CONTENT ANALYSIS AND SOCIAL NETWORK ANALYSIS: A TWO-PHASE METHODOLOGY IN OBTAINING FUNDAMENTAL CONCEPTS OF COOPETITION

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ABSTRACT

This study introduces a two-phase methodology in obtaining fundamental concepts from literature. Content analysis performed in the first phase leads to the most frequent concepts scholars used in scrutinizing a theme. Social network analysis in the second phase results a network of the relationships between concepts and examines the importance of every concept in the network. To elucidate the advantage of the methodology, the study applies the methodology on Coopetition – to cooperate and compete simultaneously – literature. Ten most frequent concepts occur in the coopetition literature are: Competition, Cooperation, Coopetition, Knowledge, Market, Network, Relationships, Resources, Strategy and Value. Under the social network analysis terms, the importance of every concept in the network is denoted in degree, closeness and betweenness centrality measures. Ranging from the most important concepts to the least are Relationships, Strategy, Resources, Competition, Cooperation, Coopetition, Market, Network, Value and Knowledge.

Keywords*: content analysis, social network analysis, coopetition*

INTRODUCTION

Content Analysis.

Content analysis is a research tool used to objectively and systematically make inferences about the intentions, attitudes, and values of individuals by identifying specified characteristics in textual messages. This scope represents two type of content analysis: conceptual analysis and relational analysis. While conceptual analysis deals with quantifying the presence frequency of concepts represented by words of phrase, relational analysis goes further by examining relationships among concepts in texts.

This study uses the relational analysis, since it enables us to move beyond counting and identifying concepts to more fully explore the relationships that exist between concepts. Relational analysis has also been termed semantic analysis (Palmquist, *et al.*, 1997). Briefly, the objective of relational analysis is to look for meaningful relationships. In this analysis, meaning is gained from relationships among concepts – which can also be signified as *key words* – in a text.

Relational analysis has three subcategories: affect extraction,

proximity analysis and cognitive mapping. Affect extraction provides an emotional evaluation of concepts explicit in a text. Proximity analysis concerns with the co-occurrence of explicit concepts in a text. Cognitive mapping allows for further analysis of the results from the two previous approaches. Whereas affective and proximal analysis function primarily within the preserved, cognitive mapping attempts to create a model of the overall meaning of the text. Model in this approach can be represented as graphic map that represents the relationships between concepts.

Principally using map analysis, cognitive mapping can explore "how meanings and definitions shift across people and time" (Palmquist, *et al.* 1997) can illustrate a variety of different mental models, according to the focus of the researcher. This variety indicates that mental models are representations of interrelated concepts that reflect conscious or subconscious perceptions of reality. Carley (1990) suggests to represent these mental models as networks.

This study applies the proximity analysis and adopts the way of representing the map of relationships between concepts from the cognitive mapping. The study concerns with the co-occurrence of explicit concepts, but not particularly deals with any affection or conscious and subconscious perception. Yet, the relationships between concepts are drawn in a network. Further, the importance of every concept in the maps is assessed using the centrality measures from the social network analysis.

Social Network Analysis.

Social network analysis has emerged as a useful tool for studying relations in modern sociology. It is a collection of graph analysis methods that researchers developed to analyze networks in anthropology, biology, communication studies, economics, geography, information science, organizational studies, social psychology, and sociolinguistics as well as a popular topic of speculation and study.

Social network analysis is built based on an assumption of the importance of relationships among interacting units. The social network perspective encompasses theories, models, and applications that are expressed in terms of relational concepts or processes. A "social network" is defined as a group of collaborating entities that are related to each other. Mathematically, this is a graph (or a multi-graph); each participant in the collaboration is called an actor and depicted as a node in the graph. Actors can be persons, organizations, or groups—any set of related entities. Valued relations between actors are depicted as links between the corresponding nodes.

In explaining the structure of the network, social network analysis introduced the network centralization indices. Network centralization indices explain the topology of the network. Network may have one (or more) actor(s) that dominate(s) as in the star topology; or the connectedness is equally distributed among nodes and forms the circle topology. As for the importance of every actor in the network, social network analysis used the unit centrality measures. Both network centralization indices and unit centrality measures consist of degree, closeness and betweenness measures. Degree centrality measure represents number of ties an actor has with other actors in the network. Closeness centrality represents number of shortest path an actor has with other actors in the network. Betweenness centrality of an actor indicates the number of relations between two other actors in the network that regard it as connecting node.

Coopetition.

In endeavor to find a new perspective and framework in examining coopetition, Galvagno and Garraffo (2009) present a list of seven articles which can be considered as sample of the most well-known definitions of coopetition in the literature. In chronological order, the referred articles are: Hamel, *et al*. (1989), Brandenburger and Nalebuff (1996), Lado, *et al*. (1997), Bengtsson and Kock (2000), Gnyawali and Madhavan (2001), Dagnino and Padula (2007) and Luo (2007).

Under the term of strategic alliances, Hamel *et al*. (1989) propose the collaboration with competitors as new sources of competitive advantage. Coopetition – which in their term is referred as "Competitive Collaboration" – is considered a potential way to acquire new technologies, skills and knowledge from competitors. Remarks on the benefit of coopetition can be summarized as balancing the collaborative and competitive strategy. Coopetition can only happen if the strategic goals of the firms involved in the coopetitive relationships converge while their competitive goals diverge. That is, each firm in the relationships allows for the other's continued prosperity in the shared business. For example, two firms might collaborate in producing new product, but neither side invades the other's market.

In their seminal book, Brandenburger and Nalebuff (1996) acknowledge both the limits of competition and the growing importance of cooperation, and claim to offer a new business strategy that combines the benefits of both. Although they don't provide an explicit definition of coopetition, their perspective is illustrated by the following quote: "Business is cooperation when it comes to creating a pie and competition when it comes to dividing it up". In other words, Galvagno and Garraffo (2009) rephrase this definition and define coopetition as a relationship between two firms based on cooperation to develop a new product and create value and share of market and distribute the returns to the value that has been created.

Lado, *et al.* (1997) define coopetition under the term of syncretic rent- seeking behavior that describes a firm's strategic orientation to achieve a dynamic balance between competitive and cooperative strategies. The article starts the tradition of formalizing the multidimensionality of coopetition under the shade of orthogonality that is drawing the typology of coopetition as a four-quadrant scheme with competition and cooperation constructs as the axes. In their article, Lado, *et al*. (1997) also integrate three major theoretical perspectives that still considered important in exploring Coopetition: game theory, resource base view and socioeconomics.

According to Bengtsson and Kock (2000), coopetition is a complex relationship. Coopetition is more complex than the firm simultaneously is involved in both cooperative and competitive interactions with the same competitor at the same product area. The complexity of the coopetitive relationships is due to the fundamentally different and contradictory logics of interaction that competition and cooperation are built on. Bengtsson and Kock (2000) propose to separate the competitive and the cooperative parts of the relationship to manage the complexity and thereby make it possible to benefit from coopetition. The competitive and cooperative of interaction in coopetitive relations are not divided between counterparts but between activities, as it is impossible to compete and cooperate with the same activity. In this article, coopetition is put within a single continuum with competition and

cooperation as its opposite ends. This structure accommodates different shapes of coopetition. On one end, we can have a relationship between two competitors consisting merely of cooperation, a traditional cooperative relationship. On the end, we can have a relationship between two competitors consisting merely of competition, a competitive relationship. Between these two ends we will have at least three different types of coopetitive relationships depending on the degree of cooperation and competition occur in the relationship: the cooperation-dominated relationship, equal relationship and competition-dominated relationship. Later, this structure is criticized because it can not accommodate the dynamics of coopetition over time (Luo, 2007 and Galvagno and Garraffo, 2009).

A solution to capture the dynamics of coopetition is proposed by Gnyawali and Madhavan (2001). They introduce the multilevel conceptual model that explains how the structural properties of firms and the structure of the network to which the firms belong, influence the flow of assets, information, and status among network members. Resource asymmetries occur because of the differential flow of resources among network members, as well as their differential ability to control such flows. They call the perspective as embeddedness perspective of competitive dynamics. This perspective is principally built based on the properties of network analysis. In this perspective, networks are regarded as loci of resources. They consolidate four sets of arguments to support the importance of networks as resources. First, relationships in a network are potential conduits to internal resources held by connected actors. Second, external economies-that is, "capabilities created within a network of competing and cooperating firms"- often complement firms' internal resources. Third, the rate of return on internal resources is determined by how well structured the firm's network is. And fourth, a firm's position in a network contributes to its acquisition of new competitive capabilities, which, in turn, enhances its ability to attract new ties. In addition to the access logic of the above four arguments, a firm's control over the flow of resources from itself to the connected actors and between the latter also influences competitive behavior.

While Hamel, et al. (1989) address that collaboration is a competition in a different form, thus establish competition as the starting point of coopetition, Dagnino and Padula (2007) view coopetition as the intrusion of competition in a cooperative game structure. By suggesting that coopetition is a matter of “incomplete interest (and goal) congruence” concerning firms’ interdependence, Dagnino and Padula (2007) emphasize that coopetition does not simply emerge from coupling competition and cooperation issues, but rather it implies that cooperation and competition merge together to form a new kind of strategic interdependence between firms, giving rise to a coopetitive system of value creation.

Luo (2007) examines coopetition in the context of global competition. In this context, coopetition is defined as simultaneous competition and cooperation between two or more rivals competing in global markets. Under coopetition, the relationship between global rivals is a simultaneous, inclusive interdependence with cooperation and competition as two separate yet interrelated continua. The interdependence entails competitive and collaborative activities undertaken in the pursuit of global reach, expansion, and profit. Luo (2007) also continues the tradition to explain coopetition by depicting a typology. His typology of coopetition is built based on the intensity of coopetition – that is the extent to which

a focal global player is both competing and cooperating with a major global rival in international markets. This pair-wise analysis is a measure of the vigor of a specific coopetitive relationship with a leading competitor. Depending on the intensity of competition and cooperation that simultaneously occur with a global rival, a firm may find itself in a (1) contending situation, (2) isolating situation, (3) partnering situation, or (4) adapting situation.

METHODOLOGY

The Stages.

The two-phase analysis conducted on Coopetition literature was set in this thorough sequence and through four stages. First the content analysis was performed to single out the most frequent concepts that occurred in the papers. Then, statistical bivariate correlation analysis was conducted to examine the significance of every relationship that occurred between the most frequent concepts. Third, the significant relationships were drawn as a network. Fourth and finally, the network was evaluated using social network analysis centrality measures.

Data Sources.

The author analyzed 146 articles produced between 1989 and 2008, categorized as published and unpublished paper. Published papers refer to journal article, and unpublished to internet file, thesis, conference, workshop, seminar, working or research paper; 32 articles are published and 114 are unpublished.

Phase 1: Content Analysis
Text Preparation.

All article files were converted to the Rich Text Format (RTF) fulfilling the prerequisite of ATLAS.ti. 5.0. the content analysis software used in the study. Misspelled and deformed words and paragraph were corrected to ensure the consistency of word form and spelling. Refer to the part of article used in the content analysis, in this study the author introduced a somewhat opposing to the simple bibliometric method (used for example by Furrer, *et al.*, 2008 and Valmar, *et al.* 2008). While bibliometric method uses only bibliography or references part of articles, this study used complete content. In the stage of text preparation, the text was cropped and left it only with title, name of authors, complete content and foot notes. In this way, the non-contextual meaning of the concepts and the words (concepts) redundancy were minimized.

Counting and Defining Concepts.

Using *Word Cruncher* function provided by ATLAS.ti.5.0. the words in all the texts were counted. This stage resulted list of the most frequent concepts. Based on the lists, the semantic definition of every concept is determined. Words and quotations with similar meaning were grouped into a single meaningful concept. For example, the author coded the words of Coopetition, Coopetitive, Coopetitor(s), Syncretic and statements consisted of "compete and cooperate with competitor" as the concept of Coopetition. Table 1 shows the concept definition expressed in the syntaxes of ATLAS.ti.5.0. Table 2 compiles occurrences of concepts in all the texts for all the setting with standard descriptive statistical measures: mean and standard deviation.

Table 1 Codes expression

Codes	Expression
Competition	compet*|riva*|enem*
Cooperation	cooperat*|collab*|partner*|counterpart*|ally*|allia*
Coopetition	coopet*|syncretic*|Quotation: "simultaneously compete and cooperate"
Knowledge	knowle*
Market	market*
Network	netw*
Relationships	relati*|interact*
Resources	resour*
Strategy	strate*
Value	value*

The asterisk (*) is the GREP function used by the software that matches any number (including zero) of character preceding expression.

Table 2 Descriptive statistics of concepts

Concepts	N = 146		
	Number	Mean	S.D.
Competition	4268	29.23	21.50
Cooperation	4918	33.68	23.96
Coopetition	3203	21.94	20.69
Knowledge	1535	10.51	16.15
Market	2247	15.39	13.84
Network	1223	8.38	15.94
Relationships	3167	21.69	18.45
Resources	1254	8.59	11.71
Strategy	2575	17.64	13.22
Value	1243	8.51	9.75

Determining and Drawing Relationships.

The next stage was performing bivariate correlation analysis on every possible relationship between concepts. Statistical computations were performed using SPSS. This stage resulted lists of significant relationships between every pair of concepts on which maps of relationships are drawn. Network delineation was done both using ATLAS,ti.5.0 and Pajek, for the same set of data both software produce identical networks. Nevertheless, compared to ATLAS,ti.5.0, network drawing using Pajek was better since it provided the networks with recommended measures of centrality.

Mostly the relationships in the networks were defined as associate with. only three forms of relationships were defined in a different way. The study defined relationships between competition – cooperation as contradict and both relationships between competition – coopetition and between cooperation – coopetition as is part of.

Even though graphically is part of was drawn as directed arc, in the network analysis we treated this relationship as undirected one. Since contextually in the articles the relationships between the concepts of coopetition, cooperation and competition were symmetric. It was assumed that in all the texts, the concept of competition (and cooperation) occurs because the concept of coopetition occurs, and vice versa. This assumption was applied to all the relationships in the networks. In the network analysis, all relationships were treated as undirected edges or simply as lines.

Phase 2 Social Network Analysis
Computing Centrality Measures.

In analyzing network, Pajek provides every concept with its unit centrality measures and every network with its network centralizations indices. Unit centrality measures include degree, closeness and betweenness centrality (Freeman, 1977). Every concept in the network entitles a number for every of these unit centrality measures. Network centralization index refer to a number for a single network. Network centralization measures include degree, closeness and betweenness centralization index (Freeman, 1979, Batagelj and Mvar, 2009).

Degree centrality is based on the idea that important nodes are those with the largest number of ties (degree) to other nodes in the graph. Closeness centrality measures the centrality of a node based on the distance of its shortest path to another node. Betweenness centrality includes three nodes (e.g. X, Y and Z) and it measures the number of shortest path between Y and Z through X. Pajek applies relative centrality measures that range from 0 to 1, 0 denotes that a node does not have any connectivity with any nodes in the network and 1 represents that it has connection to all the nodes in the network.

Network centralization indices are represented by numbers between 0 and 1 and the numbers vary due to the network topology. The values of centralization measures of a network with star topology are 1, and the values of those of a circle are 0. Highly centralized network – that is a network with some numbers of nodes has much higher centrality than other nodes – has centralization measures value close to 1. On the other hand, if centrality measures of every node in the network do not differ significantly, the values of centralization indices are close to 0.

DISCUSSION

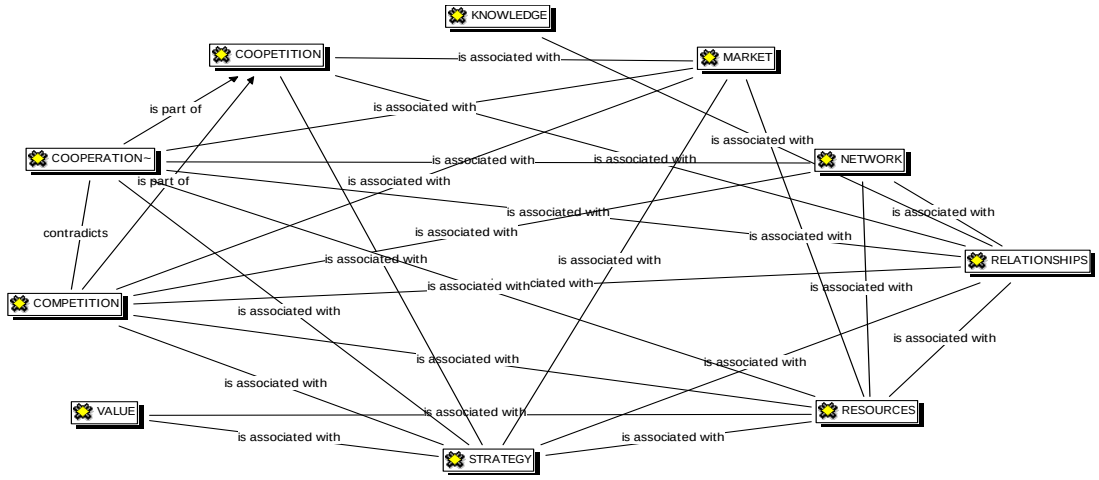
Results of bivariate correlation analysis, network of relationships between concepts and centrality measures of concepts are shown in Table 3, Figure 1 and Table 4. Ten most frequent concepts occurred are: competition, cooperation, coopetition, market, network, relationships, resources, strategy and value. All the concepts at least have one significant relationship with at least one concept in the network. The strongest relation in the network is the relation between the concepts of competition and cooperation ($r = 0.63$). Related to coopetition, the concepts of competition, cooperation, market, network, relationships and strategy have significant relations. Only with the concepts market and value, coopetition has insignificant relations.

Table 3 Correlations between concepts

		1	2	3	4	5	6	7	8	9	10
1	Competition	1									
2	Cooperation	.63**	1								
3	Coopetition	.59**	.30*	1							
4	Knowledge	.04	.13	.09	1						
5	Market	.51**	.29**	.18*	-.01	1					
6	Network	.39**	.21*	.13	.04	.13	1				
7	Relationships	.38**	.42**	.33**	.20*	.14	.27**	1			
8	Resources	.51**	.46**	.12	.06	.36**	.31**	.26**	1		
9	Strategy	.42**	.36*	.31**	-.02	.40**	.01	.20*	.32**	1	
10	Value	.04	.05	.09	.14	.13	-.08	.06	.25**	.25**	1

** *Correlation is significant at the 0.01 level (2-tailed).*

* *Correlation is significant at the 0.05 level (2-tailed).*



Network Centrality Index :	Degree	Closeness	Betweenness
	0.25	0.26	0.21

Figure 1 Networks of relationships between concepts

Table 4.Centrality measures of concepts

Concepts	Degree	Closeness	Betweenness
Relationships	0.78	0.82	0.24
Strategy	0.78	0.82	0.12
Resources	0.78	0.82	0.11
Competition	0.78	0.82	0.04
Cooperation	0.78	0.82	0.04
Coopetition	0.56	0.69	0.01
Market	0.56	0.64	0.01
Network	0.44	0.64	0.00
Value	0.22	0.53	0.00
Knowledge	0.11	0.47	0.00

Assortment of concepts used in discussing coopetition is also supported by the social network analysis results. The concepts of relationships, strategy, resource, competition and cooperation all are connected to 78% of the concepts and have shortest path to 82% of the concepts in the network of published and unpublished literature. Nevertheless, betweenness centrality measures of these five concepts considerably differ. The concept of relationships has the highest betweenness centrality measure (0.24), and is followed by strategy and resources (with value of betweenness centrality measure = 0.12 and 0.11) and by competition and cooperation which have exactly the same value of betweenness centrality measure (0.04). These values conclude that in term of being a connecting concept, the most important concept in the network is Relationships.

The connection between relationships and coopetition may also be compiled in the relational view, a perspective that is potential to explain coopetition (Yami, *et al.*, 2008). This perspective challenges of length Resource based view (Barney, 1981) by suggesting firms to develop relationships that result in sustained competitive advantage. According to the resource based view, gaining a high profit is about protecting, not sharing firm's valuable, rare, imperfectly imitable and imperfectly substitutable resources. However, protecting sources might have a negative effect; for example a firm might lose its competitive advantage while protecting its valuable proprietary know-how to prevent knowledge spillovers. On the other hand, an effective strategy from a relational view allows firms to systematically share valuable know-how with alliance partners (and willingly accept some spillover to competitors) in return for access to the stock of valuable knowledge residing within its alliance partners. This strategy can only be applied when the expected value of the combined inflows of knowledge from partners exceeds the expected loss/erosion of advantages due to knowledge spillovers to competitors (Dryer and Singh, 1998).

The second most important concept is strategy. Coopetition is a new form of strategy. Coopetition manifests itself as a strategy for 'cooperation and competition' (Bengtsson and Kock, 2000; Brandenburger and Nalebuff, 1996; Luo, 2005). More specifically, Dagnino and Padula (2007) define coopetition strategy as a kind of inter-firm strategy which consents the competing firms involved to manage a partially convergent interest and goal structure and to create value by means of coopetitive advantage. This definition explicitly involve the concepts of strategy, relationships, competition, cooperation and value, in this way it helps to clarify the betweenness centrality measures of all the mentioned concepts. Coopetition is described as the nature of the inter-firm interdependences where competitors decide to cooperate on the basis of a partial convergent interest structure which results in value creation.

The concept of resources is the third most important concept. Resources may reveals in the sense of resource based-view, a perspective employed in examining coopetition. The resource-based view provides an explanation of competitive heterogeneity based on the premise that close competitors differ in their resources and capabilities in important and durable ways (Petegraf, 1993). Moreover, the concept of Resources is firmly attached to the relational view which not only values relationships as an access to resources but also as resource itself. The Relational View considers relationships as loci of

value creation and a way to stimulate firm performances (Dyer and Singh, 1998).

Other connections between resources, relationships and coopetition are compiled by Dowling *et al.* (1996). in attempt to compose typology of coopetition – or in their case they name it as multifaceted relationships – Dowling *et al* (1996) use Resource Dependence Theory which comprises relationships and resources. Resource Dependence Theory hypothesizes that inter-organizational relationships are formed to reduce dependence on external resources. Based on this theory, two types of relationship are distinguished: competitive, where the outcome achieved by one organization can only be higher if the outcome achieved by a competing organization is lower (a zero sum game according to game theory), and cooperation, where the output of one is the input of another. The theory identifies that such interdependencies may also occur simultaneously, which leads to the definition of coopetition.

The variety of concepts exploited in examining coopetition is also supported by the network centralization indices. The indices ranged from 0.21 to 0.26 indicate that the network is closer to the ring topology rather than to the star one.

CONCLUSION

The content analysis results in ten most frequent concepts scholars use in defining and discussing Coopetition. The concepts are: competition, cooperation, coopetition, knowledge, market, network, relationship, resources, strategy and value. Social network analysis on coopetition literature results the importance order of concepts in term of unit centrality measures for every concepts in the network. Ranging from the most important concept to the least are the concepts of Relationships, Strategy, Resources are considered the most important concepts in the network of the last setting.

Besides the importance order of concepts, social network analysis also confirms the nature of the network relationships between concepts. The network centrality indices indicate that the topology of the network is closer to the ring topology.

Connectivity between the concepts of Relationships, Strategy and Resources brings perspectives such as resource based view and relational view into our consideration as potential theoretical perspective in explaining coopetition. All the results at the end may affirm coopetitive strategy as a new form of strategy, an alternative to the two other main paradigms – competition and cooperation – that are already corroborated in the field of strategic management.

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