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Marketing's SEM based nomological network: Constructs and research streams in 1987–1997 and in 1998–2008☆

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ABSTRACT

Which constructs are most important to marketing? Has their importance waxed or waned over time? Is the discipline converging or diverging conceptually? Although scholars have attempted to study the evolution of the discipline, such questions remain largely unanswered. The present research addresses these issues by examining marketing's nomological network—the interconnection of psychometric variables found in the discipline's structural equation models (SEM)—using sociometric techniques. Two digraphs containing the interleaved and concatenated results from SEMs during two periods are investigated. The findings suggest that although marketing thought in SEM studies is somewhat fragmented, two dominant research streams emerge—one dealing with organizational behavior issues and the other with relationship marketing. The focus on SEMs suggests that the findings are particularly relevant for scholars or practitioners in survey-based research, as they provide direction for future research and suggest that firms can prosper by improving customer relationships.

1. Introduction

As a science matures, the progress, evolution, and impact of that particular science are assessed by philosophers of science (Ramos-Rodríguez & Ruíz-Navarro, 2004). As such, marketing's relative importance to a wider audience of social scientists has been investigated (Hoffman & Holbrook, 1993). These efforts have resulted in attempts to determine if marketing is converging on a set of agreed upon propositions that are useful for both researchers and practitioners (Stremerch, Verniers, & Verhoef, 2007). In particular, the structure and process of the discipline have been studied with citation analysis (Hoffman & Holbrook, 1993). By analyzing the discipline's citation patterns, marketing's evolution can more clearly be traced.

The research presented, however, contributes to understanding the discipline's progress by examining the discipline's constructs and their interrelationships. Specifically, several network analysis algorithms are leveraged to investigate the evolution of marketing's nomological network—the law-like interconnection of measured, latent constructs found in the domain (Cronbach & Meehl, 1955). By examining the relationships between the constructs embedded in structural equation models (SEM) in the *Journal of Marketing*, *Journal of Marketing Research*, *Journal of Consumer Research*, and *Marketing Science* over two decades, inferences can be drawn regarding the discipline's advancement. Although these inferences are limited to marketing's psychometric variables, they provide valuable insights for both research and practice.

The present research discusses bibliometric techniques and how these methods have been used to explore the field's progression. In particular, network analysis is used to discover which constructs are most central, and hence most important, to the field, as well as revealing the waning relative importance of others. This analysis also suggests that the marketing discipline is highly fragmented, as numerous versions of semantically related and context specific constructs are identified. The discipline embodies some degree of coherence, as two overarching themes dominate during the past two decades. Additionally, a permutation test assesses the degree to which a network of constructs exhibits symmetry, providing clues as to how researchers assemble SEMs. Finally, a permutation procedure known as the BEA uncovers subsets of constructs with cohesive relationships. Accordingly, direction for the discipline is provided, offering insights for

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substantive researchers developing new constructs, theories, and research streams using SEM. In addition, insights for managers seeking the most effective strategies for winning and keeping customers are provided. Finally, given the focus on SEMs, the present research should be particularly applicable to the large B2B literature, the marketing management literature, or any domain that relies upon survey data.

2. Conceptual background

A sizable body of literature combines citation analysis and a desire to understand the evolution of a scientific domain (Baumgartner & Pieters, 2003; Bettencourt & Houston, 2001). Broadly classified as bibliometrics, such efforts operate by examining journal citations. The inclusion of a citation interconnects articles, suggesting agreement on the cited author's findings (Shadish, Tolliver, Gray, & Gupta, 1995). For example, citing Parasuraman, Zeithaml, and Berry (1988) might suggest a bias towards assessments of service quality based on a perceived gap between expectations and actual performance. Additionally, bibliometry examines co-citations where two or more authors make a reference to a particular article, perhaps indicating agreement on a theoretical stance.

Bibliometry is an accepted method for examining business disciplines, yielding insight into the sociology of science, while "requir [ing] minimal subjective judgments by the researcher" (Tellis, Chandy, & Ackerman, 1999, p. 121). These techniques provide the foundation for studies on hidden colleges and academic career advancement (Casey & McMillian, 2008; Seggie & Griffith, 2009). Bibliometry also explores researcher productivity, the epistemological proximity of journals, and sources of new ideas (Baumgartner & Pieters, 2003; Bettencourt and Houston 2001; Tellis et al., 1999). These techniques examine research authorship and article impact (Stremerch et al., 2007). Thus, bibliometry is an accepted method for exploring a discipline's evolution and impact.

Some methodologists, however, take issue with the validity of the results derived from such methods, suggesting that they may be sufficient for counting co-citations, but not author agreement (Shadish et al., 1995). Consider that an author may cite another that they disagree with to develop a countervailing argument. For this reason, bibliometry may lack construct validity.

The analysis of marketing's nomological network found in the present research overcomes some of the weaknesses inherent in such methods by evaluating the linkages among constructs with a series of network analyses. Specifically, the present research examines constructs found in SEMs. Since a domain's constructs, and their relative positions in the nomological network, create substantive and theoretical meaning, this technique allows for a more direct assessment of a domain (Cronbach & Meehl, 1955). Thus, an examination of marketing's nomological network provides further insights into the evolution of the discipline that may be obscured to bibliometricians (Campbell, 1960).

3. Methods and data collection

3.1. Graph-theoretic framework

Marketing's nomological network is framed as a directed graph, G(V, E), where V and E are the vertex and edge sets. The vertex set, $V=\{v_1,\ldots v_n\}$, consists of n latent constructs identified in SEM studies published from 1987–2008. A directed edge between a pair of vertices $\{v_i, v_j\}$ is established if at least one study investigates the effect of latent construct v_i on latent construct v_j. v_i is the sending construct and v_j is the receiving construct (Wasserman & Faust, 1994). As the effect of a latent construct on itself is not plausible, loops are not included ($\{v_i, v_i\}\notin E$ for all $1\le I\le n$). As the effect of one construct v_i on construct v_j might be measured in one study and the impact of v_j on v_i might be examined in another, $\{v_i, v_j\}\in E$ and $\{v_j, v_i\}\in E$. An $n\times n$ matrix, $\mathbf{X}=[x_{ij}]$, is obtained from G(V, E) such that $x_{ij}=1$ if $\{v_i, v_j\}\in E$, else $x_{ij}=0$.

3.1.1. Network metrics

A number of metrics summarize **X**, including density, δ:

$$\delta=\frac{\sum_{i=1}^{n}\sum_{j=1}^{n}x_{ij}}{n(n-1)} \tag{1}$$

Density represents the total number of directed edges in the network matrix divided by the number of possible edges (note the use of $n(n-1)$, as loops are not permitted).

Two other noteworthy metrics are in-degree and out-degree centrality. For each vertex v_j, the in-degree centrality, ω_j, represents the number of directed edges entering the vertex divided by the total number of vertices. The computation of in-degree centrality:

$$\omega_j=\frac{\sum_{i=1}^{n}x_{ij}}{n},\ \forall 1\le j\le n. \tag{2}$$

The average in-degree centrality across all vertices is obtained as:

$$\bar{\omega}=\frac{\sum_{j=1}^{n}\omega_j}{n} \tag{3}$$

In a similar manner, the out-degree centrality for each vertex j, denoted η_j, and the corresponding average across all vertices are computed as follows:

$$\eta_j=\frac{\sum_{i=1}^{n}x_{ji}}{n},\ \forall 1\le j\le n. \tag{4}$$

$$\bar{\eta}=\frac{\sum_{j=1}^{n}\eta_j}{n}. \tag{5}$$

To provide additional information regarding the relative importance of a construct, a measure of construct embeddedness is calculated. For each vertex, v_j, the subset V_j is defined such that $v_i\in V_j$ if $\{v_i, v_j\}\in E$ and/or $\{v_j, v_i\}\in E$. V_j is the subset of constructs that are either direct senders or receivers to construct v_j. The measure of embeddedness for construct v_j, which is denoted as ϕ_j, is a straightforward density calculation based on the constructs in V_j. If v_j has only one immediate neighbor, then $\phi_j=0$; otherwise, ϕ_j is computed as follows:

$$\varphi_j=\frac{\sum_{i\in V_j}\sum_{l\in V_j}x_{il}}{\left(\left|V_j\right|\right)\times\left(\left|V_j\right|-1\right)},\ \forall 1\le j\le n, \tag{6}$$

where $|V_j|$ is the cardinality of V_j (the number of vertices). The embeddedness measure is a density calculation for each construct, assessing local neighborhood embeddedness. Constructs with larger values of ϕ_j play a key role in explaining and predicting other constructs and, thus, have greater usefulness for both theory and practice.

3.1.2. Permutation test of symmetry

A permutation test, based on quadratic assignment, is used to test the null hypothesis that a matrix does not exhibit symmetric properties versus the alternative of symmetry. The observed statistic for Mantel's (1967) test is the sum of the products of two $n\times n$ matrices. The reference distribution is obtained by holding one of the matrices

constant and permuting the rows and, simultaneously, the columns of the second matrix. A complete distribution is obtained by recomputing the Mantel index for each of the n! permutations of the second matrix; however, this is computationally infeasible for matrices where n exceeds 12 or 13. Accordingly, most applications approximate the distribution.

Although Mantel's test can be applied to evaluate the concordance of any pair of n×n matrices, Hubert and Baker (1979) noted that a test of symmetry is performed when the two matrices are **X** and its transpose (**X**′). In this context, the Mantel statistic is computed as:

$$\Gamma\left(X,X'\right) = \sum_{i=1}^{n}\sum_{j=1}^{n} x_{ij}x'_{ij} \tag{7}$$

After computing this statistic, a reference distribution is obtained by randomly generating 9999 permutations of the n constructs. For each permutation, ψ, with elements ψ(j) indicating the vertex index occupying position j of the permutation (for $1 \le j \le n$), a permutation of the rows and columns of the transpose matrix results, denoted X'_{ψ}. An index for each permuted transpose matrix is computed as follows:

$$\Gamma\left(X,X'_{\psi}\right) = \sum_{i=1}^{n}\sum_{j=1}^{n} x_{ij}x'_{\psi(i)\psi(j)} \tag{8}$$

A reference distribution of 10,000 indices is established by the statistic and the 9999 indices for the random permutations. An approximate p value is obtained by dividing the number of indices that equal or exceed Γ(**X**,**X**′) by 10,000. If this p value is less than .05, then the null hypothesis of no symmetric structure is rejected.

3.1.3. The bond energy algorithm

To uncover structural patterns in the network matrix, the BEA is used. The BEA has been used in the formation of manufacturing cells, design of recommender systems, and study of social networks. Here, the BEA establishes permutations of the rows (senders) and columns (receivers) with the goal of optimizing an index that produces large strings of 1s in the permuted network matrix. The output enables the identification of blocks of sender and receiver constructs used in tandem.

3.2. Data collection

Two digraphs are established by interleaving and concatenating the results of SEM studies from 1987 to 1997 and from 1998 to 2008 in four marketing journals. For instance, the $\mathbf{X_{98\text{-}08}}$ matrix was developed by including *product judgments* and *willingness to buy* as the first elements, as these constructs were listed in the first study found in the *Journal of Marketing* in 1998. $G_{87\text{-}97}$ and $G_{98\text{-}08}$ refer to the digraphs for the two time periods and $\mathbf{X_{87\text{-}97}}$ and $\mathbf{X_{98\text{-}08}}$ to the corresponding network matrices. It should be noted that the two decades investigated were chosen based on the year for which data were available at the time of the study.

Only constructs found in SEM studies defined the nomological network for several reasons. First, such constructs are purged of measurement error during an SEM analysis, allowing for more accurate operationalizations (Anderson & Gerbing, 1988). Second, their reliability and validity are assessed. These assessments reinforce the construct's epistemological value and hence contribute to the domain's theories (Hunt, 1991). Constructs found in these models are directionally related; that is, the strength of the effect of one construct on another is captured in a beta coefficient. This allows for an assessment of the overarching theoretical structures found in the nomological network (Campbell, 1960). Finally, constructs are measured, latent, and psychometric variables, which is in agreement with the original intent of Cronbach and Meehl's (1955) treatise on validity in general and nomological validity in particular.

Not all constructs in SEM studies during these two time periods are included. Hierarchical, multidimensional constructs are excluded if their nomological validity is not assessed (Cronbach & Meehl, 1955; Peter, 1981). In these cases, although the newly developed construct in question may add to the body of knowledge, since the construct has not been evaluated as either endogenous or exogenous to any number of related constructs in the nomological network, the construct lacks empirical validation (Anderson & Gerbing, 1988). In other words, the construct's broader meaning relative to marketing's overall theoretical structure is untested and is therefore unknown (Campbell, 1960; Cronbach & Meehl, 1955). Finally, since constructs serve as the unit of analysis, multiplicative constructs (interactions) are not included.

3.3. Analysis and results

To examine the evolution of marketing and determine which constructs are most important in SEM studies, the two digraphs ($G_{87\text{-}97}$ and $G_{98\text{-}08}$) are subjected to a series of network analyses. A visual inspection is conducted, where a side-by-side comparison of the two digraphs shows an increase in the number of constructs and, thus, SEM publications. The network's density is estimated for both decades allowing for a comparison of cohesion levels between constructs, and thus empirical inquiries, in two time periods. To examine which constructs are the most important to the field, measures of each construct's in-degree and out-degree centralities are calculated. In addition, construct embeddedness is estimated to study how constructs group together. A permutation test is conducted on each matrix to test the null hypothesis that each is symmetric. Finally, the BEA is applied to uncover cohesive blocks of senders and receivers.

3.4. Density

The densities of the $\mathbf{X_{87\text{-}97}}$ and $\mathbf{X_{98\text{-}08}}$ matrices are calculated using UCInet 6.191, revealing densities of .51 and .38%. Since 340 and 454 constructs are found, 588 out of 115,600 and 778 out of 206,116 possible connections are present. This finding suggests that the majority of constructs are not connected, implying a diverse discipline that may be diverging.

The lack of network density, coupled with a 25.49% decrease over time, indicates that the discipline is becoming more specialized. If the network had shown signs of increasing density, this would have suggested that SEM studies were using the same or fewer constructs and thus the discipline was converging. For instance, both digraphs contain several different, contextually relevant *performance* and *satisfaction* constructs. The first digraph contains thirteen and nine versions of these constructs, while the latter digraph contains nine. In other words, network density demonstrates the creation of new context specific constructs for which a more general construct might have sufficed.

By collapsing semantically related constructs into general versions, density increases. The 1987–1997 digraph's density increases from .51 to .69%, a 35.29% change; while the 1998–2008 digraph's density increases from .38 to .54%, a 42.11% change. This finding suggests a decrease in constructs found in each network (from 340 to 272 and from 454 to 340 constructs in each period).

3.5. In-degree centrality measures

Mean in-degree centrality is computed using UCInet 6.191. The results for the $G_{87\text{-}97}$ digraph's centrality analysis show that *role ambiguity*, *role conflict*, *trust*, *environmental uncertainty*, *communication*, *shared values*, *opportunistic behavior*, *cognitive age*, *reward*, and *material cost sensitivity* are the most widely used endogenous constructs.

The results from the $G_{98\text{-}08}$ digraph's centrality analysis suggests minimal continuity over time, as only one of the same constructs retained its importance as an outcome. In particular, *trust*, *satisfaction*, *customer oriented strategy*, *commitment*, *supplier transaction-specific assets*, *interdependence*, *dependence asymmetry*, *relational norms*, *buyer transaction-specific assets*, and *formalization* surfaced in this analysis. Thus, relationship marketing constructs played an important role in SEM studies in marketing over the last decade. Finally, mean in-degree centrality values are combined across decades, allowing the most widely used endogenous constructs to be identified. These results show that *role ambiguity*, *trust*, *role conflict*, *satisfaction*, *customer oriented strategy*, *environmental uncertainty*, *supplier transaction-specific assets*, *commitment*, *interdependence*, and *dependence asymmetry* are the top outcome or mediating constructs in SEMs from 1987 to 2008.

3.6. Out-degree centrality measures

Mean out-degree centrality is computed using UCInet 6.191. The results from the $G_{87\text{-}97}$ digraph's analysis suggest that *satisfaction*, *job satisfaction*, *effort*, *decision uncertainty*, *cooperation*, *propensity to leave*, *attitude towards the AD*, *organizational commitment*, *mutual satisfaction*, and *outcome-based coordination efforts* feature the greatest mean out-degree centrality values and thus are the greatest source of ties during this time period. Context specific constructs—*job satisfaction*—that could impact front-line employees' motivation, and influence consumers' satisfaction levels, are important to the discipline (Bitner, Booms, & Mohr, 1994). An out-degree centrality analysis using UCInet is also conducted on the $G_{98\text{-}08}$ digraph. The results show that the top ten sources of ties—exogenous constructs—are *trust*, *commitment*, *purchase intentions*, *customer product acquisition costs*, *customer operations costs*, *satisfaction*, *overall firm performance*, *tech-based innovation*, *market-based innovation*, and *job satisfaction*. Thus, these constructs are important predictors, as they are found in multiple studies and most frequently filled the role of exogenous constructs in SEMs in marketing.

The mean out-degree centrality values are combined across decades. Through sorting these values by their relative magnitudes, the most widely studied exogenous constructs are identified as *trust*, *satisfaction*, *commitment*, *purchase intentions*, *job satisfaction*, *effort*, *decision uncertainty*, *customer product acquisition costs*, *customer operations costs*, and *overall firm performance*.

3.7. Construct embeddedness

An embeddedness test shows that organizational behavior constructs in the $G_{87\text{-}97}$ digraph are more extensively embedded, with *leadership consideration*, *leadership role clarification*, *job performance*, *turnover intentions*, and *organizational citizenship behaviors* having the highest coefficients. This finding changed during the next decade, as *conflict*, *overall financial performance*, *sales growth*, *communication*, and *supplier market orientation* appear to be the most well connected within their respective neighborhoods.

3.8. Network symmetry

A symmetry test of the $G_{87\text{-}97}$ digraph reveals a Mantel statistic of $\Gamma(\mathbf{X}, \mathbf{X}') = 4$. Two symmetric construct pairings (*trust–cooperation* and *role conflict–role ambiguity*) are found where each is both a sender and a receiver. The permutation test for the $\mathbf{G_{87\text{-}97}}$ digraph results in an approximate p value of $p = .3447$ and a failure to reject the null hypothesis. Contrastingly, 27 symmetric pairs appear in the $G_{98\text{-}08}$ digraph. The resulting Mantel statistic was $\Gamma(\mathbf{X}, \mathbf{X}') = 54$, with the approximate p value of $p = .0001$ leading to the null hypothesis's rejection. Among the constructs that are part of multiple symmetric pairs are *trust*, *opportunistic behavior*, *interdependence*, and *relational norms*. These constructs formed symmetric pairs with one another. *Buyer transaction-specific assets* are also both a sender and receiver for the *trust*, *interdependence*, and *relational norms* constructs. Finally, many symmetric pairs are formed among communication and knowledge constructs such as *face-to-face communication*, *e-mail communication*, *tacit-form knowledge*, *process knowledge*, and *product knowledge*.

3.9. Cohesive blocks of senders and receivers

The application of the BEA to the $\mathbf{X_{87\text{-}97}}$ matrix produced several interesting blocks of senders and receivers. The most notable among these is a block of 9 sending and 7 receiving constructs shown in the top panel of Table 1. Three of the sending constructs (*opportunistic behavior*, *shared values*, and *communication*) are senders for each of the seven receivers in the block, and *trust* is a sending construct for 6 of 7 receivers. *Cooperation* is the strongest receiving construct in the block, with ties to 8 of 9 sending constructs. *Relationship commitment*, *acquiescence*, and *propensity to leave* each had ties to 6 of 9 sending constructs. *Trust* and *relationship commitment* appear as both senders and receivers in the block. *Trust* is a sending construct for all receivers (except itself), and is a receiving construct for each of the three principal senders (*opportunistic behavior*, *shared values*, and *communication*). In addition to serving as a receiving construct for 6 of 9 senders, *relationship commitment* is a sending construct for *acquiescence*, *cooperation*, and *propensity to leave*.

The application of the BEA to the $\mathbf{X_{98\text{-}08}}$ matrix yields some interesting blocks; however, they tend to be smaller and less cohesive than those obtained for the $\mathbf{X_{87\text{-}97}}$ matrix. A block of 7 sending and 7 receiving constructs for the $\mathbf{X_{98\text{-}08}}$ network is shown in the bottom panel of Table 1. Unlike those in the top panel, no constructs in the bottom serve as both senders and receivers. The two principal sending constructs in the bottom panel are *market orientation* and *competition intensity*, each serving as a sender for 5 of 7 receivers. *Organizational learning*, *market-based innovation*, and *technology-based innovation* are the strongest receiving constructs, with ties to 6 of 7 senders. None of the other receivers had ties to more than 2 senders.

4. Discussion and implications

This paper examines marketing and the discipline's evolution by leveraging sociometric techniques to investigate the interconnectedness of marketing's psychometric constructs. Marketing's nomological network as found in SEMs is captured and analyzed to determine which constructs are most important to the field, if these constructs have remained important, and if the field is converging or diverging conceptually. The findings suggest that organizational behavior constructs play an important role in the nomological network in the first period, while relationship marketing constructs are central in the last. The results show two dominating research streams and increasing complexity and specificity over time.

A density analysis suggests that the number of marketing constructs found in SEMs in marketing is increasing. While this increase may reflect true growth and maturity of the discipline, the increase could be attributable to the accessibility of SEM software or doctoral training. Journal receptivity to SEM studies may also play a role (Steenkamp & Baumgartner, 2000). Alternatively, this increase could be attributable to the notion that scholars are rewarded for publishing findings that are differentiated from, and extend, prior literature. Whatever the case, the increasing number of constructs indicates that the discipline is becoming more fragmented and the findings, perhaps, less generalizable, as research efforts increase in specificity. For example, more specific forms, such as *satisfaction with contact person*, of general constructs, such as *satisfaction*, have been developed.

A density analysis shows that the majority of marketing constructs in SEMs are not connected, suggesting that constructs may be underutilized. This finding may suggest that multiple, semantically related

Table 1
Subsets of sending and receiving constructs from the bond energy algorithm (top panel 1987–1997, bottom panel 1998–2008).

	Trust	Functional conflict	Uncertainty	Relationship commitment	Acquiescence	Cooperation	Propensity to leave
Outcomes given comparison level	0	0	0	0	0	1	0
Influence by partner firm	0	0	0	0	0	1	0
Relationship commitment	0	0	0	0	1	1	1
Trust	0	1	1	1	1	1	1
Opportunistic behavior	1	1	1	1	1	1	1
Shared values	1	1	1	1	1	1	1
Communication	1	1	1	1	1	1	1
Relationship termination costs	0	0	0	1	1	1	1
Relationship benefits	0	0	0	1	0	0	0
	Venture performance	Competitor knowledge process	Organizational learning	Market-based innovation	Tech-based innovation	Customer loyalty	Innovativeness
Entrepreneurial orientation	0	0	1	1	1	0	0
Technological orientation	0	0	1	1	1	0	0
Demand uncertainty	0	0	1	1	1	0	0
Market orientation	0	0	1	1	1	1	1
Technology change	0	1	1	1	1	0	0
Competition intensity	1	1	1	1	1	0	0
Positional advantage	1	0	0	0	0	0	0

Note: A value of '1' indicates that construct in the row was a sender for the receiving construct in the column. The stringing of 1s in the rows and columns is an artifact of the objective criterion used by the BEA.

or linearly equatable constructs have been unnecessarily created (Hedges & Olkin, 1985). This finding may also indicate that the domain is widening, facilitating answers to new practitioner relevant questions (Stewart, 2002; Tellis et al., 1999).

Density assessments are conducted on a collapsed version of marketing's nomological network, increasing domain parsimony and minimizing fragmentation. However, collapsing marketing's nomological network reduces the specificity of contributions and represents a serious challenge for the field, as new ideas must be created to invigorate the discipline, enhance theories' predictive and explanatory power, and develop more effective and exportable explanations (Stewart, 2002).

The findings also imply that researchers should guard against developing new constructs that are not really new (Peter, 1981). Instead, researchers should use validated constructs and recognized theories, as building on prior work enhances opportunities for a deeper understanding of marketing phenomena and hence adding to the nomological network's texture (Tellis et al., 1999). In sum, building on prior findings may encourage knowledge accumulation and the development of richer theories.

An in-degree centrality analysis suggests that constructs borrowed from organizational behavior are the most connected endogenous constructs during the 1987–1997 period. In particular, *role ambiguity* and *role conflict* are widely used as mediators and outcome variables, indicating that marketing theory and practice are concerned with how such factors are shaped by and shape organizational practices and, therefore, consumer behaviors. An analysis of the second digraph, $G_{98\text{-}08}$, shows a shift in marketing's focus, as constructs dealing with relationships took center stage. Scholars investigated the factors that influence inter-organizational *trust*, *commitment*, *supplier transaction-specific assets*, *interdependence*, *dependence asymmetry*, *relational norms*, and *buyer transaction-specific assets*. However, *trust* played an important role in both time periods and across contexts, implying the wide applicability and capacity of the construct trust to explain B2B and B2C interactions.

An out-degree centrality analysis supports the idea that marketing is broadening, allowing consideration of organizational behavior. Specifically, marketing placed a heavy emphasis on individual differences, expanding the discipline's analysis of the exchange of value to focus on the parties involved in the exchange process (Bagozzi, 1975). This finding suggests that employee-related issues were a major concern to both marketing researchers and practitioners. This focus may be due to the enlargement of the services marketing sub-discipline, which coincides with a movement towards a service-driven economy (Stewart, 2002). That is, organizational behavior issues may be more important to marketing since the increase in services has resulted in high levels of and more frequent contact between consumers and service employees. Given this possibility, and the widening definition of marketing, factors that can negatively impact service workers' attitudes, and hence their performance, have fallen under marketing's purview (Bitner et al., 1994). Thus, marketing, as assessed through SEM studies, is expanding in scope to consider the role of human factors in analyses of transactions (Bagozzi, 1975).

An out-degree centrality analysis on the second period shows that relationship marketing, and related constructs, furnish the network with a substantial source of ties. This finding implies that relationship marketing is especially important to the discipline, speaking to the impact and usefulness of such constructs to both the field and practitioners. Specifically, relationship marketing variables are useful antecedent or causal constructs in many models, as they explained a large portion of variance in outcome measures. Thus, relationship marketing factors influence and facilitate the exchange of value and increase the firms' success (Palmatier, Dant, Grewal, & Evans, 2006). Finally, *satisfaction* is important in both time periods, suggesting that satisfaction is applicable across contexts and levels of analysis.

A test of construct embeddedness confirms that the most connected or embedded constructs change over time. In particular, constructs imported from organizational behavior play a major role in the $G_{87\text{-}97}$ digraph, while relationship marketing constructs do the same in the $G_{98\text{-}08}$ digraph. Thus, marketing is dynamic, changing to better serve the needs of both researchers and practitioners. Therefore, researchers should carefully evaluate prospective contributions to determine if they are promoting an installed paradigm or innovating based on a changing reality. In this regard, a contribution's usefulness is predicated on the contribution's relationship to real world phenomena, as well as the contribution's ability to solve real world problems (Hunt, 1991).

Permutation tests examining network symmetry provide noteworthy findings. While the $\mathbf{X}_{87\text{-}97}$ matrix displays a lack of symmetry, $\mathbf{X}_{98\text{-}08}$ shows a significant level, suggesting that in the later time period, researchers are more open to testing the causal sequencing of variables. *Trust* is proposed as an antecedent to *relational norms* in one study, while another suggests the opposite. Since relationship marketing concepts were emerging during this period, researchers

were possibly uncertain about the directionality of the linkage between these constructs. This possible uncertainty resulted in 27 pairs of symmetric constructs and may also signify that researchers were seeking to challenge established theories. In sum, permutation tests indicate that the discipline is evolving, and that the domain rewards research efforts that empirically test established relationships and counter-intuitive propositions.

The results of the BEA support those obtained in the above analyses, suggesting a greater divergence in more recent times. Specifically, larger and more cohesive blocks of senders and receivers are found in the $\mathbf{X}_{87\text{-}97}$ network matrix than in the $\mathbf{X}_{98\text{-}08}$ matrix. This increased fragmentation sheds light on the domain, as the smaller and less cohesive blocks combined with an increase in constructs in the later period suggests that newly developed constructs are in fact different. This finding implies that researchers are building on prior efforts, developing richer theories, and contributing to the nomological network. Thus, marketing has truly become more fragmented overtime.

5. Conclusions, future directions, and limitations

The marketing discipline, as captured by the interconnection of the discipline's latent constructs found in SEMs, converges on two research streams. The domain produces more context specific studies over time and, hence, is becoming increasingly fragmented. These findings suggest the following conclusions, while raising several research questions as well as pointing to the following limitations.

Relationship marketing and organizational behavior concerns for customer contact employees are marketing's dominant themes in SEMs. Although these research streams appear to be conceptually different, they may be related as they represent the study of factors that influence the exchange of value (Bagozzi, 1975). Consider that the relationship marketing literature shows that firms flourish by cultivating buyer–seller relationships in both B2B and B2C contexts (Palmatier et al., 2006). In other words, relationships can influence purchasing decisions and are thus valuable. A similar interpretation can be made regarding the organizational behavior stream. This stream tests factors that impact the service encounter. A lack of *job satisfaction* is shown to effect *employee performance* and hence *customer service* and *quality*. Also, *role conflict* and *role ambiguity* stifle relations (Bitner et al., 1994). Thus, employee characteristics are central to developing enduring connections with customers. Given this conclusion, studies should consider other managerially relevant variables that facilitate the exchange.

The results suggest that SEMs stress individual differences, such as *role ambiguity*, that affect buyer–seller behaviors, which affect relationships. This result implies that the dyad could be the most revealing unit of analysis. Thus, although psychometric techniques identify factors that influence relationship formation and longevity, other methods might allow for a deeper understanding of interactions. Specifically, since psychometric techniques measure buyer or seller attributes, methods that measure relationship characteristics may provide a more complete understanding of the phenomenon. Hence, research could benefit from using dyadic depth interviews or sociometric techniques to study the exchange of value.

The results indicate that marketing has become increasingly fragmented and specialized. This fragmentation has occurred with the addition of new, more context specific constructs in SEMs. While the results suggest that scholars have guarded against the addition of constructs which simply represent repackaged and renamed concepts, such a repackaging of concepts is an issue that should be prevented in future research. In addition, researchers should develop constructs that are orthogonal and oblique to established ones, allowing for new insights and alternative explanations, perhaps providing better direction for marketers attempting to solve real world problems.

This study contains several noteworthy limitations. First, the findings are generalizable only to SEM studies. Research extensions to overcome this weakness could expand data collection efforts to include more than latent constructs, as well as the time intervals analyzed. Such an expanded data collection method would allow for a more accurate assessment of marketing's evolution. Second, although the study suggests that the field's two dominant research streams ultimately serve to explain and predict factors that influence the exchange of value, the study does not predict, nor claim to predict, the specific direction that the field will take. Instead, the study suggests that marketing's gatekeepers should grapple with the advantages and disadvantages associated with developing a more parsimonious versus context specific field. Finally, extensions could carefully examine each construct identified in this study, providing more detail on their operationalizations and conceptualizations. Such an extension would allow researchers to determine if cognate constructs are, indeed, linearly equatable. Doing so may assist in the development of more definitive criteria for what constitutes an intellectual contribution in marketing, as well as in other fields.

References

Anderson, John C., & Gerbing, David W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411–423.

Bagozzi, Richard P. (1975). Marketing as exchange. *Journal of Marketing*, *39*(4), 32–39.

Baumgartner, Hans, & Pieters, Rik (2003). The structural influence of marketing journals: A citation analysis of the discipline and its subareas over time. *Journal of Marketing*, *67*(2), 123–139.

Bettencourt, Lance A., & Houston, Mark B. (2001). Reference diversity in JCR, JM, and JMR: A reexamination and extension of Tellis, Chandy, and Ackerman (1999). *Journal of Consumer Research*, *28*(2), 313–323.

Bitner, Mary J., Booms, Bernard H., & Mohr, Lois A. (1994). Critical service encounters: The employee's viewpoint. *Journal of Marketing*, *58*(3), 95–106.

Campbell, Donald T. (1960). Recommendations for APA test standards regarding construct, trait, or discriminant validity. *American Psychologist*, *15*(8), 546–553.

Casey, Debra, & McMillian, G. Steven (2008). Identifying the 'invisible colleges" of the industrial labor relations review: A bibliometric approach. *Industrial and Labor Relations Review*, *62*(1), 126–132.

Cronbach, Lee J., & Meehl, Paul E. (1955). Construct validity in psychological tests. *Psychological Bulletin*, *52*(4), 281–302.

Hedges, Larry V., & Olkin, Ingram (1985). *Statistical methods for meta-analysis.* Orlando, FL: Academic Press.

Hoffman, Donna, & Holbrook, Morris B. (1993). The intellectual structure of consumer research: A bibliometric study of author cocitations in the first 15 years of the journal of consumer research. *Journal of Consumer Research*, *19*(4), 505–517.

Hubert, Lawrence J., & Baker, Frank B. (1979). Evaluating the symmetry of a proximity matrix. *Quality and Quantity*, *13*(1), 77–84.

Hunt, Shelby D. (1991). Positivism and paradigm dominance in consumer research: Toward critical pluralism and rapprochement. *Journal of Consumer Research*, *16*(6), 32–44.

Mantel, N. (1967). The detection of disease clustering and a generalized regression approach. *Cancer Research*, *27*(2), 209–220.

Palmatier, Robert W., Dant, Rajiv P., Grewal, Dhruv, & Evans, Kenneth R. (2006). Factors influencing the effectiveness of relationship marketing: A meta-analysis. *Journal of Marketing*, *70*(5), 136–153.

Parasuraman, A., Zeithaml, Valarie A., & Berry, Leonard L. (1988). Servqual: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, *64*(1), 12–40.

Peter, John P. (1981). Construct validity: A review of basics issues and marketing practices. *Journal of Marketing Research*, *18*(2), 133–145.

Ramos-Rodríguez, Antonio-Rafael, & Ruíz-Navarro, José (2004). Changes in the intellectual structure of strategic management research: A bibliometric study of the strategic management journal, 1980–2000. *Strategic Management Journal*, *25*(10), 981–1004.

Seggie, Steven H., & Griffith, David A. (2009). What does it take to get promoted in marketing academia? Understanding exceptional publication productivity in the leading marketing journals. *Journal of Marketing*, *73*(1), 122–132.

Shadish, William R., Tolliver, Donna, Gray, Maria, & Gupta, Sunil K. Sen (1995). Author judgments about works they cite: Three studies from psychology journals. *Social Studies of Science*, *25*(3), 477–498.

Steenkamp, Jan-Benedict E. M., & Baumgartner, Hans (2000). On the use of structural equation models for marketing modeling. *International Journal of Research in Marketing*, *17*(2), 195–202.

Stewart, David W. (2002). Getting published: Reflections of an old editor. *Journal of Marketing*, *66*(4), 1–6.

Stremerch, Stefan, Verniers, Isabel, & Verhoef, Peter C. (2007). The quest for citations: Drivers of article impact. *Journal of Marketing*, *71*(3), 171–193.

Tellis, Gerald J., Chandy, Rajesh K., & Ackerman, David S. (1999). In search of diversity: The record of major marketing journals. *Journal of Marketing Research*, *36*(1), 120–131.

Wasserman, Stanley, & Faust, Katherine (1994). *Social network analysis: Methods and applications.* New York: Cambridge Press.