

Partnering Contracts – A Solution to the Nash Equilibrium?

In a contract law and game theory perspective

By

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Abstract

This paper discusses partnering contracts in Denmark and Great Britain, analyses the legal content and applies game theory and the prisoner's dilemma game on some of the legal clauses and objectives. The paper defines partnering contracts as alternative social contracts relevant when forming a strategic alliance or another long-term relationship with a certain degree of specificity and frequency. It is not the aim of partnering contracts to replace the traditional contracts. The paper focuses on partnering in the construction industry and compares the clauses in both Danish and British partnering contracts. Based on the analysis, the paper sets up a scientific definition regarding the aim of partnering contracts and shows that economic theory can explain the legal clauses in the partnering contract, and the partnering contract can solve inefficiency in the Nash Equilibrium in the prisoner's dilemma game. The partnering contract makes it possible to obtain the benefit from joint utility and the paper proposes some legal improvements in this regard.

Key words: Partnering, game theory, contract law, joint utility, Nash equilibrium, comparative analysis, Danish partnering contract, British partnering contract

1. Introduction

This paper concerns contracts in Denmark and Great Britain, and supplements the legal analysis by applying game theory on the legal clauses and objectives in the partnering contract. This paper discusses and analyses the purpose of a partnering contract, the specific characteristics in a partnering contract and also makes some economic explanations concerning the relations among the clauses in partnering contract. Joint utility versus self-optimisation and game theory are used to explain the output of negotiations and explain how to behave in order to obtain joint utility in a contractual relationship as partnering in the construction industry. Right below in section 1; two definitions regarding the partnering contract will be introduced. In subsection 2 follows further definitions and content in the partnering contract together with a discussion regarding the objectives in the partnering contract in a comparative perspective including Denmark and Great Britain. In section 3 the economic perspective and supplement will be applied and in section 4 some closing remarks are to be found.

The first important definition of a partnering contract is that it is an alternative to a traditional contract. The partnering contract is not here to replace the traditional contract. Partnering contracts are useful and even an economic improvement if the economic transaction concerns for example a strategic alliance or another type of transaction with a close relationship among the parties. Strategic alliances can be explained as a hybrid in a Williamson universe, but it is the purpose of this article to define the strategic alliance. If the transaction and the specificity and frequency call for a hybrid, a partnering contract could be a relevant legal tool, if the parties are interested in prioritising positive elements and relational norms to improve the long-term transaction. Furthermore, the British Partnering agreed document, the PCC 2000 discussed below, includes strategic alliance as a legal word and the behaviour of parties in a strategic alliance in some of the clauses.¹

The second important definition of the partnering contract to be introduced in the beginning is that the contract aims at structure and guides the parties from being separate parties to be partners as is one purpose of a strategic alliance.²

Thus, the partnering contract sets up a binding legal framework aiming to optimise the transaction among the parties as a whole instead of two parties aiming to optimise their own utility.

The paper draws empirical data from contracts used in the Danish and British construction industry.³ One reason that partnering was established as a concept in the

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¹ PPC2000, amended 2008, ACA standard Form of Contract for Project Partnering, Construction Excellence in the build environment, Construction Industry Council, ACA and Towers & Hamblins LLP, 2008, by Dr. David Mosey, in section 24.1 and 24.2.

² Matton van den Berg and Peter Kamminga, Optimising contracting for alliances in infrastructure projects, *The International Construction Law Review*, 2006, 59-77.

construction industry was due to the extremely high amount of conflicting cost - in Denmark more than 100 million DKK per year.

The conflict culture in the construction industry in Denmark takes up many resources and in Denmark an increase in the number of cases at the Arbitration on Construction (Voldgiftsnævnet for Bygge- og Anlægsvirksomhed) on approx. 50 % from 2002 to 2007 has been seen.

Data shows that approx. 11 per cent of the cases in 2007 used a partnering contract and under half a per cent of the cases in the Arbitration on Construction involved partnering contracts.⁴

One reason to negotiate a partnering contract is to reduce the cost of conflicting; another reason is to optimise the common output. This paper will focus on the latter and keep the first reason in mind - and begin the analysis below by defining the purpose of the partnering contract.

2. The purpose of the partnering contract

The partnering concept comes from the US and Great Britain and came to Denmark in the late 1990's.⁵ In the beginning, the partnering contracts were pilot projects. In 2001 and later on in 2005 the Danish construction industry created a partnering paradigm to be used free of charges by the parties in the construction industry. This partnering paradigm and the British PCC 2000 Partnering Agreed Document⁶ are used as the legal data in this paper.⁷ The Danish as well as the British partnering contracts⁸ are based at binding clauses concerning joint utility,⁹

³ See further empirical data on the Danish construction industry at www.plus-net.dk.

⁴ Danish Construction Authority: Erhverv- og Byggestyrelsens rapport af 6. Maj 2008, Partnering og tvister i byggeriet I, www.Plus.net.dk.

⁵ Ole Hansen, Det entrepriseretlige hjemmelsproblem – modsætningsforhold eller fællesskab, Kbh., 2008, p. 263.

⁶ PPC2000, amended 2008, ACA standard Form of Contract for Project Partnering, Construction Excellence in the build environment, Construction Industry Council, ACA and Towers & Hamblins LLP, 2008, by Dr. David Mosey.

⁷ Danish BYG Partnering Paradigm 2005 – The Danish Construction Industry Association (Dansk Byggeri, Danish Architects Association (Danske Arkitektvirksomheder), Association of Danish Engineers and TEKNIQ (Danske ingeniører og TEKNIQ): BYG - Partnering i praksis, Vejledning i partnering, 2. Udgave, oktober 2005.

⁸ James Barlow, Michael Cohen, Ashok Jaspapara and Yvonne Simpson, Towards Positive partnering, revealing the realities in the construction industry.

⁹ Section 6.2 in BYG partnering paradigm, 2005 og the Danish construction Authority: Erhverv- og Byggestyrelsens Vejledning i partnering, januar 2006, p. 9, and Byggeriets evalueringscenter, State of the Art Report, June 2003 and The Danish Construction Authority: Erhvervs- og Boligstyrelsen, Arbejdsrapport om brug af workshops ved partnering, Projekt nye samarbejdsformer, October 2002, p. 5.

open books,¹⁰ collaboration, trust, openness¹¹ and establishment of joint management teams and alternative conflict procedures.¹²

Furthermore, the partnering contract focuses on the function of for example the building instead of the demands from the building owner. This requires that the building owner describes the needs instead of the usual practice in a traditional construction contract setting up a long list of demands by detailing descriptions of the specific content of the building before inviting the constructor to the table.¹³

Firstly, just by inviting all parties, including the constructor at the table from the beginning of the partnering contract negotiations, a completely different contract and collaboration will arise.

Secondly, the partnering contract should be the framework contract setting up the procedure to continue to negotiate the transaction going along with the design, construction and delivery of the building.

2.1. The British perspective

In 1998 Sir John Egan finished his report "Rethinking construction"¹⁴ and proposed partnering as a new model to enter into construction relationships suggesting that the contract might not be legally binding (to work). Sir John Egan proposed that:

'Effective partnering does not rest on contracts. Contractors can add significantly to the cost of a project and often add no value for the client. If the relationship between a constructor and employer is soundly based and the parties recognize their mutual interdependence, then formal contract document should gradually become obsolete.'

This idea has now been abandoned. When establishing one of the first partnering Agreed Documents in Great Britain (the PCC 2000), the partnering contract has been legally binding among the parties signing the contract and today most of the partnering concepts in Great Britain are legally binding.¹⁵ The partnering tradition in Denmark also stands on the idea that the contract is legally binding. In both

¹⁰ Section 6.1 in the Danish BYG partnering paradigm, 2005. "Punkt 6.1: Det er projektledelsens målsætning: at gennemføre projektet inden for budgetrammen med en forbedret økonomi set i relation til kendte kontraktformer - at sikre kvalitet for pengene - at sikre projektets parter en sund forretning - at sikre, at projektets totaløkonomi tilgodeses (anlægs-, drifts- og vedligeholdelsesomkostninger).

¹¹ Section 2.1 in the Danish BYG partnering paradigm, 2005. "Punkt 2.1: Partneringprocessen gennemføres i et tæt samarbejde baseret på engagement, åbenhed, ærlighed og gensidig respekt."

¹² Section 11 in the Danish BYG partnering paradigm, 2005.

¹³ Section 2.2 in the Danish BYG partnering paradigm, 2005, "Parterne har sat sig som mål, at opføre et byggeri, der opfylder bygherrens behov. (Kommafejl(-komma før infinitiv): Er citatet korrekt afskrevet?"

¹⁴ Sir John Egan, Rethinking Construction, Department of the Environment, Transport and the Regions, 16th of July 1998.

¹⁵ Jan Middleton, Construction Law, (2000) 11, 7, p. 6, 1. August 2000 and James Barlow et al. Towards positive partnering, 1997, The policy Press, University of Bristol, p. 4.

Denmark and Great Britain, the partnering concept is, today, an acknowledged concept.¹⁶

2.2. The British PCC 2000 partnering paradigm compared to the Danish BYG paradigm

As mentioned above, ACA - the British Association of Consultant Architects)¹⁷ developed a Standard Form of Contract for Project Partnering¹⁸ as a multiple party agreement called PCC 2000 (amended 2008 Project Partnering Contract-2000) regarding large projects¹⁹ The Danish BYG-partnering standard form is similar to the PCC 2000.²⁰ One significant difference is that (the) PCC 2000 is a complete contractual form compared to the BYG partnering contract, which is linked to the traditional construction agreed documents in Denmark.

The Danish BYG partnering agreement 2005 has 12 clauses and is referring to the construction law in general to fulfil the contract relationship; excluding some clauses which are not compatible with the partnering concept. The PCC 2000 is more than 65 pages long. These include more than 10 pages of individual clause, 34 pages on standard clauses and 5 pages with legal definitions and an appendix list.

It is not allowed to quote from the PCC 2000 contract (which is) why specific quotas are not possible in this paper. Permission to explain and compare with the Danish partnering regime has been granted personally from the publisher to the author of this paper.

The PPC2000 partnering contract was the first British agreed Document to involve more than two parties. The legally binding²¹partnering contract includes all parts of the construction from design to delivery.²² Through the PPC2000 contract, the parties commit themselves to collaborate, to show mutual trust in one another, to be fair and to work with the common purpose of the project in sight,²³ thus the parties cannot work just to optimise their own utility. Furthermore, the parties are obliged to ensure transparency and share all relevant project information,²⁴ such as open books and calculations,²⁵ to create and fulfil common

¹⁶ Michael Conroy Harris, *Construction Law*, (2006) 17, 8, no. 4, 1st of October 2006.

¹⁷ ACA has allowed the author of this paper to analyse and refer to the PPC2000- Project Partnering Contract.

¹⁸ PPC2000, amended 2008, ACA standard Form of Contract for Project Partnering, Construction Excellence in the built environment, Construction Industry Council, ACA and Trowers & Hamlins LLP, 2008, by Dr. David Mosey.

¹⁹ Richard Dartnell, *Construction Law* (2007) 18, 3, p. 23, 1st of April 2007. PPC2000 was in 2006 used on works at more than 8 Billion Pound in Great Britain.

²⁰ David Mosey, *Construction Law* (2007) 18, 2, 1st of Marts 2007, p. 6.

²¹ PPC2000, amended 2008, § 2.3.

²² In 2005 ACA developed another partnering contract called TPC2005 including a public party. David Mosey, *Construction Law* (2009) 20, 3, p. 23, 1st of April 2009.

²³ PPC2000, amended 2008, § 1.3.

²⁴ PPC2000, amended 2008, § 3.1.

²⁵ PPC2000, amended 2008, § 10.1(i).

goals²⁶ and needs.²⁷ All characteristics comparable to the Danish BYG partnering paradigm (which holds the same clauses and is a multiple party contract).

The purpose of the British partnering contract is to obtain a joint economic benefit through a common goal, defined as follows:

*"The first approach essentially sees partnering as a tool for improving the performance of the construction process and emphasises the way it helps to create synergy and maximize the effectiveness of each participant's resources... Secondly, partnering has been seen as a management process... to improve the efficiency of large construction projects...as a variant of total quality management... the formation of a project team with a common set of goals. Finally, others have focused on the contractual and relationship implications of partnering, seeing it as a way of "putting the handshake back into doing business"..."*²⁸

2.3. An American partnering objective

The American purpose of the partnering concept is similar to the British concept and focus on the common objectives regarding the maximisation of the effectiveness of the resources and the common goals:

*"... Partnering is a long-term commitment between two or more organizations for the purpose of achieving specific business objectives by maximising the effectiveness of each participant's resources. This requires changing traditional relationships to a shared culture without regard to organizational boundaries. The relationship is based upon trust, dedication to common goals, and an understanding of each other's individual expectations and values."*²⁹

Most relevant in this regard, the parties must ensure a change in behaviour compared to traditional contracts and dedicate them selves to the common goal as defined later on as joint utility.

2.4. Danish definitions regarding partnering

There are several definitions in Denmark to be found on partnering. The most important is in the BYG partnering paradigm BYG's³⁰ called: *Partnering i praksis 2005*. This paradigm is a legally binding³¹ multiple party agreement based on common goals, open books and an on-going negotiation to solve the needs and functions (as well as) trust and collaboration.

"Aftalens parter forpligter sig til at handle i overensstemmelse med intentionerne i nærværende aftale. Det er således en afgørende forudsætning for aftalen og for realisering af den målsætning og de intentioner, der udspringer af den aftalte

²⁶ PPC2000, amended 2008, § 4.1(i).

²⁷ PPC2000, amended 2008, § 10.1(ii).

²⁸ Barlow, Cohen, Jashapara and Simpson, Towards positive partnering, Revealing the realities in the construction industry, the Policy Press, University of Bristol, 2002, p. 6.

²⁹ US-Construction Industry Institute's Partnering Task Force, Construction Industry Institute, 1991, In search of partnering excellence, Austin, Texas, CII, University of Texas, p. 2.

³⁰ Danish BYG partnering paradigm, 2005.

³¹ Section 4, in BYG partnering paradigm, 2005, *"Aftalens parter forpligter sig til at handle i overensstemmelse med intentionerne i nærværende aftale.*

samarbejdsform, at parternes samarbejde bygger på tillid, fuld åbenhed og professionalisme.”³²

”Der er fuld åbenhed om økonomien, og alle parter er medansvarlige for at sikre, at økonomien holdes indenfor budgetrammen og er forpligtet til at medvirke til at optimere økonomien med henblik på at opnå en øget indtjening/besparelse for alle parter.”³³

The Danish Construction Authority defines partnering as:

”Begrebet ”partnering” anvendes om en samarbejdsform i et bygge- og anlægsprojekt, der er baseret på dialog, tillid og åbenhed og med tidlig inddragelse af alle parter. Projektet gennemføres under en fælles målsætning formuleret ved fælles aktiviteter og baseret på fælles økonomiske interesser”³⁴

”..., parternes adfærd søges ændret fra at være kontraktorienteret (fokuserer på suboptimering og egne rettigheder) til at være relationsbaseret (fokuserer på helhedsoptimering og samarbejde)...”³⁵

The Authority is focusing on the transformation from a self-centred, “contract based” attitude to relation-based, joint optimisation and collaboration.

2.5. The scientific definition of partnering in this paper

Based upon the above described definitions the partnering in renewal can be defined as the following:

”Partnering is a contract type in which all involved parties, from the beginning to the end of the project, obliges themselves to collaborate on solving the needs and functions of the project described by the owner, with a joint utility perspective and by agreeing on common goals. All parties must increase the utility of the transaction, not their own, and allocate the benefits from joint optimisation in an economic and fair share by awarding when fulfilling the positive incentives, acknowledging, that joint optimisation can only be obtained by full information, open books and calculations, trust, dialogue and use these objectives if a conflict arises”

The legal clauses to be drawn from this definition would be similar to the PCC 2000 partnering contract, which is mostly similar to the Danish BYG partnering contract.

3. The economics behind the partnering contract

Thus, the partnering contract is a legal setup to promote long term relational commitments among two or more parties, as for example a strategic alliances or a multiple party construction contract. In a partnering contract, the parties must shift

³² Section 4 in BYG partnering paradigm, 2005.

³³ Section 6.2 in BYG partnering paradigm, 2005.

³⁴ Danish Construction Authority, Erhverv- og Byggestyrelsens Vejledning i partnering, januar 2006 and Byggeriets evalueringscenter, State of the art Rapport, June 2003.

³⁵ Danish Construction Authority, Erhvervs- og Boligstyrelsen, Arbejdsrapport om brug af workshops ved partnering, Projekt nye samarbejdsformer, October 2002, p. 5.

from being parties to being partners, a significant tool to maximise the output from a long-term strategic alliance. Sharing information is also a relevant alliance tool together with the relational norms such as trust, collaboration and incentives, and also tools in strategic alliances used to create a competitive advantage.³⁶

The joint utility and common goals can be explained by several economic theories, for example the principal agent theory, the Coase Theorem and Game Theory. This paper will use a game theory perspective on the partnering concept regarding the joint utility.

Looking at the game theory argumentation in the Prisoners Dilemma game, joint utility will create the highest possible output, but the game will still end up in an inefficient Nash Equilibrium, due to the fact that the parties will end up self-optimising even though this will end in the worst possible economic output.

The most significant difference between a traditional contract and a partnering contract is the objective concerning joint utility. Both traditional contracts and traditional contract law are based on the idea of self-optimisation. Every party will optimise their own utility. The lawyers will optimise their clients utility and though that their own utility. The client will control the lawyer/negotiator's capability to obtain the highest pay-off regarding oneself and the law behind all types of contracts will support this perspective.

The negotiations of the contract must result in a joint goal benefitting all and removes the opposite interests among the parties. When optimising the project or the transaction, the parties can focus on a common interest instead of their own interest. For example, in a traditional building contract the building owner will demand the lowest price and the contractor will set the highest possible price. By establishing joint optimisation, it is possible to create both cheaper and better buildings in all parties' interest as long as they share the gains.

3.1. Joint optimisation in a game theory perspective

Economic theory consider contracts as Pareto Optimal: *"if the contract is impossible to modify (within the class of contracts) so as to raise the expected utility of both of the parties to it; such a contract will sometimes be referred to simple ad efficient or as mutually beneficial."*³⁷ This paper argues, that a partnering contract seeks to create a Pareto improvement and - after worth - to share the benefits among the parties. This paper does not consider the economic fair share among the parties but will simply recommend using the theory behind initial investments and the theory on law and economic theory.³⁸

³⁶ Matton van den Berg and Peter Kamminga, (2006). Optimising contracting for alliances in infrastructure projects. *The International Construction Law Review*, 2006, 59-77.

³⁷ Shavell, *Contracts*, The New Palgrave Dictionary of Economics and the Law, p. 436.

³⁸ Grossman & Hart, *Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration*, *Journal of Political Economy*, Vol. 94, 1986, p. 691-719.

In a traditional contract the supplier is obliged to deliver the asset in due time, place and condition otherwise he/she will be in breach of contract. The asset owner will deliver the right payment in the right time and place. Neither of the parties have an incentive to deliver a better solution than (that) agreed upon. Why obtain a higher risk without being paid to do so?

In a partnering contract the parties are obliged to improve the asset by working to fulfil the needs instead of specific demands. By collaborating they can create the solutions to the demand by using lower cost and resources. From a game theory perspective, the parties can obtain a higher output by joint utility, but will not. They will end up in an inefficient Nash equilibrium only possible to escape through the use of the legally binding partnering contract.

3.2. Brief explanation of the game theory

Game theory can explain how parties in conflict will react when negotiating, making decisions, cooperating or not cooperating and explain the typical strategy (which) the parties will consider. Thus, game theory is a traditional mathematic study of the decisions made by rational parties.

The game used in this paper is the prisoner's dilemma – a game explaining the dilemma between self-optimising and joint utility. The concept of “self-optimisation” serves to illustrate the parent's decisions and joint utility serves to illustrate the best child-situation. Also, the prisoner's dilemma game serves to illustrate that parties cannot optimise by themselves and that legal actions are mandatory, if the intention is to focus on the optimal outcomes in terms of the child's best interest.

The prisoner's dilemma game³⁹ illustrates the dilemma between choosing self-optimisation and joint utility. The two individuals choose not to cooperate even though they can both see the common interest in collaborating, thus the game illustrates the difference between individual and collective rationality. Decisions that are rational from the individual's perspective are inappropriate when seen with common eyes, even though an outsider can see the rational gains resulting from a common perspective.⁴⁰

Two people (“the prisoners”) have been arrested with stolen goods. The prosecutor only has sufficient evidence to get them prosecuted and convicted for possession of stolen goods if one or both of them confess to burglary. If the prosecutor only prosecutes the prisoners for possession of stolen property, it will lead to a lower penalty than conviction for burglaries.⁴¹

³⁹ Rapoport, Prisoners' Dilemma, The New Palgrave, Game Theory, [1998], Maxmillian, p. 100. See also Rapoport & Chammah, Prisoner's Dilemma, Ann Arbor, University of Michigan Press. MI.

⁴⁰ Rapoport & Chammah, Prisoner's Dilemma, Ann Arbor, University of Michigan Press. MI

⁴¹ Anatol Rapoport, Prisoner's Dilemma, The New Palgrave, Game Theory, p. 100.

The two prisoners are placed in isolation and cannot talk to each other. Each prisoner is visited by the prosecutor, and is offered the same deal. If one prisoner confesses and also gives evidence against the other prisoner; the first prisoner will go free, while the other prisoner will receive the maximum sentence of four years of imprisonment.

If both prisoners confess, they will each be sentenced to three years of imprisonment for burglary. If neither confesses, then each prisoner will be imprisoned for half a year for possession of stolen goods, because the break-in cannot be proved.

The dilemma and the economic pay-offs from the decision-making are shown in the matrix below.

	Keeps quiet = Cooperates	Confesses = Defects
Keeps quiet = Cooperates	- ½, - ½	-4, 0
Confesses = Defects	0, - 4	- 3, - 3

The matrix shows, that "confession" is the dominant strategy because "confession" is the optimal choice for each player regardless of what the other player does. Or stated in economic terms; the only possible Nash equilibrium is to always defect.

Prisoners 1 and 2 are in the same situation and have the same information. Thus, the game ends by both players spending three years in prison instead of only half a year.

The prisoner's dilemma game illustrates that two individuals will not cooperate even when it is obvious that it is in their best interests to do so.

Furthermore, the prisoner's dilemma game illustrates that defecting is always chosen in preference to cooperation.

Why? Because a rational, self-interested person evaluates their own options in consideration with the other party's possible choice, knowing that the rational self-interested counterparts do the same – in this scenario the only possible outcome therefore is not to cooperate, but to defect. The risk of being defected by the other person is too great.

The partnering contract can solve this economic inefficiency by making the parties acknowledge the concept and benefit of joint utility and by creating a legally binding framework making the parties choose the right strategy without being caught in the dilemma between joint and self-optimisation.

3.3. Real life parties and the Prisoner's Dilemma

A counterargument from a practical perspective could state that real individuals would not act like that; this won't happen in reality. But science has shown that it will happen in the real world. Humans in general will choose to self-optimize instead of seeking joint utility. Only if simultaneous games are played without the parties knowing when the last game will occur, the parties have the incentive to cooperate because they continuously have an opportunity to penalize the other for previous decisions.⁴² Thus, studies have shown that only when games are repeated for a long period; more joint optimising strategies can be observed.⁴³

3.4. Full information and open books

The obligation to have open books and calculations is a significant condition in order to reach the benefit from joint utility. If the parties do not share all relevant information with each other and cannot trust the other parties to reveal their information, self-optimisation will occur at once. Full information will increase the possibility to cheat and self-optimize.⁴⁴

Trust and collaboration as well as open books and joint utility are obligations to be delivered on the same conditions as delivering the building and payment. Open books and calculations increase the amount of information and by that; information regarding prices, cost, payment, salary, discounts, savings, earnings, etc.⁴⁵ The higher degree of information, the larger is the possibility to achieve joint utility. Information also decreases moral hazard and adverse selection and the risk of hold up. Information is a key element to increase the output of the transaction. The more the legally bound parties are revealing the information regarding the transaction, the closer to joint utility the parties get.⁴⁶

Game theory has shown some relevant theoretical information regarding situations in which the economic agent or contract party faces a decision concerning a conflict of interest in which the agent or contract party must choose a strategy. Many similar decisions must be taken every day in contracting, negotiation,

⁴² Otherwise, the parties just calculate with a backward induction and continue to betray each other repeatedly.

⁴³ Axelrod, *The evolution of cooperation*, 1984. See also Rapoport, *Tit for tat strategy*, in which the strategy is to cooperate from the beginning and then repeat what the counterparty does. See further Rapoport, *Prisoner's Dilemma*, The New Palgrave, *Game Theory*, [1998], Macmillan, p. 100. See also Rapoport & Chammah, *Prisoner's Dilemma*, Ann Arbor, University of Michigan Press. MI.

⁴⁴ Tvarnø, *Partneringaftalens særlige karakteristika*, UFR nr. 45, 8. November 2003, p. 366.

⁴⁵ Section 6.2 in BYG partnering paradigm: *"Der er fuld åbenhed om økonomien, og alle parter er medansvarlige for at sikre, at økonomien holdes indenfor budgetrammen og er forpligtet til at medvirke til at optimere økonomien med henblik på at opnå en øget indtjening/besparelse for alle parter..."*

⁴⁶ Steven Shavell, *Contracts*, The New Palgrave Dictionary of Economics and the Law, p. 433.

employment, pricing, buying, selling, collaborating etc. - situations, where persons must consider how to behave in a certain way or not.⁴⁷

The specific clauses in both the Danish BYG and the British PCC 2000 partnering contracts consist of binding agreements requiring the building owner to describe the needs and functions, and the constructor and design enterprises together with the building owner to collaborate on common goals and to use positive incentives to obtain the goals instead of negative clauses on breach and damages. Furthermore, the clauses obliges the parties to open the books and calculations and to show trust. The long-term intention in the partnering contract is to stretch out the length of the contract to create the framework for the on-going negotiations to seek the most optimal solutions on the future challenges in the transaction. When building on needs and functions, the design and constructor do not have any specifications to fulfil, but must fulfil a more uncertain goal. A goal negotiated along the way by using the joint utility perspective in the partnering contract. A very different perspective compared to a traditional works contract.

As for traditional contracts the partnering contract is the legal rule among the parties and by that the legal reality even though the framework differs from the contract law doctrine.⁴⁸ It is necessary to bind the parties legally by the partnering contract. If not, the game theory has shown that it is too risky to joint optimise and too tempting to self-optimise. The risk of being cheated is too big if the parties are not bound by the contract. When using positive incentives and positive pay-offs, the partnering contract demands to share the common benefit from joint utility possible to gain (as shown by the prisoner's dilemma game).

Thus, the more soft social clauses concerning collaboration, trust, common goals, joint utility, open books, and incentives must be as binding as the obligation to deliver and pay.⁴⁹

3.5. Conflicts

If or when the conflict occurs, it is significant that the conflict clause in the partnering contract keeps the parties on the joint utility track.⁵⁰

⁴⁷ Robert Cooter og Thomas Ulen, Law and Economics, 5th edition, Pearson/Addison-Wesley, 2008, p. 38.

⁴⁸ Tvarnø, Loyalitetspligt og partneringaftaler, Julebog 2002, ed. Ruth Nielsen, DJØF, p. 149.

⁴⁹ Tvarnø, Partneringaftalens særlige karakteristika, UFR nr. 45, 8. november 2003 p. 366.

⁵⁰ The British PCC 2000 has 8 subsections regarding (conflicting/conflicts?) including notice, problem-solving hierarchy, a core group review, mediation, adjudication, litigation or arbitration. The Danish partnering paradigm has one clause, not in the same detailed description, but aiming at a similar, alternative conflict model: ”Enhver uenighed om forståelsen af denne partneringaftale, dertil hørende supplerende aftaledokumenter og bilag skal søges afklaret ved dialog mellem de personer, hvor uenigheden er opstået.” And: ”1. niveau – Hvor uoverensstemmelsen er opstået: ... døgn. 2. niveau – Projektledelse: ... døgn. 3. niveau – Styregruppen: ... døgn. Kan uenigheden ej heller løses i styregruppen kan denne ved enstemmighed beslutte at søge uenigheden løst ved mediation eller ved mægling/opmand. Kan uenigheden ikke afklares ved mediation eller ved mægling/opmand, kan enhver af de stridende parter begære sagen forelagt voldgiftsinstituttet, jfr. ABR 89 pkt. 9.0.1 eller AB 92 §§ 45-47.”

In a conflict situation, a problem arises when the parties turn to the well-known contract law instead of staying in the more unknown partnering regime. But it is very important to keep the game theory in mind in the conflict situation. When optimising on the ground of risks, the parties turn to self-optimisation and forget about the far more positive gain from collaboration and joint optimisation. That is exactly what is happening in the prisoner's dilemma game and the opposite of the aim of the partnering contract.

Due to the risk of self-optimisation, the conflict clause in both the Danish BYG partnering paradigm and the British PCC 2000 partnering contract should be improved to ensure the aim and the social clauses in the contract. All the important tools to solve the inefficiency of the economic prisoner's dilemma must be mentioned again in the conflict clause.

Furthermore, both the Danish BYG partnering paradigm and the British PCC 2000 partnering contract should consider demanding that the partnering contract be at the table along with the transaction as an everyday tool to negotiate and prevent conflicts and write this in the beginning of the contract. In addition, the parties could require some education concerning the partnering concept and the economic explanations behind the objectives of the contract, the clauses and the content.

4. Closing remarks

The game theory can, as described and analysed above, show how to optimise long term relational and social contracts as for example a strategic alliance. The tool is a legally binding partnering contract; a contract that sets the stage to optimise the transaction. As illustrated by the prisoner's dilemma game, the joint utility gives a significant larger pay off-compared to the game in which the parties self-optimize as shown in the matrix by the $-1/2, -1/2$ pay-off.

When entering into a partnering contract, the parties accept a set of rules to govern the process to obtain joint utility. It is a complete package. It is necessary to use all the clauses. If for example the parties do not include the clause concerning open books and calculations, the risk of creating asymmetrical information is in place. That can end up in a hold-up or in uncertainty that again can move the parties to the inefficient Nash Equilibrium. Or if for example, the parties do not include the clause regarding specific payment derived from fulfilling positive incentives, the risk of being excluded from sharing the benefit from joint utility might move the parties towards self-optimisation and the inefficient Nash Equilibrium. This paper recommends including two new clauses. Firstly, that the parties introduce the tool of education in the partnering concept in the beginning of the contract and secondly, that the parties include a more specific conflict repeating the legally binding aspects such as open book(s?), joint utility, collaboration etc. Thirdly, it is recommended to use the partnering contract and not hide it in the drawer waiting for the conflict to arise. By using the partnering contract, the process and the idea behind the legal clauses, the optimal output is possible to gain.