,9	3,4
2.2. Safety has been assured	4,6	4,1	4,4	4,2
2.3. Work areas have been controlled by assigned entities	3,6	3,4	3,3	3,2
2.4. Site has not expanded out of the construction site area	4,3	3,6	4,0	3,3
2.5. The renovation work has not caused unreasonable inconvenience to residents	4,3	4,3	4,3	4,0
2. Average	4,2	3,8	4,0	3,6
3. Collaboration and interaction				
3.1. Control has been timely and constructive	3,5	3,3	3,6	3,2
3.2. Collaboration with designers has been flexible	3,6	4,0	3,5	3,3
3.3. Collaboration with main contractor has been flexible	4,0	2,7	3,8	3,4
3.4. Collaboration with the client has been flexible	4,1	3,8	4,2	4,0
3.5. Collaboration between different contractors has been flexible	3,7	3,8	4,1	3,8
3.6. Information has been well handled	3,1	3,2	3,9	3,0
3. Average	3,7	3,5	3,8	3,5
4. Design				
4.1. Plans well served the design's implementation	3,8	3,6	3,7	2,3
4.2. Design well served the customer and end-user needs	4,4	3,4	3,8	4,0
4.3. Project's account information available on time	4,0	3,3	3,8	4,0
4. Average	4,1	3,4	3,7	3,4
5. Procurement and contracting				
5.1. Contract models have been encouraging	3,0	2,8	4,0	3,3
5.2. Contract model has led to innovation	2,3	2,7	3,3	3,5
5.3. Alliance model has brought positive changes further in the project	3,4	2,7	2,6	2,7
5. Average	2,9	2,7	3,3	3,1
6. Quality				
6.1. Works' performance has been of high quality	4,3	3,7	4,1	4,2
6. Average	4,3	3,7	4,1	4,2
Round average	3,5	3,3	3,7	3,2

Collaboration and interaction by group of survey respondents



Appendix F – Survey’s free comments field

1st Stage

1.1) It was a good agreement model for this kind of project. Objectives and costs were obtained in the same basket with all interested parties.

1.2) End user needs were not taken into account until the end, sometimes it felt that the course goes along with designers’ plans and if something revealed too difficult or challenging then it was left out.

1.3) Records from scheduled meetings were not available to some subcontractors. Model to review decisions did not always go further and alternate decisions took a long time. The schedule was prepared with an excessive hurry, and not very reasonably. Now we are trying to get the next stage done in 2 months even knowing that the first stage took 4 months. Probably the construction time should be somewhere in between.

1.4) Construction personnel from main contractor, were not always cooperative, seeking obstinately cost savings and ignoring quality. The operational model is not in accordance with the Alliance spirit.

2nd Stage

2.1) Moderma Ltd is a temporary employer, providing construction workers under SRV command.

2.2) Cost pressures have tightened the schedule, which was not always in favour of meeting KRAs.

2.3) Recreational activities at the site were important, since it strengthened all Alliance parties involvement. At last the Alliance spirit brightens up.

2.4) It was observed that the construction site had their own agenda, resulting in a poor understanding of residents’ needs.

2.5) The entire site is a true mess. There is a terrible loss of purpose and excessive urgency to produce things all the time. That results in reduced quality. It feels master workers have room to improve on their professional skills.

3rd Stage

3.1) It was not possible to do more than only a few things at time in the new building. That resulted in going to the building many times to perform small tasks as there were different works going on, and that resulted in a significantly late completion.

3.2) Unfortunately, the people who are most involved in the site, were not here in the office filling the surveys.

3.3) Speed of decision-making could be improved. The facilities management and maintenance company should be timely familiar with the local conditions. (group of tenants and cultural differences)

4th Stage



4.1) Doing great, keep it going!

4.2) C block of apartments had its schedule tightened and the work took place in the summer holiday months, which is in the light of the excellent work's performance.

4.3) Not enough time was left for own work inspections. External inspections were forced to happen in incomplete locations. In the new apartments, many contractors are trying to get work done at the same time, but out of their working schedule. Other contractors don't care about installations of others, closing some places and then wondering. The schedule was poorly developed since it predicted too much work during summer holiday months. Some installations and tasks could not be performed, having an intermittent pace, since some places are not in proper conditions. The roof was full of stuff the entire work period.

Appendix G – Survey’s Pearson correlation matrix

	q1_1	q1_2	q1_3	q1_4	q1_5	q1_6	q1_7	q1_8	q2_1	q2_2	q2_3	q2_4	q2_5	q3_1	q3_2	q3_3	q3_4	q3_5	q3_6	q4_1	q4_2	q4_3	q5_1	q5_2	q5_3	q6_1
q1_1	1	,681	,494	,405	,285	,439	,408	,317	,063	,157	,012	-,045	-,067	,113	,145	,329	,328	-,078	,020	,405	,095	,174	,294	,294	,316	,213
q1_2	,681	1	,605	,461	,394	,434	,309	,207	,195	,129	,051	-,016	,121	,055	,198	,299	,332	,079	,157	,350	,249	,172	,340	,333	,360	,271
q1_3	,494	,605	1	,804	,373	,389	,233	,263	,136	,044	,070	,130	,218	,229	,407	,248	,229	-,158	,235	,364	,469	,352	,300	,408	,378	,228
q1_4	,405	,461	,804	1	,305	,330	,200	,246	,088	,140	,024	,016	,035	,277	,430	,332	,221	-,241	,173	,404	,474	,368	,203	,416	,409	,194
q1_5	,285	,394	,373	,305	1	,440	,360	,351	,366	,177	,159	,214	,112	,437	,367	,407	,312	,017	,215	,308	,195	,229	,375	,401	,437	,348
q1_6	,439	,434	,389	,330	,440	1	,476	,615	,277	,258	,144	,237	,231	,224	,370	,415	,457	,048	,147	,399	,206	,302	,349	,389	,420	,420
q1_7	,408	,309	,233	,200	,360	,476	1	,620	,322	,275	,303	,319	,178	,280	,112	,311	,291	,291	,210	,447	,118	,276	,411	,251	,201	,380
q1_8	,317	,207	,263	,246	,351	,615	,620	1	,110	,154	,175	,317	,168	,210	,149	,306	,261	,114	,191	,476	,307	,380	,482	,408	,344	,271
q2_1	,063	,195	,136	,088	,366	,277	,322	,110	1	,409	,380	,385	,122	,321	,161	,422	,356	,350	,306	,042	-,064	,087	,269	,124	,077	,489
q2_2	,157	,129	,044	,140	,177	,258	,275	,154	,409	1	,223	,033	-,080	,288	,169	,510	,243	,096	,069	,050	-,073	-,025	,007	,023	,019	,438
q2_3	,012	,051	,070	,024	,159	,144	,303	,175	,380	,223	1	,512	,259	,219	,071	,237	,322	,366	,196	,185	-,066	,143	,195	,144	,029	,278
q2_4	-,045	-,016	,130	,016	,214	,237	,319	,317	,385	,033	,512	1	,565	,232	,318	,060	,236	,387	,348	,151	,156	,234	,333	,251	,065	,289
q2_5	-,067	,121	,218	,035	,112	,231	,178	,168	,122	-,080	,259	,565	1	,248	,476	-,074	,183	,270	,435	,226	,423	,393	,303	,352	,267	,154
q3_1	,113	,055	,229	,277	,437	,224	,280	,210	,321	,288	,219	,232	,248	1	,562	,412	,292	,023	,409	,125	,210	,351	,147	,410	,495	,373
q3_2	,145	,198	,407	,430	,367	,370	,112	,149	,161	,169	,071	,318	,476	,562	1	,172	,485	-,135	,321	,267	,571	,599	,278	,593	,616	,345
q3_3	,329	,299	,248	,332	,407	,415	,311	,306	,422	,510	,237	,060	-,074	,412	,172	1	,379	,056	,236	,165	-,010	,128	,288	,240	,318	,521
q3_4	,328	,332	,229	,221	,312	,457	,291	,261	,356	,243	,322	,236	,183	,292	,485	,379	1	,170	,155	,286	,222	,355	,253	,334	,481	,543
q3_5	-,078	,079	-,158	-,241	,017	,048	,291	,114	,350	,096	,366	,387	,270	,023	-,135	,056	,170	1	,259	,122	-,144	-,091	,122	-,078	-,135	,305
q3_6	,020	,157	,235	,173	,215	,147	,210	,191	,306	,069	,196	,348	,435	,409	,321	,236	,155	,259	1	,038	,216	,334	,211	,327	,336	,243
q4_1	,405	,350	,364	,404	,308	,399	,447	,476	,042	,050	,185	,151	,226	,125	,267	,165	,286	,122	,038	1	,478	,404	,369	,328	,323	,259
q4_2	,095	,249	,469	,474	,195	,206	,118	,307	-,064	-,073	-,066	,156	,423	,210	,571	-,010	,222	-,144	,216	,478	1	,531	,333	,413	,386	,053
q4_3	,174	,172	,352	,368	,229	,302	,276	,380	,087	-,025	,143	,234	,393	,351	,599	,128	,355	-,091	,334	,404	,531	1	,392	,601	,484	,194
q5_1	,294	,340	,300	,203	,375	,349	,411	,482	,269	,007	,195	,333	,303	,147	,278	,288	,253	,122	,211	,369	,333	,392	1	,666	,481	,279
q5_2	,294	,333	,408	,416	,401	,389	,251	,408	,124	,023	,144	,251	,352	,410	,593	,240	,334	-,078	,327	,328	,413	,601	,666	1	,799	,334
q5_3	,316	,360	,378	,409	,437	,420	,201	,344	,077	,019	,029	,065	,267	,495	,616	,318	,481	-,135	,336	,323	,386	,484	,481	,799	1	,310
q6_1	,213	,271	,228	,194	,348	,420	,380	,271	,489	,438	,278	,289	,154	,373	,345	,521	,543	,305	,243	,259	,053	,194	,279	,334	,310	1

 Moderate/Strong correlation
 Moderate/Strong correlation (Under same Area)