

# What Makes Coopetition Successful? An Inter-Organizational Side Analysis on Coopetition Critical Success Factors in Oil and Gas Distribution Networks

Eduard Gabriel Ceptureanu <sup>1</sup>, Sebastian Ion Ceptureanu <sup>1,\*</sup>, Violeta Radulescu <sup>2</sup> and Stefan Alexandru Ionescu <sup>3</sup>

<sup>1</sup> Department of Management, The Bucharest University of Economic Studies, 010374 Bucharest, Romania; eduard.ceptureanu@man.ase.ro

<sup>2</sup> Department of Marketing, The Bucharest University of Economic Studies, 010374 Bucharest, Romania; violeta.radulescu@mk.ase.ro

<sup>3</sup> Department of Informatics, Statistics, Mathematics, Romanian-American University, 012101 Bucharest, Romania; stefan.ionescu@profesor.rau.ro

\* Correspondence: sebastian.ceptureanu@man.ase.ro; Tel.: +40-740-019-879

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**Abstract:** This paper investigates the inter-organizational Critical Success Factors for coopetition in oil and gas distribution networks. Based on an extensive review of literature, 17 Critical Success Factors were identified and analyzed in the context of oil and gas distribution industry. We concluded that Trust, Outcomes, Outcomes distribution and Tension have the greatest impact on coopetition success within business networks, while Congruence, Governance, Inter-dependence and Equity, even though significant, have the lowest impact. The study contributes to the development of literature concerning Critical Success Factors in business networks by presenting an inter-organizational perspective, by providing a ranking of them, and by discussing the implications for oil and gas distribution companies.

**Keywords:** coopetition; Critical Success Factors; networks; oil and gas distribution

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## 1. Introduction

Coopetition has received increasing attention in the academic literature in recent decades [1–5]. Considered a type of inter-organizational cooperation, coopetition is defined as the simultaneous cooperation and competition between competitors [6,7]. Even though it is most frequently analysed in the context of relationships between companies [8,9], there are also analyses of cooperation and competition at the intra-organizational level, with a distinct focus on business networks [2,6,10].

At the inter-organizational level, the coopetition phenomenon is analysed in the context of strategic alliances [11,12], and networks theories [6,13–15]. However, despite the studies that make it possible to explore the complexity of coopetition, the state of knowledge about this phenomenon is still underdeveloped [16].

Critical Success Factors (CSFs) constitute one such element. Various CSFs are discussed in the literature, factors that determines, influence or are critical for coopetition success [5,17–25]. However, the body of literature is still small, and the findings are rather eclectic and usually not empirically tested.

This study seeks to provide answers to two main research questions:

(a) What are the Critical Success Factors for coopetition in oil and gas distribution networks? and

(b) What are the most important of them?

There are several reasons that motivate this study: (a) first of all, there has been an increased interest in studying coopetition in the last decades [26–28], which, along other industries, may shape the oil and gas industry in the future; (b) secondly, studies focused on coopetition in the oil and gas industry are very scarce in the literature [5]; (c) Romania had and still has an important oil and gas industry; (d) the success or failure of oil and gas distribution networks may depend on adequate identification and consideration of CSFs. Therefore, the purpose of this paper is to increase understanding of coopetition Critical Success Factors in terms of their identification from inter-organizational side in networks from oil and gas distribution industry and by providing a ranking of them. By doing so, the paper may prove useful for decision-makers from oil and gas distribution companies, who are involved or planning to get involved in networks, or are already members, to foster those factors which are more important than others in the overall success of the business network. It is also useful for network coordination bodies to act on making their working arrangement better by supporting or developing those formal and informal internal mechanisms able to contribute more to the overall success.

The paper is structured as follows: the first section provides an introduction on the subject; the second section reviews the literature by discussing the existing findings in terms of coopetition within networks, with a distinct focus on the inter-organizational coopetition, and by presenting the theoretical foundations of the paper, namely the results of the few existing studies analysing coopetition CSFs; the third section presents the materials and methods of the study; the fourth section presents the results, including the ranking of the CSFs; finally, the fifth section discusses the results and draw the conclusions.

## 2. Literature Review

Although coopetition can exist on many different levels, from individuals to organizations and networks, it is generally considered to be common between companies [6,7,26,27,29]. The current focus in the literature has been to manage the tensions resulting from coopetition [30–32], to systemize the existing knowledge about inter-organizational coordination of cooperative interactions [33,34] or to measure varying degrees of competitive and cooperative interactions [7,26,35].

Partners within business networks may engage in coopetition due to the occurrence of perceived or potential benefits [36–38]. These include gaining access to complementary or additional resources from partners [39] or achieving synergy effects due to complementarity of resources [40]. Coopetition also stimulates innovation between partners [41], the development of technology [42,43], and may facilitate joint creation of tangible and intangible assets [44]. Moreover, it allows companies to achieve economies of scale [11], and reduces operational costs [36,45] and risks [46], contributing to the creation of value for them [47] and their partners [12].

However, there are threats and risks related to cooperative interactions in business networks. The nature of coopetition, comprising a competitive dimension alongside the cooperative one, may increase the opportunistic behaviour of the companies involved [48], may determine leakage of information or other intangible assets [49], or may narrow the opportunities for cooperation with others [50]. Other scholars highlight the above-average costs of coopetition [51], and the high expenses related to alliance management or time costs [52]. As a consequence, the cooperative relationship may become a liability for partners' survival [50].

Regarding inter-organizational coopetition within networks, a common approach, used in the current study, is the relational approach, focusing on the relationships between various actors which jointly create value for themselves and for other network members [36,47,53,54]. Studies on coopetition indicate that in many industries competition and cooperation increasingly move from the inter-firm level towards coopetition within and between networks [55].

Inter-organizational coopetition at network level usually occurs in clusters or distribution networks, where the concentration of companies generates dynamic relationships between interconnected actors, with varying levels of cooperation and competition intensity. There are scholars [56] emphasizing the role of coopetition on knowledge acquisition and value creation, while

others [13] argue that firms' positions within a network influence their cooperative behaviour. Three prerequisites have to be met to engage in inter-organizational cooperation within a network: complementary resources, compatible network structures, and a balance of competition and cooperation [15,22], while the purpose is to reduce the competitive intensity [57]. However, these must be approached with caution, since they may change over time, whenever the market conditions and the internal needs associated with cooperation change [58].

Companies participating in cooperative processes need adequate governance mechanisms as a basis for their cooperation [59]. Therefore, the coordination of partners within a business network, implying various degrees of formality, has a critical role in managing competitive interactions. Still, informal coordination mechanisms may be equally efficient for determining how joint activities must be conducted. Communication is also important, with one study reaching divergent conclusions in the case of competition for tangible and intangible resources [60]. Finally, other scholars discuss cooperation as an effective approach to create value [55,61,62] for each network member.

One typical example of cooperation within networks is the case of supply chain networks, with a number of studies finding that the incidence of this phenomenon has increased in recent years [63–65]. Various studies have investigated how a company can use its local supplier network to develop new organizational capabilities to balance competition and cooperation [64], or the role of cooperation for knowledge creation within the supplier network [65]. Little research has been conducted on the influence that cooperation has on network outcomes. One such study [66] examines how competition influences the structure of the network.

There are very few studies specifically analysing Critical Success Factors (CSFs) for cooperation at network level. Most existent studies investigate aspects related to the management and shaping of cooperative relationships or how tensions in business networks can be managed [6,13,15,32]. The feasibility of cooperative relationships is also investigated in relationship with the network members' capacity to create better results than those available through individual operation [67]. Another stream of research focuses on identification of efficient forms of cooperation based on the motives of the partners [68]. Finally, separation of competitive and cooperative fields within network members is another topic discussed by various studies [6,15].

The congruence in terms of common goals, coupled with the compatibility of network members, may also prove important, requiring procedures and mechanisms that need to be established and managed according to the need and requirements [69], such as establishing the criteria to select the partners with the purpose of identifying their value-adding potential [35,70] or complementarity in terms of processes, competencies and resources [22,23,71]. The conclusion of these studies is that there are no standard behaviours for inter-organizational relationships to be successful [72].

Dorn et al. (2016) [22], in their framework of cooperation phases, provide a list of items important in cooperative relationships. At the inter-firm level, for initiation, managing, shaping, and evaluation phases, these are: (1) Agreement form, consisting of both (a) *formal* and (b) *informal agreements*; (2) Structural design, including (a) *assignment of partner-specific tasks*; (b) *structural separation vs. integration of competitive and cooperative aspects*; (3) Setup of relational mechanisms and routines, consisting of (a) *workshops and events* and (b) *incentive policies*; (4) Balancing cooperation and competition, comprising (a) *typologies of cooperation relationships*; (b) *balancing cooperation and competition within alliance portfolios* and (c) *external parties establishing a balance*; (5) Dynamics over time consists of (a) *changes in market power and competitive behaviour of firms*; (b) *continuous adjustment of mechanisms and structures*; (6) Managing tension and conflict, including (a) *sources of conflict*; (b) *managerial attitudes toward cooperation* and (c) *establishing a strong partnership attitude*; (7) Firm characteristics, consisting of (a) *influence of cooperation on the firms' structure*; (b) *influence on firms' abilities*; (c) *technological* and (d) *business-model innovation*; (e) *positive outcome with regard to financials and value creation*; and (8) Industry characteristics, which includes (a) *increased value for consumers* and (b) *influence on the industry characteristics*.

Ceptureanu et al. (2018) [5] identify several factors related to cooperation success, but do not label them as such. These factors include Intensity, Functionality, Formalism, Benefits, Tension and Stability factors, encompassing items like *Number of partners*, *Behaviour*, *Value creation*, *Objectives*,

*Structure, Contract, Trust, Trust evolution, Benefits distribution, Coopetitive tension, Opportunism and Performance*. Some of these factors were included in the conceptual model of this paper as such; others were adapted due to a different classification of Critical Success Factors.

Petter et al. (2014) [20] and, further, de Resende et al. [24] identified 18 critical success factors which determine the coopetitive performance in horizontal business networks, grouped in 2 categories: (1) inter-relationship and (2) internal factors. In terms of inter-relationship factors, these are *Trust and commitment, Complementarity and reciprocity (synergy), Exchange of experiences and learning, History and identity (culture), Sharing and equity, Management of conflicts and incompatibilities, Competitive cooperation, Standardization, Adaptability and alignment, Interdependence and heteronomy, and Governance and Externalities*.

Another study, by Chin et al. (2008) [21], developed a hierarchical model consisting of the following success factors: (1) Management commitment, which comprises *Leadership, Long-term commitment and organizational learning*, (2) Relationship development, which comprises *Trust, Knowledge and Risk sharing*, and (3) Communication, comprising *IT support and Conflict management*.

Finally, one last study [73] used 3 categories of variables: (1) Partnering context, which includes *Cooperative context, Shared values, Mutual trust, Awareness on advantages by partnering, Strength of partnering, Competitive context, Complementarity level, Intra-sectorial competitiveness level, Internal competitiveness level and External competitiveness level*; (2) Partnering behaviour, consisting of *Cooperation degree, Integrated management in the sector, Participatory planning and Central management of projects*; and (3) Partnering results, including *Number of inter-organizational private programs in the sector, Number of inter-organizational public-private programs in the sector, Number of inter-organizational regional programs in the sector, Number of inter-organizational programs for innovation in the sector, Number of inter-organizational programs for co-creation of value in the sector and Number of co-marketing actions in the sector*.

Some of these studies include external CSFs, such as systemic and sectorial factors, which could influence both cooperation and competition. Due to various legal and economic landscapes shaping oil and gas distribution in different countries, these were not considered in the study, even though they may have a role in the network success.

### 3. Materials and Methods

The first stage, or research design, required a comprehensive review of the literature regarding inter-organizational coopetition Critical Success Factors. This stage led to the identification of 17 CSFs (Table 1), which were further reviewed, in the second stage, by 4 experts: 2 from the oil and gas industry and 2 from academia. Our initial identification of CSFs was endorsed by experts, which accepted all of them for the questionnaire phase of the study.

**Table 1.** Conceptual framework

Category	Critical Success Factor	References
Stability	Tension	[2,5,21,40,42,43,74–83]
	Trust	[5,20,23,53,56,60,77–80,84–98]
	Long-term commitment	[5,20,23,40,53,77–80,84–94]
	Synergy	[23,79,80,86,89,90,92,99]
	Equity	[70,77,78,89,99–101]
Functionality	Cooperation	[23,77,78,84,85,87,91]
	Inter-dependence	[92,101,102]
	Cohesion	[70,77,79,80,84,88,89,99,102,103]
Network	Antecedents	[70,77–80,84,85,99]
	Congruence	[70,77,85]
	Capabilities	[5,104–109]
	Intensity	[5,13,14,26–28,31,32,62,65,77–80,86,90,100,102–105,110–117]
	Management	[2,15,34,44,58,59,71,104,106,107,113,114,116,118–131]
	Governance	[78,89,90,101,102,110]

<b>Management and governance</b>	Standardization	[23,70,78,79,85,86]
<b>Results</b>	Outcomes	[3,5,46,53,56,60,61,66,70,77,79,80,84,88,89,95,97–99,102,103,111,132–138]
	Outcomes distribution	[5,44,93,132,133,139,140]

Measurement scale and descriptors for the selected Critical Success Factors are described in Table 2.

**Table 2.** Measurement scale and descriptors for Critical Success Factors.

Critical Success Factor	Descriptors	Measurement scale
<b>Category: Stability</b>		
CSF1. Tension	<i>Conflict resolution mechanisms within the network</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Conflict monitoring procedures</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Incompatibilities resolution in the network</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Administration of internal conflicts between network members</i>	(1) Strongly disagree to (5) Strongly agree
CSF2. Trust	<i>Formal vs informal interactions</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Affinity</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Risk sharing</i>	(1) Strongly disagree to (5) Strongly agree
CSF3. Long-term commitment	<i>Long-term agreements</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Periodic review of existing agreements</i>	(1) Strongly disagree to (5) Strongly agree
<b>Category: Functionality</b>		
CSF4. Synergy	<i>Integration of mutual strengths and weaknesses</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Complementarity</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Investments in network</i>	(1) Strongly disagree to (5) Strongly agree
CSF5. Equity	<i>Balanced rights</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Balanced duties and responsibilities</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Reciprocity</i>	(1) Strongly disagree to (5) Strongly agree
CSF6. Cooperation	<i>Sharing of assets</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Control of rivalry</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Removing cooperation limitations</i>	(1) Strongly disagree to (5) Strongly agree
CSF7. Inter-dependence	<i>Autonomy in operations</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Mutual dependence between network members</i>	(1) Strongly disagree to (5) Strongly agree
CSF8. Cohesion	<i>Internal cohesion of the network members</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Control of opportunistic behaviours</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Capacity to manage various expectations and interests</i>	(1) Strongly disagree to (5) Strongly agree
<b>Category: Network</b>		
CSF9. Antecedents	<i>Historical antecedents</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Cultural alignment</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Previous experience and reputation</i>	(1) Strongly disagree to (5) Strongly agree
CSF10. Congruence	<i>Adaptability</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Strategic alignment</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Network members similarities</i>	(1) Strongly disagree to (5) Strongly agree
CSF11. Capabilities	<i>Available resources</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Available infrastructure</i>	(1) Strongly disagree to (5) Strongly agree
CSF12. Intensity	<i>Degree of interaction</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Number of network members</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Direction of the relationship</i>	(1) Strongly disagree to (5) Strongly agree
<b>Category: Management and governance</b>		
CSF13. Management	<i>Policy and strategy</i>	(1) Strongly disagree to (5) Strongly agree

	<i>Resource allocation</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Coordination of actions</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Effective communication</i>	(1) Strongly disagree to (5) Strongly agree
CSF14. Governance	<i>Formalization</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Management of relationships external to the network</i>	(1) Strongly disagree to (5) Strongly agree
CSF15.	<i>Mechanisms of management and control</i>	(1) Strongly disagree to (5) Strongly agree
Standardization	<i>Network standardization</i>	(1) Strongly disagree to (5) Strongly agree
<b>Category: Results</b>		
	<i>Value creation for network</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Value creation for network members</i>	(1) Strongly disagree to (5) Strongly agree
CSF16. Outcomes	<i>Engagement and motivation</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Knowledge identification, sharing and use</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Collective learning</i>	(1) Strongly disagree to (5) Strongly agree
CSF17. Outcomes distribution	<i>Perceived fairness of outcomes distribution</i>	(1) Strongly disagree to (5) Strongly agree
	<i>Perceived mutual benefits</i>	(1) Strongly disagree to (5) Strongly agree

The second phase consisted of distributing the questionnaires in 3 networks from oil and gas distribution industry. The selected companies from the networks had to fulfil two criteria: to participate in at least one coopetition relationship with a partner from the network, regardless of whether the outcome was positive or negative; and to participate in a coooperative relationship with a company outside of the network. This was to make it easier for respondents to identify those factors which were more important for coopetition within the network, by having the respondents experiencing both internal and external coooperative processes.

Data were analysed by means of statistical methods (mean, variance and *t*-test), which were run in SPSS 13 to validate and rank the important Critical Success Factors (Table 3).

Cronbach's  $\alpha$  is commonly used to measure internal consistency [141]. Table 4 shows the estimation of the reliability according to Cronbach's coefficient  $\alpha$  for the constructs. All of them are acceptable and satisfactory [142]. Therefore, the results derived from the questionnaire were highly stable and consistent.

**Table 3.** The results of the independent sample *t*-test.

<b>Critical Success Factor</b>	<b>Mann-Whitney U</b>	<b>Wilcoxon W</b>	<b>Z</b>	<b>Asymp. Sig. (2-Tailed)</b>
<b>Category: Stability</b>				
CSF1. Tension	3.646,5	11.120,5	−0.036	0.918
CSF2. Trust	3.101,0	12.108,0	−0.379	0.651
CSF3. Long-term commitment	3.457,5	13.284,5	−0.562	0.519
<b>Category: Functionality</b>				
CSF4. Synergy	3.568,0	13.674,0	−0.348	0.675
CSF5. Equity	3.654,5	13.622,5	−0.031	0.921
CSF6. Cooperation	3.259,5	13.230,5	−0.135	0,154
CSF7. Inter-dependence	3.278,5	13.105,5	−0.672	0.447
CSF8. Cohesion	3.337,0	12.757,0	−0.643	0.465
<b>Category: Network</b>				
CSF9. Antecedents	3.646,5	10.118,5	−0.034	0.920
CSF10. Congruence	3.069,0	12.479,0	−0.142	0.128
CSF11. Capabilities	2.913,0	11.267,0	−0.862	0.332
CSF12. Intensity	3.024,5	12.856,5	−0.144	0.142
<b>Category: Management and governance</b>				
CSF13. Management	2.833,0	11.822,0	−0.138	0.145
CSF14. Governance	3.354,0	13.052,0	−0.374	0.652
CSF15. Standardization	3.502,0	13.183,0	−0.157	0.817
<b>Category: Results</b>				

CSF16. Outcomes	2.790,0	11.797,0	−0.224	0.021
CSF17. Outcomes distribution	3.214,0	13.045,0	−0.130	0.254

**Table 4.** Scale validation for coopetition CSFs.

Critical Success Factors	Items	Factor Loadings
<b>Category: Stability</b>		
CSF1. Tension <i>Cronbach's <math>\alpha = 0.721</math></i>	<i>Conflict resolution mechanisms within the network</i>	0.767
	<i>Conflict monitoring procedures</i>	0.709
	<i>Incompatibilities resolution in the network</i>	0.652
	<i>Administration of internal conflicts between network members</i>	0.754
CSF2. Trust <i>Cronbach's <math>\alpha = 0.691</math></i>	<i>Formal vs informal interactions</i>	0.689
	<i>Affinity</i>	0.682
	<i>Risk sharing</i>	0.702
CSF3. Long-term commitment <i>Cronbach's <math>\alpha = 0.704</math></i>	<i>Long-term agreements</i>	0.744
	<i>Periodic review of existing agreements</i>	0.663
<b>Category: Functionality</b>		
CSF4. Synergy <i>Cronbach's <math>\alpha = 0.678</math></i>	<i>Integration of mutual strengths and weaknesses</i>	0.669
	<i>Complementarity</i>	0.709
	<i>Investments in network</i>	0.656
CSF5. Equity <i>Cronbach's <math>\alpha = 0.705</math></i>	<i>Balanced rights</i>	0.684
	<i>Balanced duties and responsibilities</i>	0.663
	<i>Reciprocity</i>	0.769
CSF6. Cooperation <i>Cronbach's <math>\alpha = 0.697</math></i>	<i>Sharing of assets</i>	0.672
	<i>Control of rivalry</i>	0.709
	<i>Removing cooperation limitations</i>	0.709
CSF7. Inter-dependence <i>Cronbach's <math>\alpha = 0.720</math></i>	<i>Autonomy in operations</i>	0.756
	<i>Mutual dependence between network members</i>	0.684
CSF8. Cohesion <i>Cronbach's <math>\alpha = 0.712</math></i>	<i>Internal cohesion of the network members</i>	0.712
	<i>Control of opportunistic behaviours</i>	0.707
	<i>Capacity to manage various expectations and interests</i>	0.716
<b>Category: Network</b>		
CSF9. Antecedents <i>Cronbach's <math>\alpha = 0.695</math></i>	<i>Historical antecedents</i>	0.667
	<i>Cultural alignment</i>	0.706
	<i>Previous experience and reputation</i>	0.712
CSF10. Congruence <i>Cronbach's <math>\alpha = 0.685</math></i>	<i>Adaptability</i>	0.652
	<i>Strategic alignment</i>	0.711
	<i>Network members similarities</i>	0.692
CSF11. Capabilities <i>Cronbach's <math>\alpha = 0.703</math></i>	<i>Available resources</i>	0.769
	<i>Available infrastructure</i>	0.683
CSF12. Intensity <i>Cronbach's <math>\alpha = 0.682</math></i>	<i>Degree of interaction</i>	0.689
	<i>Number of network members</i>	0.665
	<i>Direction of the relationship</i>	0.693
<b>Category: Management and governance</b>		
CSF13. Management <i>Cronbach's <math>\alpha = 0.740</math></i>	<i>Policy and strategy</i>	0.737
	<i>Resource allocation</i>	0.709
	<i>Coordination of actions</i>	0.722
	<i>Effective communication</i>	0.793
CSF14. Governance <i>Cronbach's <math>\alpha = 0.670</math></i>	<i>Formalization</i>	0.689
	<i>Management of relationships external to the network</i>	0.652
CSF15. Standardization <i>Cronbach's <math>\alpha = 0.725</math></i>	<i>Mechanisms of management and control</i>	0.747
	<i>Network standardization</i>	0.702
<b>Category: Results</b>		
CSF16. Outcomes <i>Cronbach's <math>\alpha = 0.724</math></i>	<i>Value creation for network</i>	0.746
	<i>Value creation for network members</i>	0.806

CSF17. Outcomes distribution <i>Cronbach's <math>\alpha = 0.818</math></i>	<i>Engagement and motivation</i>	0.712
	<i>Knowledge identification, sharing and use</i>	0.681
	<i>Collective learning</i>	0.673
	<i>Perceived fairness of outcomes distribution</i>	0.816
	<i>Perceived mutual benefits</i>	0.819

All items considered had factor loadings of 0.65 or higher, which was the acceptable threshold for samples of our size [143], thereby indicating satisfactory levels of convergence and discriminant validity.

#### 4. Data Analysis and Results

For each of the Critical Success Factors, the null hypothesis  $H_0$  was:

Hypothesis  $H_0$ . *The average score of Critical Success Factor importance is lower than 3.*

While the alternative hypothesis  $H_1$  was:

Hypothesis  $H_1$ . *The average score of Critical Success Factor importance is higher than 3.*

The results of the  $t$ -tests for each item are presented in Table 5. All tests were calculated at 95 per cent confidence level ( $\alpha = 0.05$ ). The  $t$ -test rejected the null hypotheses for all items. Hence, the importance of the Critical Success Factors was recognized to be significant.

**Table 5.** Critical Success Factors  $t$ -test.

Critical Success Factor	<i>t</i>	df	Sig. (2-Tailed)	Mean	SD	Std. Error Mean	95 Per Cent Confidence Interval of the Difference	
							Lower	Upper
Category: <b>Stability</b>								
CSF1. Tension	5.558	87	0.000	3.37	1.16	0.075	0.311	0.619
CSF2. Trust	3.843	68	0.000	3.22	1.06	0.074	0.164	0.468
CSF3. Long-term commitment	2.979	73	0.004	3.17	1.20	0.078	0.098	0.433
Category: <b>Functionality</b>								
CSF4. Synergy	3.777	85	0.000	3.24	1.25	0.073	0.171	0.509
CSF5. Equity	4.080	78	0.000	3.23	1.08	0.071	0.179	0.472
CSF6. Cooperation	6.193	81	0.002	3.44	1.18	0.077	0.381	0.705
CSF7. Inter-dependence	8.783	84	0.001	3.55	1.01	0.075	0.323	0.787
CSF8. Cohesion	3.706	78	0.000	3.21	1.16	0.077	0.155	0.469
Category: <b>Network</b>								
CSF9. Antecedents	8.228	75	0.000	3.72	1.07	0.071	0.474	0.865
CSF10. Congruence	5.177	70	0.003	3.32	1.08	0.073	0.273	0.573
CSF11. Capabilities	8.931	79	0.000	3.71	1.13	0.075	0.499	0.806
CSF12. Intensity	4.136	65	0.000	3.26	1.11	0.078	0.197	0.518
Category: <b>Management and governance</b>								
CSF13. Management	7.238	77	0.000	3.53	1.17	0.079	0.479	0.804
CSF14. Governance	3.187	82	0.002	3.14	1.05	0.078	0.102	0.383
CSF15. Standardization	4.037	74	0.000	3.24	1.14	0.078	0.185	0.501
Category: <b>Results</b>								
CSF16. Outcomes	2.896	76	0.006	3.16	1.19	0.072	0.090	0.422
CSF17. Outcomes distribution	6.944	79	0.000	3.49	1.13	0.075	0.431	0.741

The list of the Critical Success Factors includes *Tension*, *Trust*, *Long-term commitment*, *Synergy*, *Equity*, *Cooperation*, *Inter-dependence*, *Cohesion*, *Antecedents*, *Congruence*, *Capabilities*, *Intensity*, *Management*, *Governance*, *Standardization*, *Outcomes* and *Outcomes distribution*.



According to each category of Critical Success Factors, the results are detailed below (Table 6):

**Table 6.** Ranking of Critical Success Factors

Critical Success Factor	Overall Ranking
CSF2. Trust	1
CSF16. Outcomes	2
CSF17. Outcomes distribution	3
CSF1. Tension	4
CSF12. Intensity	5
CSF9. Antecedents	6
CSF6. Cooperation	7
CSF13. Management	8
CSF3. Long-term commitment	9
CSF8. Cohesion	10
CSF4. Synergy	11
CSF15. Standardization	12
CSF11. Capabilities	13
CSF10. Congruence	14
CSF14. Governance	15
CSF7. Inter-dependence	16
CSF5. Equity	17

(a) In terms of **Stability**:

- **Tension** (ranked 4th), comprising *Conflict resolution mechanisms within the network, Conflict monitoring procedures, Incompatibilities resolution in the network and Administration of internal conflicts between network members* is, according to the results, the most important coopetition Critical Success Factor. A recurring theme in coopetition literature, since tensions and conflicts are likely to occur due to the sometimes conflicting roles of the partners [2], tensions are perceived as a natural consequence of coopetitive relationships that need to be balanced [144,145]. Hence, managing tension is necessary to maintain a successful coopetitive relationship, enhancing network members' capacity to deal with any potential conflict before it escalates [146].
- **Trust** (ranked 1st), comprising *Formal vs informal interactions, Affinity and Risk sharing*, proves to be an important Critical Success Factor, since it is an essential element for building a collaborative relationship. A high level of trust reduces conflicts and causes higher partner satisfaction [147] and enhances cooperative behaviour [96]. Hence, the development of trust is important to maintain cooperation between companies in the network which are simultaneously competitors. Therefore, these companies have to pay attention to interaction intensity, namely number of partners within the network they engage with. Affinity, namely the number of interactions with each member of the network, may prove important for network success since a higher number of interactions is a proof of trust between coopetitors and a signal they are interested in network survivability and development.
- **Long-term commitment** (ranked 9th), comprising *Long-term agreements and Periodic review of existing agreements*, is a signal of how reliable a partnership is with other network members, enhancing legitimacy or neutralizing possible conflicts [40]. Long-term agreements let organizations work together toward achieving strategic objectives [148], but these require periodic review of existing agreements to maintain collaboration [149].

(b) In terms of **Functionality**:

- **Synergy** (ranked 11th), consisting of *Integration of mutual strengths and weaknesses, Complementarity and Investments in network* and, emphasize the focus of each member of a network to adopt the other's strengths to achieve a synergy effect and a long-term

cooperative relationship [40] by developing a deeper understanding and enhancement of their relationship within the network. Network members should take into consideration, also, their complementarity in terms of what their roles are and how involved they are in terms of investments made in the network, since coopetition is often characterized both by improvisation, flexibility and creativity, along routinization and control [150].

- **Equity** (ranked 17th), consisting of *Balanced rights, Balanced duties and responsibilities* and *Reciprocity*, the least important CSF, described the need to avoid tension and possible conflicts within the network. This is achieved by providing balanced (not equal) rights for network members, since the place of each company (its centrality within the network) determines its duties and responsibilities. In terms of reciprocity, it is important since it may be a reason to reduce trust between network members or even provide a rationale to leave the network if the company considers its role does not match the efforts.
- **Cooperation** (ranked 7th), consisting of *Sharing of assets, Control of rivalry* and *Removing cooperation limitations*, brings forward the balance between competitive and cooperative forces. The forces that shape coopetition are multiple, since the relationship is complex, relying on various factors [26]. Therefore, it is crucial to first examine the appropriate levels of cooperation and competition and the factors that influence them [151,152]. Gnyawali et al. (2006) [13] used a competitive dynamics perspective exploring the roots for network-level coopetition, and found that the firms' position within a network—such as whether it is more autonomous or central—influences its competitive action frequency and variety.
- **Inter-dependence** (ranked 16th), consisting of *Autonomy in operations* and *Mutual dependence between network members* is among the least important CSFs. Firms can form networks between unequal partners, where at least one partner is more powerful than the others. In oil and gas distribution, this is usually the case, with the more powerful partner setting up the framework for cooperation [136]. Still, collaboration permits better results than through individual action [153,154].
- **Cohesion** (ranked 10th), consisting of *Internal cohesion of the network members, Control of opportunistic behaviours* and *Capacity to manage various expectations and interests*, focused on the degree to which team members are attracted to each other [155] while opportunistic behaviour is described by the risk that one of the network members stop cooperating after it gets its desired resources or outcomes [5]. Cohesive entities show a high level of satisfaction and trust one another [156]. Prior research argues that cohesive structures are well coordinated and flexible, and thus perform better under uncertain conditions [157]. Various studies emphasize positive results of cohesion, such as new product performance [155], interpretation of new information [158] or improved communication [159]. This reduces the risks of opportunistic behaviours, also. However, companies should be aware of the risks, since there are scholars arguing that a high level of harmony suppresses necessary creative tensions [160] or may have negative effects on innovativeness [161].

(c) In terms of **Network**:

- **Antecedents** (ranked 6th), consisting of *Historical antecedents, Cultural alignment* and *Previous experience and reputation*. In the study, this factor achieved a surprisingly high position, emerging as an important Critical Success Factor. Indeed, there are studies linking previous experience between the firms involved in the coopetition process and the reputation of their interaction with a feeling of greater credibility between those involved [162]. In terms of cultural alignment, one must assume that different organizations have different organizational cultures. In coopetition, respect, understanding, acceptance, integrity and toleration are keys to a successful development of the network organizational culture.
- **Congruence** (ranked 14th), consisting of *Adaptability, Strategic alignment* and *Network members similarities* describes how consistent relationships are within the network. Therefore, the paces of network members' adaptability to change, how congruent network goals are with its members' own objectives and strategies, or the network capacity to

manage the various expectations and interests of its members are important factors. To efficiently work together and achieve the expected gains, it has been argued that companies exhibit similar characteristics in terms of their cultures, structures, or processes [163]. Various studies have shown that organizational similarity is an antecedent of trust [164–166].

- **Capabilities** (ranked 13th) consists of *Available resources* and *Available infrastructure*. Little research has been done concerning the capabilities that are necessary to be successful. Despite their importance, the link between dynamic capabilities and coopetition has so far not been explored in depth [167], even though these will become more important in a dynamic and complex environment [168] such as the oil and gas industry. Oil and gas distribution companies should consider developing their organizational ambidexterity, since it provides structural and motivational implications that could be transferred to the management of coopetition as well [169,170].
- **Intensity** (ranked 5th), consisting of *Degree of interaction*, *Number of network members* and *Direction of the relationship*, focused on multiple partner arrangements within networks. These arrangements involve specific problems, such as coalition building, higher structural complexity, and partner dynamics [171,172]. The sparse literature on vertical coopetition mainly investigates relationships among buyers and suppliers [173,174] or among the members of a supply chain [65]. Multi-partner arrangements determine more complex control mechanisms, like smart pricing schemes, special contractual provisions [175] or more general incentive structure designs [117]. Numbers of interactions with the same partner or with different partners raise issues in terms of the interests of the involved actors, such as price setting [117], and must not be neglected by oil and gas distribution top executives.

(d) In terms of **Management and governance**:

- **Management** (ranked 8th), consists of *Policy and strategy*, *Resource allocation*, *Coordination of actions* and *Effective communication*. This factor is important for coopetition because it reflects top management's attitude towards it [176]. The way network members coordinate their actions is a key factor in the effectiveness and the outcome of coopetitive relationships. The coordination of actions includes partner-specific task assignment [116,177], as well as the specialization and formalization of interactions among network members [15,122].
- **Governance** (ranked 12th), consisting of *Formalization* and *Management of relationships external to the network*, argue that the existence of separate structures to deal with coopetitive relationships has a positive impact on how effective the coopetitive relationship is [132]. Various cooperative arrangements have been studied by the alliance literature, with scholars finding a variety of contingencies that influence the choice of a distinct cooperative form [178,179].
- **Standardization** (ranked 15th) consists of *Mechanisms of management and control* and *Network standardization* covers elements like structural designs, and sets of relational mechanisms and routines that impact a coopetitive relationship [58,114,121]. In this respect, flexibility seems to be an important parameter [44,58]. Future inter-firm-level research should build on these findings and adapt them to the specific coopetition context. Hakansson and Ford (2002) [72] point out that there are no standardized behaviours or a single solution for alliances to be successful, and that some factors have a greater or lower influence on the success of the business networks.

(e) In terms of **Results**:

- **Outcomes** (ranked 2nd) covers a wide range of benefits (results). In our study, these includes *Value creation for network*, *Value creation for network members*, *Engagement and motivation*, *Knowledge identification, sharing and use* and *Collective learning*. Most contributions have focused on the advantages of coopetition based on low transaction costs, compatible resources, or enhanced innovative capabilities, and only a few studies have recently started

to examine coopetitive arrangements with regard to innovativeness or financial results [46,111,136]. Coopetition research is also concerned with the extent to which coopetitive relationships can create additional value, such as improved processes, enhanced services for consumers, and efficient use of resources. It has often been noted that firms engaging in coopetition are not only able to enhance their own performance, but also increase their customers one [53].

- **Outcomes distribution** (ranked 3rd) covers both *Perceived fairness of outcomes distribution* and *Perceived mutual benefits*. An important Critical Success Factor, the results are in line with other studies [44,93].

## 5. Discussion and Conclusions

Scholars focused on researching coopetition interaction have paid little attention to ranking of Critical Success Factors, preferring to address specific elements like tension or outcomes and neglecting analysis on specific industries. This study contributes to filling this gap by identifying the most important CSFs and by ranking them in oil and gas distribution.

The findings allow us to draw several conclusions.

(a) The following factors come in the first category, the most important ones according to their impact. First of all, companies involved in oil and gas distribution networks had to carefully consider Tension in their operations, since it is, according to the study, the most important Critical Success Factor. Tension may be a consequence of coopetitive relationships, so both network coordination bodies and top executives of oil and gas companies have to enhance their own capabilities to deal with any potential conflict. Companies operating in oil and gas distribution networks should pay special attention to establishing, maintaining and adapting conflict resolution mechanisms and conflict monitoring procedures to avoid instances where their actions may be interpreted by other network members as being too competitive or outside their agreements. They have to identify incompatibilities between them and other network members early and try to manage internal conflicts within the network. According to the findings, it would be best to have at least some network level mechanisms and regulatory bodies to supervise and enforce network rules to ease tension among its members. The focus of many respondents on Outcomes and Outcomes distribution is natural. The majority of companies involved in networks or in coopetitive arrangements are seeking results. For oil and gas companies, equally important is not only the level of outcomes, but also how these outcomes are distributed within the network. Without a doubt, how the results are distributed is influenced by many factors—equity within the network, level of governance and standardisation, trust between partners—but network leaders or initiators have to pay attention to a balanced distribution of results, since marginal members may feel prone to leave the alliance if the perceived and to the actual outcomes seems unfair. In terms of Trust, for oil and gas distribution companies it is a prerequisite to get involved in coopetitive relationships. They have multiple choices in choosing their partners, so getting involved in a network first and in coopetitive relationships later signals that the level of trust between them has to be high. Intensity in the coopetitive relationship ranking is determined by the importance of multi-partner arrangements in oil and gas distribution industry. It simultaneously allows the companies to act in a concerted way, for instance, in establishing smart pricing schemes or price setting, and must not be neglected by top executives. Oil and gas distribution company executives seem to link coopetition success to previous antecedents, since the reputation of their partners or previous business connections, without being members of the same network, may be a reason to join that specific network in the first place. In line with this, they have to be fully aware that working together to support a mutual network culture may prove fruitful in terms of success. These were the most important CSFs in terms of impact.

(b) The next round of CSFs comes in the second category of importance. Cooperation, emphasizing measures taken within the network to balance competitive and cooperative forces, provides mixed results due to various levels of cooperation and competition displayed by the surveyed companies. By following the rationale put forward by Gnyawali et al. (2006) [13], it seems that each company's position in the network provide more or fewer incentives to get involved in

various degrees of cooperation with network members. Management as a Critical Success Factor, reflecting the top management attitude toward the coopetition, is, up to a point, included in the network management mechanisms. Therefore, since it overlaps, in part, with already-existent structures and mechanisms, it may look less important, even though in the surveyed literature it is considered an important Critical Success Factor. Long-term commitment ranking comes as a surprise, since it is one of the main results of trust. For oil and gas distribution companies, we can speculate that, due to the dynamic nature of the industry, long-term agreements are less desirable, since the companies are more independent than in other industries. This has to be considered in relationship with other, this time low-ranking, CSFs: Congruence and Inter-dependence. Cohesion seems equally important and less important for surveyed companies due to the somehow contradictory factors considered. There is definitely opportunistic behaviour in the industry, due to high profits and market opportunities available, causing some network members to consider their interests first; however, they also seem to acknowledge the importance of acting together to maximize the outcome. In terms of Synergy, oil and gas distribution companies should take into consideration the complementarity of network members in terms of what their roles are and how involved they are in terms of investments made in the network, since coopetition is often characterized both by improvisation, flexibility and creativity, along routinization and control.

(c) Finally, the last 5 factors come in the third category, the least important in terms of impact. In terms of Governance, oil and gas distribution companies neither tend to establish specific structures to manage coopetitive relationships, nor focus on managing external relationships. The most likely cause is that the network itself, through internal mechanisms, facilitates setting up a framework for coopetitive relationships among network members and deals with external relationships as a whole. At the same time, oil and gas distribution companies seem reluctant to invest in developing network Capabilities by making available resources and infrastructure. This, in turn, reduces the Congruence at the network level. Another finding is that the surveyed companies do not emphasize Standardisation, do not follow specific patterns in terms of acting with other partners within network, and do not follow the same organizational routines, for instance. Coupled with the poor ranking of Inter-dependence, it all makes sense. In our opinion, top executives of oil and gas distribution companies do not want to get too involved in a network, losing autonomy in operations. Considering that in most networks there is a limited number of companies setting up the pace—usually the initiators—we may conclude that there is no deep integration of companies in the network, but rather a balanced involvement based on results.

From a practical point of view, concentrating on the most important Critical Success Factors may provide useful coordinates for top executives in the oil and gas distribution industry as a whole, but particularly for those involved in business network for focusing on those factors which are more important in the successful result of their initiative.

In terms of research limitations, the most important were: (1) contradictory or imprecise meaning or descriptors of Critical Success Factors found in the literature; (2) multidimensionality of most of the CSFs, making difficult for us to include them in specific categories. Moreover, some of them influences others, increasing the difficulty of analysing them; (3) focus of the study on a limited number of business networks, only 3 in this case. However, due to the exploratory nature of the study and considering other studies relevant to the topic, we argue that the findings are important and contribute to fill a research gap in the coopetition field.

In terms of future research, a confirmatory study on a larger sample of companies may be performed. Another direction is to investigate the impact of each Critical Success Factor on various constructs of coopetition process.

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