DEVELOPING A SCALE FOR BUSINESS NETWORK CLUSTERING

Daniel J. Flint
Regal Entertainment Group Professor of Business
314 Stokely Management Center
University of Tennessee,
Knoxville, TN 37996
dflint@utk.edu
865-974-8314

Paola Signori
Associate Professor of Marketing
Department of Business Administration
University of Verona
Via dell'Artigliere, 19 - 37129 Verona, Italy
paola.signori@univr.it
+ 39 045 8028492

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ABSTRACT

The purpose of this paper is to report on the results of a scale development study that measures the nature of business clustering relationships. Business clusters, i.e. networks of businesses in a similar industry and/or region, have been studied previously but no scale has yet been developed that describes the true nature of these network relationships. By testing the DODS model proposed by Djorcev et al. (2015), which is conceptualized very differently from the well accepted and popular Porter models, this paper extends the clustering theory in business networks. In particular, we more deeply explore what it means to be in a cluster with other organizations.

This paper reports on the survey test aspect of a mixed method project conducted in the global wine industry. The research design relies on a previous qualitative study where we proposed a model for the nature of business clustering to develop a multi-item survey. The new questionnaire tests the validity of eight dimensions of clustering (Being True to Ones' Core Business; Clarifying Motivations to Cluster; Determining Rules and Guidelines; Reconciling Collective Needs/ recognizing unique needs; Reconciling Collective Needs/international presence needs Determining Member Characteristics; Managing the Dynamics of Cluster Membership/ dynamics; Managing the Dynamics of Cluster Membership/alignment; Recognizing Drawbacks and Limitations) and outcome variables (three dependent variables: enhanced own organization's marketing strategies; Improved international presence; Improved regional awareness).

This study aimed to validate the scale items and demonstrate construct relationships to business performance measures. Although refined from the initial item pool through this scale development process, the final scales appear somewhat generalizable, able to be used by researchers in a variety of industries. Managers can use this instrument to examine the aspects of their own network relationships as they relate to marketing strategies and regional awareness. This is a cross-sectional survey conducted only within one industry, thus findings may be limited by time and context. Future research ought to extend the generalizability we implied as well its stability over time.

Keywords: clustering, scale development, survey, marketing, relationships

INTRODUCTION AND OBJECTIVES

Clustering refers to a formal alliance or partnership between three or more similar businesses to share resources, such as ideas, assets or expenditures. Often these clusters are formed because no single business has the resources needed to achieve desired objectives, which often include international recognition and distribution for its products. Thus, clustering, also known as districts or consortia and other names, often occurs for marketing reasons. It has been discussed by Porter extensively (1990; 1998; Porter and Bond 2004) and applied to the wine industry. Due to the limitations of Porter's models, we (Djorcev et al. 2015) conducted an inductive project to develop a complementary framework for explaining the nature of clustering itself, i.e., what it

meant to be a member of a cluster. In that development phase, we referred to this as the DODS model (Dual Octagon Dynamic and Social) reflecting the two octagons in the framework, one depicting eight behaviors of a cluster organization and the other depicting members' mental orientations impacting those behaviors.

In order to increase the generalizability of this model and to enable the testing of hypotheses about the effects of clustering on dependent variables such as marketing effectiveness and international awareness of brands and regions, a robust measurement scale is needed. Therefore, we set out to develop a scale to capture the nature of clustering, specifically to develop a survey instrument of questions that could be used to get at the behavior octagon within the DODS model.

RESEARCH QUESTION

In 2015, a clustering model was introduced describing how wineries form alliances in order to pool resources and increase the effectiveness of their international marketing efforts (Djorcev et al. 2015). That model was limited however in that it was the result of an inductive theory building study and lacked validation. We decided to put that model to a test. The aim of this article is to describe the initial results of a study designed to develop a survey scale instrument for measuring the nature of business network clustering. Our overarching two-part research question was: What could the measurement of "the nature of clustering" look like in terms of measurement and predictive validity? The purpose of this paper is to report on the results of this scale development study that measures the nature of business clustering relationships.

LITERATURE AND RESEARCH MODEL

Clustering can apply to regional planning, economics, geography and marketing (Vorley 2008). It has been referenced as an industrial district when it involves numerous businesses that connect to each other within a local region (Ditter 2005) and as such, all of the businesses in a district are not necessarily the same, but form supply chains for each other. In Italy these initially were referred to as 'Third Italy' (Boschma 1998, 1999; Boschma and Kloosterman 2005; Montgomery 2011). In particular, Giacomo Becattini (1979) "reactivated the Marshallian idea of the 'industrial district' in an effort to account for the dramatic rise of neo-artisanal manufacturing in Northeast Italy" (Becattini as cited in Ditter 2005, p.41). Becattini suggested that an 'industrial district' is an accurate representation of a local production system. Clustering of these specialized enterprises enabled rapid growth, opened access to global markets, developed new niche markets, and offered various employment opportunities (Boschma and Kloosterman, 2005; Montgomery 2011).

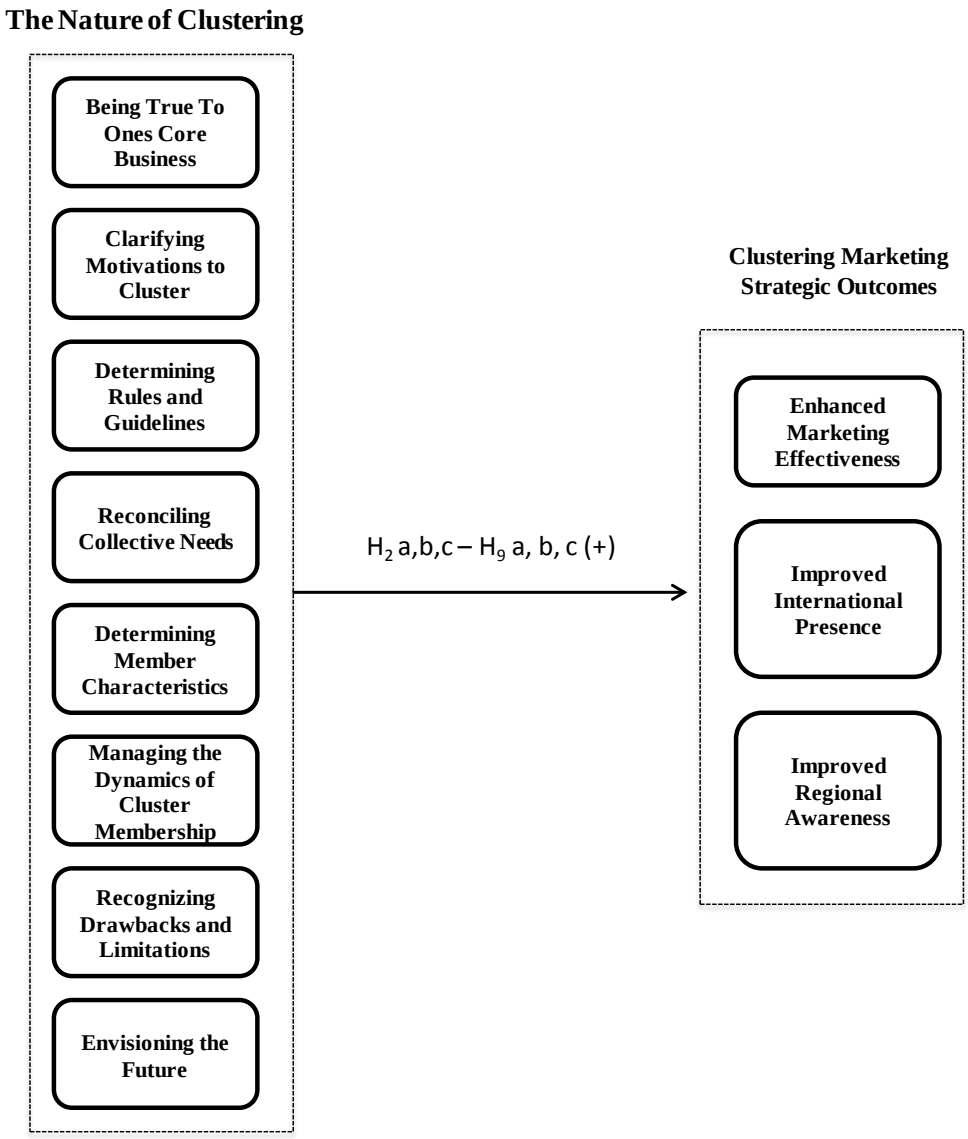
Literature on industrial districts and clustering is fairly fragmented (Hervas-Oliver et al., 2015). Arikan and Schilling (2011) argue that the theoretical fragmentation in the field has reached a point of leading some researchers to question the very utility of the district concept (Martin and Sunley, 2003). When all of the businesses are of the same type, such as all wineries, the network organization might be referred to as a consortia or a network alliance. These clusters are formed by the members primarily to pool/share resources for the cluster, such as funds to support marketing efforts, and the individual businesses within the cluster (Boja 2011).

Michael Porter's (1990, 1998) strategy and structure diamond model is widely used. In particular, wineries globally have realized that cluster approaches can be quite beneficial to their businesses because they encourage the exchange of knowledge, spur innovation and can improve efficiency and effectiveness of international marketing efforts (Ditter 2005; Porter 1998; Muller et al. 2006; Zanni 2004). Although some research has explored the impact of clustering within various cultures such as Australia (Aylward 2004), Chile (Gálvez-Nogales 2010; Giuliani and Bell 2005), Canada (Mytelka and Goertzen 2004), France (Ditter 2005), Italy (Borghesi 2002, Brunetti et al. 2002; Camuffo and Grandinetti 2011), and California (Porter 1998), this body of work does not empirically test a model describing the nature of clustering. We know they are important for local regional economies encouraging joint strategic initiatives and potentially enhancing local, regional and natural growth and competitiveness (Centonze 2010, p. 253), but know very little about what it means to actually operate within a cluster.

Clusters are one form of inter-firm relationships. Beverland and Bretherton (2015) confirmed that the formation of inter-firm relationships or strategic alliances is a strategic reaction on behalf of firms to changes in the market environment. Under emerging external pressures, industrial districts are evolving towards a differentiated organizational structure in which innovation is driven by firms working together who are focused on core competences and high valued added activities (Capasso and Morrison 2013). There exist a number of different forms of clusters or districts. Arikan and Schilling (2011) developed a typology of districts based on the dimensions of need for coordination and centralization of control. In all cases, however, these clusters must negotiate and coordinate procedures for how they will interact. These constitute the nature of clustering.

The framework we draw upon here adapted from Djorcev et al (2015) illustrates how participants understood and interpreted their social, economic, and professional every-day lives as they strived to succeed in the marketplace through clustering. It suggests that understanding a small- to medium-size enterprise leader's marketing strategies requires understanding his/her perceptions of key aspects of clustering itself, what we refer to as the 'Nature of Clustering'.

Figure 1. The Nature of Clustering and Its Impact on Outcomes



These eight dimensions from the Dual-Octagon Dynamic and Social (DODS) Clustering Model (Djorcev et al. 2015) are defined as follows (Figure 1 represents these constructs):

- *Being True to Ones' Core Business*: Each enterprise needs to remain true to its core business, and to be authentic even though it is partnering with similar organizations.
- *Clarifying Motivations to Cluster:* Custer members spend time contemplating and discussing their motivations to cluster amongst each other, such as cost reduction, increased marketing effectiveness, and gaining energy/knowledge through shared values.

- *Determining Rules and Guidelines:* Defining member rules and tasks is a critical issue. Participants discuss how they formally and informally attempt to manage the development and enforcement (or elimination) of rules and guidelines.
- *Reconciling Collective Needs.* Members within a cluster spend time discussing and reconciling their individual organizational needs, that often include the need to expand internationally.
- *Determining Member Characteristics:* An important aspect to clustering is the determination of who should be in and who should not and what characteristics a member organization should possess.
- *Managing the Dynamics of Cluster Membership:* Cluster members join and leave at times. Members spend time dealing with the growth of their cluster.
- *Recognizing Drawbacks and Limitations:* Part of clustering involves recognizing the limitations and drawbacks of clustering itself;
- *Envisioning the Future*: Cluster members spend time envisioning what the future may hold for the cluster and their own organizations.

There are not any antecedent scales pertaining to this model, thus the entire test (set of hypotheses) is constructed from the ground up. This model depicts two kinds of hypotheses, one on the measurement of *the nature of clustering* through the eight constructs, the other on the predictive validity of those eight constructs. As such our hypotheses were as follows (collapsed here due to space constraints):

H_1: The Nature of Clustering can be measured using a survey instrument comprised of eight multi-item scales, specifically the eight constructs from the DODS framework.

H_2-H_9: Each of the eight constructs will have a positive impact on the three marketing-relevant outcome (dependent) variables, including the Recognizing Drawbacks and Limitations construct, which might be conceived as having negative relationship with the dependent variables. Because this is a part of clustering, it too should have a positive impact on the DVs. Due to there being three dependent variables, H_2-H_9 have three subparts. :

a. The Nature of Clustering constructs will have a positive impact on Enhanced Marketing Effectiveness.
b. The Nature of Clustering constructs will have a positive impact on Improved International Presence.
c. The Nature of Clustering constructs will have a positive impact on Improved Regional Awareness.

METHOD

We build on our initial qualitative study that proposed a model for the nature of business clustering to develop a multi-item survey (Djorcev et al. 2015). That qualitative study relied on

grounded theory (Glaser, 2001; Glaser and Strauss 1967) using in-depth, open-ended, conversational interviews.

The eight dimensions do not reflect any previous developed and empirically validated scales that we are aware. As such, we developed pools of items (i.e., survey questions) for each one. Consistent with standard scale development projects (DeVellis, 2003), we had an expectation that items would be deleted and even some moved from one construct to another as scale refinement progressed based on initial tests of the survey instrument.

The initial survey was comprised of 47 items measuring the eight clustering dimensions (Being True to Ones' Core Business – 6 items; Clarifying Motivations to Cluster – 8 items; Determining Rules and Guidelines – 5 items; Reconciling Collective Needs – 5 items; Determining Member Characteristics – 6 items; Managing the Dynamics of Cluster Membership – 7 items; Recognizing Drawbacks and Limitations – 5 items; Envisioning the Future – 5 items). Ten items were created to measure the three dependent variables (enhanced own organization's marketing strategies; improved international presence; improved regional awareness). A control variable (industry technological change) was added to help test for common method bias. The online survey (using Qualtrics) was distributed to 500 randomly-drawn members of a commercial mailing list of winery managers in the U.S. (Wines and Vines) as well as contacts pulled from lists in Australia, New Zealand and Italy. It should be noted that the commercial list could not identify which member organizations were members of a winery cluster. As such, we expected a very low response rate since many would not be members of a cluster and thus, would be inappropriate. However, at this preliminary pilot testing stage, we simply required a sample size large enough to test the model, which we estimated as near 100. This first wave of data collection resulted in 45 respondents who completed the entire survey.

We used this initial sample to examine basic descriptive statistics, preliminary confirmatory factor analyses, and preliminary scale reliability data simply to get an idea of whether the items were loading as expected. As a result of these tests as well as carefully re-reading of the items, we assigned a few items to different constructs. At times, the way a respondent interprets a question differs slightly from what was intended. Thus, upon re-examination, we concluded that the statistical results made sense and provided insights as to how the questions were being interpreted. For example, we discovered that two constructs (Reconciling Collective Needs, Managing the Dynamics of Cluster Membership) each reflected multiple constructs not one. As such, even though the items remained in the survey in the order they were originally placed, we theoretically expected these two constructs to reflect four constructs. The problem here is that three of the two constructs became two-item scales. Ideally, each construct would be reflected by three items or more.

We then re-distributed the survey in a second wave to an additional 1000 randomly selected members from the same commercial database. This resulted in an additional 59 fully completed surveys arriving at a total of 104 usable for pilot testing of the instrument. Although this sample percentage (i.e., 7 percent) is low, given the lack of initial pre-screening for cluster membership as well as how over-surveyed businesses are, the sample size was adequate for this initial stage. Subsequent testing of the model will focus in on a more targeted sample.

The data were initially examined using descriptive statistics such as frequencies, means, kurtosis and skewness, and normality looking for anomalies using the software package SPSS.

Subsequently we ran factor analyses on the data to confirm that items loaded effectively (i.e., with loading values over 0.500) on the constructs intended. This resulted in the elimination of 10 items. All items within one construct (Envisioning the Future) were either eliminated due to low factor loadings or moved to better fit another construct. The survey at this point measured nine independent variable constructs reflecting the nature of clustering (37 items) and three dependent variable constructs (9 items).

Construct reliability values at this stage were satisfactory, exceeding 0.700 (Nunnally, 1978) the standard for exploratory scale development. Extracted average variance (AVE) values as well as AVE compared to highest shared variance were also satisfactory for each construct.

We then analyzed the dataset within AMOS for further measurement refinement and structural equation modeling. This process refined the set of clustering constructs to 8 represented by a total of 24 items. Following measurement model refinement, predictive validity was assessed by testing the structural relationship between these 8 constructs and the dependent variables.

FINDINGS

There are two aspects to the results. The first is what is referred to as a measurement model. This refers to how well the items (questions) demonstrate construct reliability and validity in measuring what they are intended to measure. This involves both the statistical results as well as theoretical understanding based on the reading of specific items. Results of the measurement model tests in SPSS and AMOS indicate that we have valid and reliable measures of the constructs. Composite reliability values for the final constructs are indicated in Table 1 (survey items details in Appendix 1). The measurement model fit statics fell within acceptable ranges: Chi-square/degrees of freedom: 427.299/224, RMSEA: .094, CFI: .92, NFI: .90. Thus H1 is partially supported, i.e., the nature of clustering can be measured using indicators that tap into the main concepts expressed in our original model but not every concept was modeled as expected.

Table 1. Composite reliability values

Scale	Composite Reliability
Independent Variables	
Being True to Ones' Core Business (6 items) [BTOCB]	0.989
Clarifying Motivations to Cluster (3 items) [CMC]	0.779
Reconciling Collective Needs – recognizing unique needs (3 items) [RCN_UN]	0.741
Reconciling Collective Needs – international presence needs (2 items) [RCN_IP]	0.871
Determining Member Characteristics (3 items) [DMC]	0.773
Managing the Dynamics of Cluster Membership – dynamics (2 items)	0.771

[MDCM_D]	
Managing the Dynamics of Cluster Membership – alignment (2 items) [MDCM_A]	0.742
Recognizing Drawbacks and Limitations (3 items) [RDL]	0.751
Dependent variables	
Enhanced own organization's marketing strategies (5 items) [EOMS]	0.905
Improved international presence (2 items) [IIP]	0.750
Improved regional awareness (2 items) [IRA]	0.746

We then proceeded to test the structural model for predictive validity by modeling these 8 nature of clustering constructs with the DVs. Not all paths were significant in the final model. Table 2 depicts the overall model fit statistics as well as only the significant parameter estimates (i.e., supported hypotheses).

Table 2. Structural test results

Dependent Variable	Significant Constructs (at the $p < .001$ level)	Parameter Estimate (H_2-H_9)
Enhanced own organization's marketing strategies (EOMS)	Being True to Ones' Core Business (BTOCB)	0.588
	Reconciling Collective Needs – recognizing unique needs (RCN_UN)	0.852
	Reconciling Collective Needs – international presence needs (RCN_IP)	0.540
Improved international presence (IIP)	Reconciling Collective Needs – international presence needs (RCN_IP)	0.724
	Managing the Dynamics of Cluster Membership – dynamics (MDCM_D)	0.226
Improved regional awareness (IRA)	Being True to Ones' Core Business (BTOCB)	0.819
	Reconciling Collective Needs – recognizing unique needs (RCN_UN)	0.919
	Reconciling Collective Needs – international presence needs (RCN_IP)	0.294
	Recognizing Drawbacks and Limitations (RDL)	0.627
Fit statistics: Chi-Square (841.366), df (422), RMSEA (0.098), CFI (0.85), TLI (0.813)		

These parameter estimates and the fit statistics are encouraging but indicate the potential for improvement. Specifically, the model does indicate which aspects of the nature of clustering are critical for specific yet different outcome variables, but not all are important. Additionally, the fit

statistics ideally would be better such as CFI/TLI exceeding 0.90. Across all three dependent variables, five clustering constructs seem to be emerging as the most critical aspects of clustering

DISCUSSION AND CONCLUSION

This initial stage of a scale development project for the *nature of clustering* yielded some promising results. In particular, we can moderately support H_1, i.e., it is possible to measure the nature of clustering. However, not all of the hypothesized dimensions held up in our study. The envisioning the future construct failed to materialize. This could be due to at least two factors: poor measurement, or poor theory. We cannot attribute this result to sample size as this affects all constructs in the model. We also took the conceptualization further by refining two constructs each into multiple related constructs.

Concerning the remaining hypotheses, some of the nature of clustering constructs appear to be predictors of important marketing outcome variables. The finding that not all nature of clustering constructs were critical to predicting these particular dependent variables does not mean that they would not be important predictors of other dependent variables.

Therefore, it appears that this study has made progress in advancing the measurement of what it means to be part of a business cluster network.

LIMITATIONS AND FURTHER RESEARCH

Clearly these results have limitations. First, the measurement results are marginal. Ideally each construct would have higher composite reliability values and the two-item scales would be expanded. The finding that not all constructs were predictors of the dependent variables suggests that more work is needed.

This research has advanced our knowledge of what it means to operate within a cluster or similar organizations in order to leverage collective resources. To date, we are unaware of other empirical examinations of what it means to be part of these forms of alliances for collective marketing objectives. But additional work is needed. Empirically, future research should address the two-item scales, explore additional dependent variables and do so with a much larger sample size. This is a cross-sectional survey conducted only within one industry, thus findings may be limited by time and context. Future research ought to test for the generalizability we implied by testing the framework in other industries where clustering takes place and look for stability over time. Conceptually, additional attitudinal or behavioral constructs that comprise the nature of clustering ought to be developed if appropriate.

MANAGERIAL IMPLICATIONS

Despite the preliminary aspect of these findings there are still managerial implications. These results suggest that while within a cluster business network, organizations ought to not lose sight of their own objectives, spend time clarifying amongst members why each one is there and recognize what can and more importantly cannot be accomplished by the cluster. Additionally,

they should attempt to understand each organization's needs, recognize potential drawbacks as well as keep in mind the needs of the group in order to focus the cluster's strategies. Finally, members should not only recognize that members will come and go, but purposefully manage the dynamic nature of cluster membership in line with the cluster's growth strategies.

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APPENDIX 1. SURVEY ITEMS

(On a scale of 1-7, please indicate to what extent you agree with the following statements.)

9 Independent Variables

BTOCB: Being True to Ones' Core Business (6 items). *"When engaging with other businesses in a cluster/consortia…"*

BTOCB1. We try to remain authentic to our own organization within the group
BTOCB2. It is important that we stay true to our own organization's core values
BTOCB3. We must not lose sight of our own organization's central beliefs
BTOCB4. We must remember what we stand for in our own organization
BTOCB5. We must not forget who we are in our own organization
BTOCB6. We must always keep in mind how we do business in our own organization

CMC: Clarifying Motivations to Cluster (8 items). *"When engaging with other businesses in a cluster/consortia…"*

CMC1. We spend time discussing the marketing benefits that should result by clustering
CMC2. By working with other organizations within the cluster, we expect to be able to share resources
CMC3. We have procedures for how we will market the group

RCN_UN: Reconciling Collective Needs – recognizing unique needs (3 items). *"When engaging with other businesses in a cluster/consortia…"*

RCN_UN1. It is important to reconcile differences between individual organization's needs and those of the group
RCN_UN2. We must not lose sight of unique needs of the individual organizational members
RCN_UN3. We realize that each individual organization may have unique capabilities they are trying to maintain

RCN_IP: Reconciling Collective Needs – international presence needs (2 items). *"When engaging with other businesses in a cluster/consortia…"*

RCN_IP1. We consider how third parties can help the group interface with foreign markets for export
RCN_IP2. We discuss how working together will increase our international presence more effectively than any one organization trying to do it alone

DMC: Determining Member Characteristics (6 items). *"When engaging with other businesses in a cluster/consortia…"*

DMC1. When looking ahead, it is important that we remain committed to the clustering approach.
DMC2. We spend time thinking about where we might be in the future as a consortia
DMC3. We envision that by being part of this cluster, each member organization will be more successful in the future

MDCM_D: Managing the Dynamics of Cluster Membership – dynamics (2 items). *"In this cluster/consortia…"*

MCDM_D1. We acknowledge that the group can grow in membership
MCDM_D2. It is important that we are flexible in allowing organizations to join or leave our cluster.

MCDM_A: Managing the Dynamics of Cluster Membership – alignment (2 items). *"In this cluster/consortia…"*

MCDM_A1. It is important that new member organizations are social (willing to share knowledge).
MCDM_A2. It is important to ensure that new member organization's strengths align with our current member's strengths

RDL: Recognizing Drawbacks and Limitations (4 items). *"In this cluster/consortia…"*

RDL1. I see some limitations in being a part of this cluster
RDL2. There are drawbacks to joining a cluster.
RDL3. Sometimes being a member of this cluster limits me in what I can do within my own organization.

3 Dependent Variables

EOMS: Enhanced own organization's marketing strategies (5 items). *"Since joining this cluster…"*

EOMS1. My own organization has realized more effective marketing
EOMS2. My brands are more well recognized
EOMS3. I have been able to reach markets I could not before
EOMS4. We have been able to improve customer satisfaction with our own brands
EOMS5. We have been able to distribute to markets better

IIP: Improved international presence (2 items). *"Since forming this cluster…"*

IIP1. We have a more international presence
IIP2. We have seen a growth in our international reputation

IRP: Improved regional awareness (2 items). *"Since forming this cluster…"*

IRP1. Our region is more well known
IRP2. We have been able to create awareness around our unique offerings