



Incentive contract design for projects: The owner's perspective[☆]



L.P. Kerkhove^a, M. Vanhoucke^{a,b,c,*}

^a Faculty of Economics and Business Administration, Ghent University, Ghent, Belgium

^b Technology and Operations Management Area, Vlerick Business School, Ghent, Belgium

^c UCL School of Management, University College London, London, UK

ARTICLE INFO

Article history:

Received 14 November 2014

Accepted 3 September 2015

Available online 12 September 2015

Keywords:

Incentives

Contracting

Project Management

Decision Making

Strategy

ABSTRACT

Due to the adoption of more and more complex incentive contract structures for projects, designing the best contract for a specific situation has become an increasingly daunting task for project owners. Through the combination of findings from contracting literature with knowledge from the domain of project management, a quantitative model for the contract design problem is constructed. The contribution of this research is twofold. First of all, a comprehensive and quantitative methodology to analyse incentive contract design is introduced, based on an extensive review of the existing literature. Secondly, based on this methodology, computational experiments are carried out, which result in a set of managerial guidelines for incentive contract design. Our analysis shows that substantial improvements can often be attained by using contracts which include incentives for cost, duration as well as scope simultaneously. Moreover, nonlinear and piecewise linear formulae to calculate the incentive amounts are shown to improve both the performance and robustness across different projects.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

The project owner and the contractor executing the project are two separated economic actors, each with their own set of potentially conflicting objectives [53,80]. Hence, when the owner expedites work to a contractor, a relationship must be established. The nature of this relationship can be plotted on a spectrum between an explicitly negotiated contract and an alliance in which both parties are formally unified into a single economic actor for the duration of the project. For projects where complexity is limited, an explicit contract which specifies the deliverables can suffice [82]. For complex projects on the other hand, it may be more favourable to unify both actors in an alliance structure, effectively forming a single economic entity [84]. Although valuable arguments can be made in favour of such alliance structures [61], the implementation of such a structure is often highly complex [10]. Hence, the inclusion of incentive clauses, which form the middle ground in the relational spectrum between explicit contracts and alliances, can provide a more workable alternative [9]. Performance related pay in general [25,27,90], and the design of incentivised agreements for projects in particular (see Table 1) have been widely studied in academic literature over the last decades. Notwithstanding these recent advances, little guidance is

available for project owners on how to identify the best contract for a specific project environment.

The aim of this paper is to provide a quantitative framework for incentive contract design in projects, which can be used by the project owner to select the most adequate contract for any given project environment. This quantitative framework consists of three components: a trade-off model describing the nature of the project, an evaluation model describing the valuation of the different outcomes of the project for both the owner and contractor, and a contract model which is capable of representing the majority of (incentivised) contractual agreements used in practice.

Using these models, computational experiments have been carried out to investigate the impact of different project environments on the performance of contract types. These experiments take an economical rather than psychological perspective on the problem, and therefore assume that the contractor is a risk neutral profit-maximising actor. This risk-neutrality can be assumed since we are considering economic actors rather than individuals [32]. The desirability of different types of contracts is judged by taking into account both the expected profit of the owner, as well as the degree to which the motivations of the owner and contractor are aligned.

2. Literature review

Literature relevant to incentive contract design for projects can be divided into two main categories: literature dealing with the

[☆]This manuscript was processed by Associate Editor Jozefowska.

* Corresponding author at: Faculty of Economics and Business Administration, Ghent University, Ghent, Belgium.

trade-offs in project management and literature concerned with the design and implications of incentive contracts.

Project management literature dictates that the properties of a project can be described along three dimensions: the costs associated with the project, the duration of the project and the scope of a project (also known as the *iron triangle* [47]). These three dimensions are viewed as an interrelated trade-off mechanism. Ceteris paribus, decreasing the cost of a project will be accompanied by an increase in duration and/or a decrease in scope.

Similar statements are also true for the duration and scope dimensions.

Within the context of this paper these three dimensions are viewed as the outcomes of the project, as perceived by the project owner. The cost reflects the financial payment the owner has to make to the contractor to compensate for the work performed by the latter, as well as the resources used in the project (insofar as this amount is variable). The duration represents the time needed by the contractor to complete the project. The scope of the project

Table 1
Overview of literature on incentive contracting and associated trade-offs.

Author(s)	Dimensions ^a				Contract nature ^b	Cost contract types ^c	A+B ^d	Validation ^e
	C	D	S	E				
Meinhart and Delionback [50]	I	I	I	–	L	FPI/TCC, CPIF	–	–
McCall [49]	I	–	–	–	L	FFP, FPI/TCC, CPFF	–	–
Cukierman and Shiffer [24]	–	I	–	–	L	–	–	–
Hiller and Tollison [35]	I	–	–	–	L	FPI/TCC, CPFF, CPPF	–	CS
Weitzman [87]	I	–	–	–	L	FFP, CPIF, CPFF	–	TE
Stukhart [75]	I	I	I	–	L	FFP, GMP, FPI/TCC, CPFF, CPPF	–	–
Herten and Peeters [34]	I	I	I	–	P	FFP, FPI/TCC, CPIF, CPFF, CPPF	–	CS, Sur
McAfee and McMillan [48]	I	–	–	–	L	FFP, CPIF, CPFF, CPPF	–	CS
Ryan et al. [64]	I	–	–	–	L	FFP, FPI/TCC, CPFF	–	–
William and Ashley [88]	I	I	I	–	P	FFP, CPFF, CPPF	–	Sur
Abu-Hijleh and Ibbs [1]	I	I	I	T	–	FFP, GMP, CPIF, CPFF, CPPF	–	CS
Veld and Peeters [83]	I	I	I	–	P	FFP, FPI/TCC, CPIF, CPFF, CPPF	–	Sur
Rosenfeld and Geltner [63]	I	–	–	–	L	FFP, GMP, FPI/TCC, CPIF, CPFF, CPPF	–	TE
Chapman and Ward [18]	I	–	–	T	L	FFP, CPFF, CPPF	–	–
Herbsman [33]	–	I	–	–	L	–	x	Sur
Jaraiedi et al. [37]	I	I	I	–	L	FPI/TCC, CPIF	x	–
Ward and Chapman [86]	I	–	–	–	P	FFP, FPI/TCC, CPIF, CPFF	–	–
Jaafari [36]	I	I	T	–	P	FFP, FPI/TCC	–	CS, Sim
Al-Subhi Al-Harbi [3]	I	–	–	–	L	FFP, FPI/TCC, CPIF, CPFF, CPPF	–	–
Arditi and Yasamis [5]	I	I	T	T	L	FFP, FPI/TCC, CPIF, CPFF	x	Sur
Berends [7]	I	–	–	–	P	FFP, FPI/TCC, CPIF, CPFF	–	CS
Paquin et al. [55]	–	–	T	–	–	–	–	TE
Perry and Barnes [56]	I	–	–	–	L	FPI/TCC	–	TE
Boukendour and Bah [8]	I	–	–	–	P	GMP	–	–
El-Rayes [28]	–	I	–	T	L	–	x	TE
Dayanand and Padman [25]	–	I	–	–	–	–	–	TE
Bower et al. [9]	I	I	I	–	P	FFP, CPIF	–	CS
Broome and Perry [11]	I	T	T	–	P	FPI/TCC, CPIF, CPFF	–	CS
Bubshait [12]	I	I	I	–	L	FPI/TCC, CPIF, CPFF, CPPF	–	Sur
Shr and Chen [71]	T	I	–	–	L, N	–	x	CS
Shr and Chen [69]	–	I	–	–	L	–	x	CS
Shr et al. [70]	T	I	–	–	L	–	x	CS
Turner [80]	I	–	–	–	L	FFP, GMP, FPI/TCC, CPIF, CPFF, CPPF	–	–
Bayiz and Corbett [6]	–	I	–	T	L	FFP	–	TE
El-Rayes and Kandil [29]	T	T	T	T	–	–	x	TE
Kandil and El-Rayes [38]	I	I	–	T	–	–	–	–
Pollack-johnson and Liberatore [57]	T	T	T	–	–	–	–	TE
Tang et al. [76]	I	I	I	–	–	–	–	Sur
Tareghian and Taheri [78]	T	T	T	–	–	–	–	TE
Afshar et al. [2]	T	T	T	–	–	–	–	TE
Lee and Thomas [42]	–	I	T	T	L	–	x	CS
Rosandich [59]	I	I	I	–	L	FPI/TCC	–	TE, Sim
Sillars [72]	T	I	–	T	L	–	x	CS
Chapman and Ward [19]	T	T	–	–	L	FPI/TCC, CPFF	–	CS
Rose [62]	I	I	I	–	P	FFP, CPIF	–	CS
Stenbeck [74]	T	–	I	–	L	–	–	CS
Tang et al. [77]	I	I	I	–	L	–	–	CS, Sur
Ghodsi et al. [31]	T	T	T	–	–	–	–	TE
Ramón and Cristóbal [58]	T	T	T	–	–	–	–	CS
Anvuur and Kumaraswamy [4]	I	I	I	–	L	GMP	–	CS
Chan et al. [14]	I	–	–	–	L	GMP, FPI/TCC	–	Sur
Love et al. [44]	I	I	I	–	P	–	–	Sur
Mihm [52]	I	–	–	–	L	FPI/TCC	–	–
Rose and Manley [60]	I	I	I	–	L	CPIF	–	CS
Shahsavari Pour et al. [68]	T	T	T	–	–	–	–	TE
Zhang and Xing [89]	T	T	T	–	–	–	–	CS
[22]	T	I	–	–	L	–	–	CS
Chan et al. [15]	I	T	T	–	L	FFP, GMP, FPI/TCC	–	Sur
Chan et al. [17]	I	–	–	–	L	GMP, FPI/TCC	–	Sur

Download English Version:

<https://daneshyari.com/en/article/1032369>

Download Persian Version:

<https://daneshyari.com/article/1032369>

[Daneshyari.com](https://daneshyari.com)