Empirical examination of sales research: Meta-analysis, social network and nomological network analyses

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ABSTRACT

The study addresses three questions: (1) which constructs are central to sales research? (2) How do these constructs relate to each other in a nomological network? (3) What are the missing links in this nomological network? These questions are addressed with data from 482 constructs obtained from 605 empirical studies published in 13 marketing journals over 45 years. Data were analyzed with three different but related methods: meta-analysis, social network, and nomological network analyses. First, this study analyzed the frequency distribution of 482 sales constructs. Second, meta-analysis was used to estimate the strengths and distributions of all bivariate relationships. Third, the nomological network displayed the relevant information generated from meta-analysis in a matrix. Finally, social network analysis was applied to further explore the relationships among critical constructs and subgroups of constructs. The results of this study provide a comprehensive synthesis of empirical sales research that can motivate future research by identifying domains where sales research is warranted.

Keywords: Sales construct, Meta-analysis, Social network, Nomological network, Empirical sales research

INTRODUCTION

Empirical research has played a fundamental role in both theory building and theory validation in sales. Over 70 percent of sales articles published in leading marketing journals rely on data collected primarily through cross-sectional surveys (Plouffe, Williams and Wachner 2008; Williams and Plouffe 2007). However, virtually all empirical studies are prone to "crimes of omission" (Sutton and Staw 1995). As a result, theory building and manuscript writing become "an art of fitting concepts and arguments around what has been measured and discovered" (Sutton and Staw 1995, 381). Reviewers often complain that when testing empirical models, manuscript authors fail to incorporate or control for constructs that are relevant to the proposed theory. At the same time, reviewers also question the inclusion of constructs that are unrelated to the tested theory. Crimes of omission thus undermine our understanding of the links within a nomological network.

Most empirical research relies on single surveys or focuses on narrow sets of constructs to test model hypotheses. Relationships between constructs are sometimes retested with follow-up studies that find considerable variance in results. Sales researchers have relied on meta-analysis to synthesize empirical research and to better understand relationships involving important constructs such as job performance (e.g., Churchill et al. 1985), job satisfaction (e.g., Brown and Peterson 1993), adaptive selling (e.g., Franke and Park 2006), customer orientation (e.g., Franke and Park 2006), organizational commitment (e.g., Jaramillo, Mulki and Marshall 2005), and buyers trust in the salesperson (e.g., Wood et al. 2008). Researchers have also relied on qualitative methods to review extant research and to identify new research directions (e.g., Geiger and Guenzi 2009; Plouffe et al. 2008; Williams and Plouffe 2007).

Research reviews have played an important role in our understanding of sales research. However, they are also subject to limitations and biases such as "crimes of omission" (Sutton and Staw 1995). The selection of constructs is sometimes based on the authors' personal experience and research interests rather than on an objective criterion. For instance, Franke and Park's (2006) meta-analysis developed a structural model with job performance and job satisfaction as the outcome variables. In their model, adaptive selling and customer orientation were used as core predictors. The justification for the inclusion of these variables was that both "salesperson characteristics that have been the focus of prominent research streams in sales force research have not yet been examined in a meta-analysis" (Park 2006, 693). Results from Verbeke, Dietz, and Verwaal's (2011) recent meta-analysis confirm that adaptive selling is an important antecedent of a salesperson's job performance; however, the analysis also showed that other critical predictors like selling-related knowledge, role ambiguity, cognitive aptitude, and work engagement were left out. One may also question the exclusion of constructs like role conflict and role ambiguity, two predictors of job satisfaction (Brown and Peterson 1993).

This study addresses these "crimes of omission" problems by systematically analyzing all bivariate relationships among the 482 constructs that were obtained from 605 empirical studies published in 13 marketing journals over 45 years. This analysis provides answers to several research questions that lie at the heart of theory development. (1) Which are the constructs that are central to sales research? (2) How do these constructs relate to each other in a nomological network? (3) What are the missing links in this nomological network?

To accomplish this goal, this study identified constructs frequently used in empirical sales research and the evolution of these constructs over time. Relationships among constructs were studied using nomological matrices that included data from 482 pairs of constructs. The

magnitude, distribution, and statistical significance of bivariate relationships were estimated with meta-analysis. Patterns of relationships among constructs were studied using social network analysis. This combination of methods helped us estimate relationship strength and the existence of sub-networks among constructs. Unknown relationships and relationships with isolated constructs were also identified.

In summary, this research makes significant contributions to our understanding of the extent of sales knowledge and provides directions for future research. The 482 by 482 bivariate correlation matrix estimated in this study can be used in future research to test for direct effects, indirect effects, as well as moderation on virtually all constructs previously used in sales. This is a critical step in efforts toward new theory development.

LITERATURE REVIEW

Plouffe et al. (2008) and Williams and Plouffe (2007) produced a comprehensive journal-content analysis of sales research. Williams and Plouffe (2007) reviewed 1,012 articles from 15 journals and then, in 2008, reviewed 1,270 articles from 16 journals. They reviewed empirical and non-empirical studies in sales research to expose the trends of topics, theoretical foundations, and data collection/analysis methods. The current study deviated from the two aforementioned studies. The two prior studies mainly focused on topics, theoretical foundations, and data collection/analysis methods that are different from those focused on in this study, which explores the relationships among constructs. Based on Williams and Plouffe's (2007) results, Geiger and Guenzi (2009) conducted a survey of European sales academics and practitioners and asked them to evaluate sales research in terms of contribution to theory and practice. Geiger and Guenzi (2009) pointed out the structure of current knowledge and the gaps to be filled in by future sales research. The current study had one goal in common with those of the aforementioned studies: to explore knowledge-dissemination trends and future prospects in sales research. These studies rely on content analysis to present a broad view of sales research. The focus of our study is quite distinct since we are primarily interested in empirically examining the patterns of relationships among sales constructs. This analysis is critical to understanding the nomological network of the discipline (Cronbach and Meehl 1955).

Previous meta-analyses have investigated patterns of relationships along a construct or a narrow group of constructs. Churchill et al. (1985) reviewed 116 published and unpublished articles over 50 years to find the determinants of salesperson performance. They applied meta-analysis to find the six determinants (role variables, skill, motivation, personal factors, aptitude, and organizational/environmental factors) and to identify the moderators between job performance and its determinants. Extending the research of Churchill et al. (1985), Verbeke et al. (2011) revised the classification scheme of the previous research and found the influences of second-order constructs and new moderators on job performance. Brown and Peterson (1993) used meta-analysis to understand the antecedents and consequences of job satisfaction; they found the strength, valence, and moderators of construct relationships. Franke and Park (2006) focused on the antecedents and consequences of adaptive selling behavior and customer orientation; they found the magnitudes, significances, and moderators between constructs. Palmatier et al. (2006) combined different constructs to form different factors of relationship marketing, mediators, and outcomes. Using meta-analysis, they succeeded in demonstrating the effects of mediators and moderators on construct and factor levels. These aforementioned studies focused on a specific construct/factor and revealed its relationships with its antecedents,

consequences, mediators, or moderators. This study, however, did not focus on a specific construct or factor but on all available constructs in sales research. In addition, constructs are analyzed in pairs, in factors, and in networks. Based on this strong foundation, any interesting construct or factor can be developed in comprehensive models. Besides analyzing constructs, another way to integrate sales studies is to discuss scales of constructs.

Bruner and Hensel (1993) as well as Hensel and Bruner (1992) reviewed six marketing journals from 1980 to 1989. Their goals were to figure out scale usage in different marketing aspects (e.g., consumer, advertising issues) over different periods. They studied the relationships among factors such as internal consistency, number of scale items, and sample size. Numerous studies have also been devoted to studying marketing and sales measures with the underlying objective of finding more efficient and effective scales. Two examples of such papers are Lagace, Goolsby, and Gassenheimer's (1993) discussion of INDSALES and Panagopoulos and Avlonitis' (2008) study of BCCS (Babakus and Colleagues Control System). This study differs from research primarily aimed at understanding the psychometric properties of marketing scales. Our study not only analyzes the measurement properties of sales constructs but also links measurement issues with construct relationships. Patterns of construct relationships are identified with links among processes and micro-processes.

As previously noted, the selection of constructs as "critical" (and thus deserving of meta-analysis) is somewhat arbitrary. Social network analysis was used in this study as a less subjective tool for identifying constructs that are central to sales research. Wasserman and Faust (1994) indicate the key elements of social network: interdependent actors, interdependent relationships (ties) among or between these actors, and network structures (network models) that explain relationship patterns of and the degree of importance of these actors. In this study, the actor or central unit of analysis of the network becomes the construct. From the communication network aspect, Monge and Contractor (2003) indicated the theories of social network analysis, such as Resource Dependency Theory (developing relationships for necessary resources), Social Identity Theory (choosing categories and identifying their own groups), Structural Theory of Action (playing similar roles in a structure), and Strength of Weak Ties Theory (controlling information flow through relationships). These theories provide the foundation and analysis concepts of social network, such as missing relationships, cliques, factors, and centrality. Since social network analysis is relatively new to marketing, the definitions of terms are listed in Appendix.

Mostly, social network analysis is largely applied in social and behavioral science. For instance, Wellman and Wortley (1990) explored the relationships between social network and support sources and found that the kinds of support depend more on the characteristics of relationships than on those of the network members. Friedkin and Cook (1990) studied social influences on peers' opinions and identified a model showing that the mean of peers' opinions is the foundation of the pressures in a peer group. In recent studies, social network analysis has been used in various areas. For instance, Polites and Watson (2009) analyzed relationships among 125 information system journals, based on citations to identify the critical journals. Moreover, researchers have employed social network analysis to study author networks. Nerur, Rasheed, and Natarajan (2008) analyzed author co-citation in the strategic management field. They identified core authors and constructed the relationships between intellectual subfields of strategic management. In another study, Yang, Jaramillo, and Chonko (2010) explored productivity and co-authorship in JPSSM. They identified central authors and showed that network ties are potentially related to the number of citations. A review of the literature shows

that social network analysis can be used to understand the dynamics of networks in various settings, with diverse actors as the units of analysis: journal (e.g., Polites and Watson 2009), co-citation (e.g., Nerur et al. 2008), and coauthor (e.g., Yang et al. 2010). This study presents a new, alternative application of social network analysis. It employs social network analysis to display the construct relationships derived from the nomological network analysis. Networks were studied in the form of frequency and correlation coefficients. In addition, this study not only reveals the construct structures but also identifies gaps in these structures that can be filled in by future research. To sum up, this study makes unique contributions to sales research; these methods can be applied to other marketing aspects.

RESEARCH FRAMEWORK

The research includes descriptive statistics analysis, nomological network, Social Network 1 (frequency matrix), and Social Network 2 (correlation-coefficient matrix). All steps began with searching for empirical sales articles and then coding their constructs and descriptive statistics analysis to reveal construct usages and frequencies. Then, meta-analysis, the core of the study, was used to integrate various data composing the nomological network. This study relied on the nomological network to generate two social networks. The first social network derived from a frequency matrix and the second from a correlation-coefficient matrix.

Table 1 shows the outcomes of the research framework and the corresponding research objectives. In descriptive statistics analyses, the discussion of construct frequency identifies the central constructs of empirical sales research by frequency. In addition, the evolution of construct usage over three periods (decades) was examined to understand the changes of these central constructs over time. In the nomological network generated by meta-analysis, cells were filled according to average correlation coefficients (effect size), corrected correlation coefficients, numbers of effect size, sums of sample size, 95% confidence intervals, variances, average of Cronbach's alphas, and numbers of Cronbach's alpha. The existing relationships and their correlation coefficients are collected from the nomological network.

Social Network 1 (Frequency Matrix)

The frequency matrix is based on the frequency of any two constructs discussed in an article. Except for a few articles, the empirical sales article focuses on one specific model; therefore, frequency can be explained here as the number of times that any two constructs occurs in the same model. Social Network 1 presents a macro view of construct relationships and identifies the central constructs. This study used the social network to present the structures of the frequency matrix and to then identify the central constructs, isolated constructs, missing links between constructs, and redundant constructs. This procedure produces a data-based and more objective overview of sales research. First, centrality is measured by two indexes, degree and betweenness, which point out the key constructs in the networks. Comparing the two centrality indexes and frequencies of construct usage, central but relatively rarely used constructs are discovered. Second, by analyzing cliques, this study finds different subgroups with pairwise relationships and further identified the isolates, which do not participate in any subgroups and are thus ignored in most research. After theoretical examination, new models and new relationships can be built. Third, in structural holes, this study discusses the missing links in ego networks. Ego networks can thus be used to identify the scope of future research.

Social Network 2 (Correlation Matrix)

Social Network 2, with the correlation-coefficient matrix, explores in depth the bivariate relationships in a micro view. To discover the relationships of correlation coefficients, a second social network based on the combined correlation coefficients of all pair relationships was established. This analysis is different from Social Network 1 because it focuses on pairwise correlation subgroups and the constructs of highly similar subgroups. Pairwise correlation subgroups are identified using clique function. A clique is a maximal set of nodes in which every node is connected with every other node. These cliques will help researchers to develop new models that rely on meta-analytic correlations and techniques like structural equation modeling.

METHODS

All available empirical sales studies were examined from 13 key marketing journals. To achieve the research objectives, this study integrated three methods: meta-analysis, nomological network, and social network analysis. This is new to marketing and social network modeling, as is comprehending knowledge from the macro to the micro view. These three methods can be employed individually or in various combinations to address distinct research topics and analyze data from different angles. This study developed a series of links among the three methods, one closely connected to the other.

Data Sources

This study reviewed all empirical sales articles from 13 key marketing journals (JM, JMR, JAP, JAMS, JBR, IMM, IJRM, JBIM, EJM, P&M, JMPT, JBE, and JPSSM) during the period from 1936 to January 2010 (Table 2). However, the earliest usable article was published in the Journal of Applied Psychology (JAP) in 1965 and the latest one in January 2010. Scales of various constructs were collected based on the following principles: 1) including all empirical sales articles using scale(s) with primary or secondary data; 2) including all psychometric scales; 3) excluding scenario measures, such as Valentine and Barnett (2007) using a scenario-based approach to measure the stages of the ethical decision-making process; and 4) excluding dichotomous/definition measures (choosing one from given statements). These four principles were used as a wide base to clearly distinguish other measures from scales. Scale collection was followed by counting and classifying scales to different constructs. In one article, various versions of scales measuring the same construct were counted individually in terms of frequency. For example, Flaherty et al. (2009) used supervisor-rated and self-rated performance to measure Job performance. The classification of scales according to constructs was based on the original definitions of scales and their items rather than on the scale title in an article. For example, Job stress in Jaramillo et al. (2009) and Job tension in Ramaswami, Srinivasan, and Gorton (1997) were classified as Felt stress. There were 2,632 scales collected from 605 articles, which were classified into 482 constructs in this study. The most important journal in terms of sales research volume is the Journal of Personal Selling & Sales Management (JPSSM), which provided 43% (263 / 605) of articles and included 41% (1087 / 2632) of scale usage.

Meta-analysis

Meta-analysis is a statistical analysis method of integrating the results of several individual empirical studies (Glass 1976; Hunter and Schmidt 2004; Lipsey and Wilson 2001). Compared with the results of a single study, meta-analysis can estimate true effect size more precisely by reducing the biases of study collection. In this study, correlation coefficients or statistics which could be converted to correlations like t-value or χ^2 are used as an indicator of the effect size. This study followed Hunter and Schmidt's (2004) random effects model to estimate bivariate effect sizes. Evidently, no single study has contained all 482 pairwise correlations in a sole nomological network. However, Viswesvaran and Ones (1995) showed that it is not necessary to include all the relationships of a theory in each study, so this study treated correlations individually and then combined them with the same relationships by corresponding correlation coefficients, sample sizes, and Cronbach's alphas. For example, in a 3 by 3 matrix including three constructs (A, B, and C), one study may provide A and B while another may render B and C.

Meta-analytic statistics (e.g., corrected correlation coefficient) are estimated following Hunter and Schmidt's (2004) procedures. Statistical power of the effect size is calculated following Hedges and Pigott's (2001) procedures. The statistical power indicates the probability that a test will reject a false null hypothesis (e.g., true effect size is zero), namely, right decision. In this study, when a power is higher, it is more probable that the true effect size is different from zero. Former meta-analysis studies used at least three or four correlations in every relationship, and recent studies (Arthur et al. 2003; Carrillat, Jaramillo and Mulki 2009) have adopted at least five to assure that the estimated effect sizes are significantly different from zero. However, even five cannot guarantee the reliability of meta-analytic results. The statistics were filled in a matrix with corresponding constructs to generate a nomological network and some were then analyzed using social network analysis.

Nomological Network Analysis

The notion of nomological network was developed by Cronbach and Meehl (1955) in order to examine the construct validity of psychological measures. There are three main concepts in the nomological network: observable items, theoretical constructs, and the relationships among and between the observable items and theoretical constructs. Most of the time, the nomological network is used in testing the construct validity of new scales, but, recently, some studies have used it in building a law like matrix to analyze specific topics. For example, Wood et al. (2008) applied meta-analysis and built a nomological network at the item level to study buyers' trust. According to the item correlations in the nomological network, they formed five constructs (credibility, expertise, compatibility, trust, and trustworthiness) and identified those construct relationships in a specific model.

Le et al. (2010, 113) studied the redundancy of constructs and argued, "if the two constructs are similarly correlated with other variables in a nomological network, their positions/roles in the network cannot be empirically distinguished." In other words, the nomological network has been employed in traditional applications (construct validity) and relationships between items and constructs. This new application focuses on item/construct correlations and positions in the nomological network. This study created a nomological network at the construct level that comprehensively displays all relationships among constructs. Moreover, the nomological network is a unique dataset used to explore construct relationships, their magnitudes and significances, and their positions in the network. However, a review of the

literature found that there are few methods for analyzing nomological networks and that these methods are limited to some specific items or constructs. Namely, there is no effective and systematical method to be found in earlier studies for analyzing a comprehensive and large nomological network. Therefore, this study applied social network analysis to analyze the nomological network in the form of a 482 by 482 matrix.

Social Network Analysis

This study applied social network analysis to datasets consisting of frequency and effect size matrices. All networks were analyzed to explore the overall structure of the constructs. Furthermore, to clearly display a specific construct network, the ego network was identified, "The ego-network of a vertex contains this vertex, its neighbors, and all lines among the selected vertices" (De Nooy et al. 2005, 145).

Social Network 1 (Frequency Matrix). In the first social network derived from frequency, the relationships between any two constructs were measured by the number of times they were discussed together. For example, Mahajan et al. (1984) used three constructs, Job satisfaction (JS), Role ambiguity (RA) and Role conflict (RC), which generated three bivariate relationships (JS-RA, JS-RC, RA-RC). First, a measured and used construct was developed using a construct sociomatrix to present their relationships. For example, Job performance has an across cell with Job satisfaction that shows 81; this means that Job performance and Job satisfaction were together 81 times. In the sociomatrix, rows represent sending constructs, columns represent receiving ones, and cross cells represent the values. However, this study only considers the relationships without directions, so an adjacency matrix transferred from a sociomatrix is a symmetric matrix with zero in the diagonal. Direction was not considered since most studies included in the network rely on findings derived from cross-sectional data. A construct network was then developed based on the corresponding values in the adjacency matrix.

Second, after generating the full construct network, this study identified the key constructs by centrality, the subgroups by cliques, and the missing links by structural holes. In the centrality, two indexes were applied, degree and betweenness, to explore the critical constructs in networks. Following Freeman (1979), degree is the sum of the values that a given node holds to its neighbors. The higher the degree of a node, the more power it has. In other words, a construct with a higher degree is more important and more powerful in influencing other constructs because it has been more frequently used with others. Betweenness, derived from Freeman (1979), is the number of shortest paths from one neighbor to another through a given node. The higher betweenness that a node has, the more critical it is. Namely, a construct with higher betweenness is more important and more critical in connecting other constructs because it plays a core position in the network.

The original concept of clique in a network is a subgroup in which nodes are more closely tied to one another than to other nodes in the network. In UCINET 6, cliques were employed to find the maximum number of nodes that have all possible relationships present among themselves (e.g., Bron and Kerbosch 1973; Luce and Perry 1949). Cliques not only provide the completely connected subgroups but also identify the information of isolates that are not connected in any subgroups. To identify these isolates, an overlap matrix of cliques presents the number of constructs joining the 1203 completely connected subgroups; in this matrix, the constructs with zero are isolates. In identifying structural holes, all nodes in the network were

treated in turn as ego; several measures (Burt 1992) were then used. This study used effective size of ego network and efficiency. The effective size of an ego's network is defined as the difference between the number of nodes and the average degree of nodes (not including relationships to the ego). Efficiency is defined as effective size divided by the number of nodes in the ego network. For example, ego A has ties to three nodes and the three do not have any tie to other nodes, so the effective size of ego A is three (3 - 0) and the efficiency is one (3 / 3). When ego B has ties to three nodes and the three have ties to other nodes, the effective size of ego B is one (3 - 2) and efficiency is one (1 / 3). When a construct has high effective size or efficiency, it means that there are more missing links in the ego network. Construct networks with more missing links can be easily identified by structural holes, namely, potential gaps in research. Cliques and structural holes were employed to explore the gaps in networks through different methods.

Social Network 2 (Correlation Matrix). In the second social network, which is derived from correlations, the relationships between two constructs were measured by the combined correlation coefficients from meta-analysis. For instance, the corrected correlation between Job performance and Job satisfaction is .249. Following the procedures used in creating the first social network, the second social network was created. However, the second network presents the magnitude of construct relationships through correlation rather than through frequency in the first network. In other words, the correlation of two constructs is not higher just because these constructs have been studied together many times.

RESULTS

Descriptive Statistics Analysis

There were 2,632 scales categorized into 482 constructs, which were ranked by their frequencies (number of scales in constructs). Table 3 shows the top 34 frequently used constructs. The number one construct is Job performance, with a frequency of 239, which means that Job performance has been used 239 times in our sample. The top six constructs in terms of frequency are Job performance (239), Job satisfaction (180), Organizational commitment (103), Role ambiguity (102), Role conflict (78), and Intention to leave (74). These top six are the most used constructs in empirical sales research. Results show that the core construct in sales research is Job performance. A second group includes Job satisfaction, Organizational commitment, and Role ambiguity, and a third group includes Role conflict and Intention to leave. After the top six, the frequency drops greatly from 74 to 47, and thereon decreases gradually. An interesting finding is that the top 6 constructs cover 29.48% (776/2632) of frequency and the top 30 constructs cover 50.11% (1319/2632) of frequency. In other words, 1.24% (6/482) of constructs covers 30% of frequency, and 6.22% (30/482) of constructs cover 50% of frequency. Therefore, the result indicates a highly intensive usage of a limited number of central constructs in empirical sales research—namely, the Pareto principle (80-20 rule)—in most studies.

Analyzing the rankings in different time frames (the 1980s and earlier, the 1990s, and the 2000s), the evolution pattern of construct usage and frequency can be identified (Table 4). The numbers of construct usage (frequency) increase over the three time periods: 309 in the 1980s and earlier, 786 in the 1990s, and 1537 in the 2000s. Considering the number of articles published, the average number of construct usage per empirical article increases from 3.25 through 4.05 to 4.91

per article. This implies not only that constructs are applied more frequently over time but also that researchers are leaning toward more complex models. After discussing the changes in quantity, this study explores the changes in construct structure over time.

Among constructs across the three time periods, the results indicate that Job satisfaction was the number one in the 1980s and earlier. However, the top place was taken by Job performance in the 1990s and the 2000s. Job performance has become the research core and many models/theories begin with it. Among these leading constructs, the top six are almost the same, but have different rankings; Motivation was the sixth in the initial period and Customer orientation the fifth in 2000s. Frequently used constructs are pretty consistent across the three time periods, but this also implies that the research direction moves from the aspect of the salesperson to that of the customer. There are changing patterns among the minor constructs: Intrinsic Motivation and Trust in the 1980s and before, Adaptive selling and Felt stress in the 1990s, and Adaptive selling and Self-efficacy in the 2000s. This trend implies that in the 1980s and earlier, researchers focused on how to motivate salespeople in their work; after the 1990s, researchers emphasized selling skills and adaptive selling.

Nomological Network

Table 5 shows part of the full nomological matrix (482 by 482) with a number of effect size of at least two. On the upper diagonal are the 95% confidence interval, the variance of correlation coefficients, and the power of statistical tests; on the diagonal are the average of Cronbach's alpha and the number of Cronbach's alpha; on the lower diagonal are the average of correlation coefficients, the corrected correlation coefficients, the number of effect size, and the sum of sample size. For instance, the relationship between Job satisfaction and Job performance has a variance of correlation coefficient of .014, a power of statistical tests of 1, an average of correlation coefficients of .204, a corrected correlation coefficients of .249 (with the 95% confidence interval between .089 and .433), a number of effect size of 52, and a sum of sample size of 14,149. Therefore, based on random-effects meta-analysis, the estimated corrected correlation is .249, and the 95% confidence interval indicates the true correlation range (between .089 and .433). The statistic power (1) implies that the true correlation is significantly different from zero.

Furthermore, after sorting the absolute value of the 893 correct correlations from small to large and dividing them into quintiles, the first quintile (trivial/tiny) is .16, the second (weak/small) .28, the third (moderate/medium) .38, and the fourth (strong/large) .50. While Cohen (1992) identified .20, .50, and, .80 as small, medium, and large effect sizes, the results of this study provide another aspect according to actual distribution. In addition, compared with the average of all variances, variances of correlation coefficients provide us information on possible moderators or mediators in the relationship. To sum up, the nomological network provides qualitative relationships between the constructs and the unique dataset for social network analysis.

Social Network 1 (Frequency Matrix)

The first step in creating the social network is to build up a 482 by 482 symmetric adjacency matrix, such as in Table 6. Table 6 shows that Job performance and Job satisfaction are together 81 times, and Job performance and Organizational commitment/Role ambiguity 48

times. Therefore, not only high and low frequencies but also unknown/missing relationships (frequency zero) are identified. Table 7 shows the top 50 constructs in frequency ranking that are related to Job performance (Job performance ego network) and the known and unknown relationships among these 482 and top 50 constructs. For instance, Job satisfaction has been discussed with Job performance 81 times but only 52 correlation coefficients are reported. Furthermore, Job satisfaction has relationships with 207 out of the 481 constructs (excluding itself) and with 47 out of the top 50. On the other hand, the unknown relationship rate out of the 481 constructs is 57% ((481 - 207) / 481) and out of the top 50 is 4% ((50 - 47) / 49). Therefore, the results identified that Job satisfaction (order 2) has two unknown relationships out of the top 50, Commitment buyers-salespeople (order 41) and Technology adoption (order 47). In other words, Job satisfaction has never been discussed with Commitment buyers-salespeople or Technology adoption in any article. Table 7 provides the unknown relationship rates to identify the number of gaps of a construct; Table 8 clearly identifies the missing links between constructs. However, in the 482 by 482 matrix with an unknown relationship rate of 96.78% ((482 * 482 - 482) / 2 = 115921; (115921 - 3732) / 115921), it is necessary to systematically and structurally analyze using social networks.

Figure 1 shows the overall social networks of 482 constructs. However, in this huge and complex network, it is very difficult to identify the critical constructs, completely connected subgroups, isolates from subgroups, and missing links of subgroups. Therefore two indexes, degree and betweenness, were applied to identify the key nodes in the construct networks. As shown in Table 9, the study found constructs with larger degree centrality: Job performance, Job satisfaction, Organizational commitment, Role ambiguity, Role conflict, Self-efficacy, and Intention to leave; constructs with larger betweenness centrality: Job performance, Job satisfaction, Organizational commitment, Role ambiguity, Intention to leave, Customer orientation, and Effectiveness. An interesting finding is that Self-efficacy, with a frequency of 30, and Effectiveness, with a frequency of 25, are far below the top six in frequency ranking, but are key players in terms of centrality. These critical constructs with relatively low frequencies indicate important but relatively ignored constructs.

There are 1203 cliques, or completely connected networks, in the social network. Table 10 shows five of these. Clique 1 includes 12 constructs: Job performance, Job satisfaction, Organizational commitment, Role ambiguity, Role conflict, Intention to leave, Self-efficacy, Job involvement, Felt stress, Expectations, and Burnout. The first six, the top six in the frequency ranking, are included in all five cliques. These cliques provide researchers with combinations of constructs for potential models. However, it is more important to find isolates that are not included in any cliques. Therefore, when focusing on the zeros in the diagonal, isolates can be identified, such as Training agreement. Table 11 lists all the 34 isolates that do not participate in any clique; developing relationships between isolates and cliques will fill potential gaps.

Clique analysis identified the isolates; isolates, however, only display missing links between a construct and a well-connected subgroup rather than the missing links in comprehensive ego networks. Therefore, this study applied structure holes to explore the missing links in ego networks. Effective size and efficiency were applied as indexes to measure the structure holes. Thus, an ego network with a higher efficiency value has more missing links than that with a lower efficiency value; in other words, the more missing links, the higher the efficiency value. Table 12 discloses part of the construct ego network with high and low efficiency values. For example, Organization performance, Job performance, Satisfaction buyers-salespeople, Commitment buyers-salespeople, and Satisfaction buyers-company have an

efficiency of higher than .9, while Brand adoption, Ethical hiring evaluation, and Ethical training have an efficiency of .25. The Organization performance ego network, with degree 53 and effective size 48.13, has only 4.87 (53 - 48.13) average ties of constructs: on average, every construct (except Organization performance) connects to 4.87 other constructs in the network and there are 48.13 missing links.

Figure 2 shows the structure holes in the ego network of Organization performance. It is easy to identify the missing links, such as Sales innovativeness and Market orientation or Sales innovativeness and Ethical value. On the contrary, Ethical training with degree 4 and effective size 1 has 3 (4 - 1) average ties of constructs. In other words, Ethical training, Unethical behavior, Ethical attitudes, Ethical climate, and Ethical hiring evaluation comprise a completely connected ego network without any missing links (see the left part of Figure 3). Therefore, high efficiency indicates ego networks with more structure holes, which have been ignored in former studies. Structure holes are at times explained by a lack of efficiency. However, they may also exist because they suggest that two or more constructs should be connected. In addition, the location of constructs in an ego network represents the subgroups, which means that nodes in the same group have the same mutual nodes in the defined network. For instance, the ties of Ethical training, Unethical behavior, and Ethical hiring evaluation are based on the five constructs in the Ethical training ego network (namely, the same neighbors), so the three are close to each other. Ethical attitudes and Ethical climate are far away from each other because they have few mutual neighbors (Figure 3).

Social Network 2 (Correlation Matrix)

The second social network is based on the correlation matrix derived from the nomological network. This network focuses on cliques to explore completely connected networks and on factor analysis to explore constructs with similar positions in the networks. Table 13 presents 5 out of 167 cliques. For example, there are seven constructs in Clique 1, Job performance, Job satisfaction, Organizational commitment, Customer orientation, Control system, Intrinsic motivation, and Autonomy. The first four constructs are included across the five cliques, and only three constructs (Job performance, Job satisfaction, and Organizational commitment) are included in the top six in the frequency ranking. These completely connected subgroups (pairwise correlation matrices; Table 14 implies that correlation coefficients are available for potential structural equation modeling (SEM) analysis and that the models of cliques are highly interesting construct combinations. In other words, there are 167 full correlation matrices to develop models for future research. This matrix can be used to test for direct effect, moderator, and mediator relationships.

CONCLUSIONS

This study employed meta-analysis, social network analysis, and nomological network analysis to understand current knowledge and to explore new directions in sales research. The findings and the interesting results answered the four research questions of the study. First, to identify the central constructs, this study discussed the trend of construct usage over three time periods and found the most frequently used constructs, namely, the top six constructs. The study then analyzed the evolution of construct usages and frequencies and found changes in central constructs and in the intensive use of constructs. Additionally, the social network of frequency

identified the central constructs according to the number of constructs adjacent to a given construct (degree) and the sum of two connected constructs (betweenness). For example, comparing construct usage and betweenness, the study identified Self-efficacy and Effectiveness as critical constructs with relatively low usage.

Second, to explore construct relationships, the nomological network clearly and precisely displays the relationships among the 482 constructs. Furthermore, clique analysis identified 1203 cliques in the social network of frequency and 167 cliques in the social network of correlation. These cliques imply relationships or strengths among constructs. Third, to identify the missing links, clique analysis of the social network of frequency indicated 34 isolates from cliques, and structural holes examined the gaps of ego networks, which were listed according to the missing links ratios.

Theoretical and Managerial Implications

There are several theoretical and managerial implications of this study. First of all, to the best of my knowledge, this study is the first to apply social network and nomological network to analyze constructs of sales research. This new approach can be applied in other fields or sub-disciplines of marketing and may give rise to new thinking in combining different methodologies. Second, by combining these three methods, the study built up various comprehensive construct networks that are new to construct analysis. Therefore, constructs can be explored by whole networks or ego networks, in which each construct can be discussed in its own network, and researchers will not be limited to some specific models.

Third, the critical constructs, ignored constructs, missing links, and gaps are identified clearly and precisely through an analysis of the nodes, relationships, and networks. This is significantly different from previous attempts to synthesize sales research (Geiger and Guenzi 2009; Plouffe et al. 2008; Williams and Plouffe 2007). Fourth, the relationships in the study were created based on the constructs in a model; therefore, a relationship between two constructs does not mean that they have a direct (causation, mediation, moderation) relationship or are under hypothesis. After examining these relationships, the study found that most direct relationships have been hypothesized.

Fifth, correlation ranges are defined in quintiles, which are different from traditional ones (Cohen 1992). According to the distribution of 893 correct correlations, the study defined that the range of trivial relationship is 0–.16, weak is .16–.28, moderate is .28–.38, strong is .38–.50, and very strong is .5–.95. Researchers can use more detailed definitions to find small relationship changes that are neglected in larger ranges. Finally, this study evaluated empirical sales research and discussed construct usages and frequencies over time that indicate the current situation.

This study provides a unique dataset for knowledge development and accumulation that not only contributes to an understanding of the development of constructs but also to the gaps and opportunities of sales research. Therefore, the study helps researchers to focus on the critical constructs, to include related constructs, to build comprehensive model/relationships and to fill the gaps in sales research.

Limitations

There are several limitations to this study. First, some information may be lost while categorizing scales into constructs. The study classified scales into different constructs according

to their definitions and items. Nevertheless, ambiguities of construct definition or adaptation may affect findings. For example, Behrman and Perreault (1982) created a scale with five dimensions to measure Job performance. While most studies used this scale to measure Job performance, some adapted its individual dimensions to measure product knowledge or presenting skills (Ahearne, Hughes and Schillewaert 2007). In addition, if constructs are too narrow, they can be meaningless; on the other hand, if they were too broad, much information would be lost. Second, this study focused on psychometric scales, and other manifest variables are ignored; therefore, the dataset may be limited.

Third, correlation does not imply causation. Although meta-analysis can be used to find mediators or moderators with specific models and additional information, this study focuses on direct effects with non-directional social networks and a nomological network. In addition, a construct may play various roles (dependent, independent variable, moderator, or mediator) in different models. If not focusing on a specific model, it would be difficult to identify a construct's relationships with others. Therefore, this study can only identify research opportunities based on the foundational dataset rather than on specific models to identify moderators or mediators.

Fourth, there are over 96% blank cells in the matrices, that is, many structural holes and gaps in the frequency and correlation matrices. However, not every gap has a theoretical foundation and some missing relationships may not exist at all. For instance, Similarity buyers-salespeople and Technology training have never been discussed together so there is a potential relationship between them in our study. In practice, the similarity between buyers and salespeople may have no relationship with technology training. The biggest limitation is that there are too many gaps found in the study to display and discuss all the ego networks. Instead of showing numerous networks or huge matrices, this study introduced and explained the methods and procedures, indicated critical points, and demonstrated a portion of the results.

Future Research

There are many possible directions for future research based on this strong foundation. The main directions have been discussed, as follows. Critical but rarely used constructs from centrality analysis, new models from clique analysis, and missing links from structural holes are all potential future research directions. However, as mentioned earlier, in Limitations, these gaps may lack theoretical support; therefore, researchers have to examine them carefully. Second, the nomological network provides rich and current information (correlations, variances, statistical power, etc.) so meta-analysis can be applied in analyzing a specific construct model and discussing its moderators or mediators. For example, Carrillat et al. (2009) used meta-analysis and structural equation modeling to examine the model of service quality, customer satisfaction, attitudinal loyalty, purchase intention, and moderators.

Third, methodology research is also a future research direction. In the nomological network, researchers can discuss the relationships among correlations, variances, statistical power, and number of correlations. Additionally, comparisons of the construct positions in the nomological network can identify construct redundancy. At the scale level, future researchers can compare different kinds of scales in the same construct to find more efficient scales. Fourth, the researcher can analyze networks by adding more characteristics of articles, such as sample types, so that multiple matrices analysis may be applied. Combining multiple matrices will be very complex but more variances can be addressed.

Fifth, this is a first attempt to combine three different methods to develop and analyze networks. Researchers can now apply these methods in other fields, perhaps giving rise to a new era in other research areas. Finally, there is no end in developing networks. The more constructs and relationships that are included, the more issues that can be explored. In addition, construct positions in the network will be more precise if there are more data. Namely, redundant constructs (Singh 1991) can be positioned by the social network of correlation. Constructs being grouped in the same factor imply their similar positions in the nomological network (redundant constructs).

REFERENCES

Ahearne, Michael, Douglas E. Hughes, and Niels Schillewaert. 2007. "Why Sales Reps Should Welcome Information Technology: Measuring the Impact of CRM-Based IT on Sales Effectiveness." *International Journal of Research in Marketing* 24:336-49. doi:10.1016/j.ijresmar.2007.09.003

Arthur, Windred, Jr., Winston Bennet, Pamela S. Edens, and Suzanne T. Bell. 2003. "Effectiveness of Training in Organizations: A Meta-Analysis of Design and Evaluation Features." *Journal of Applied Psychology* 88:234-45. doi:10.1037/0021-9010.88.2.234

Behrman, Douglas N., and William D. Perreault, Jr. 1982. "Measuring the Performance of Industrial Salespersons." *Journal of Business Research* 10:355-70. doi:10.1016/0148-2963(82)90039-X

Bron, Coen, and Joep Kerboscht. 1973. "Finding All Cliques of an Undirected Graph." *Communications of the ACM* 16:575-7. doi:10.1145/362342.362367

Brown, Steven P., and Robert A. Peterson. 1993. "Antecedents and Consequences of Salesperson Job Satisfaction: Meta-Analysis and Assessment of Causal Effects." *Journal of Marketing Research* 30:63-77. doi:10.2307/3172514

Bruner II, Gordon C., and Paul J. Hensel. 1993. "Multi-Item Scale Usage in Marketing Journals: 1980 to 1989." *Journal of Academy of Marketing Science* 21:339-44. doi:10.1007/BF02894526

Burt, Ronald. 1992. *Structural Holes: The Social Structure of Competition*. Cambridge, MA: Harvard University Press.

Carrillat, François A., Fernando Jaramillo, and Jay Prakash Mulki. 2009. "Examining the Impact of Service Quality: A Meta-Analysis of Empirical." *Journal of Marketing Theory & Practice* 17:95-110. doi:10.2753/MTP1069-6679170201

Churchill, Gilbert A., Neil M. Ford, Steven W. Hartley, and Orville C. Walker. 1985. "The Determinants of Salesperson Performance: A Meta-Analysis." *Journal of Marketing Research* 22:103-18. doi:10.2307/3151357

Cohen, Jacob. 1992. "A Power Primer." *Psychological Bulletin* 112:155-9. doi:10.1037//0033-2909.112.1.155

Cronbach, Lee J., and Paul E. Meehl. 1955. "Construct Validity in Psychological Tests." *Psychological Bulletin* 52:281-302. doi:10.1037/h0040957

De Nooy, Wouter, Andrej Mrvar, and Vladimir Batagelj. 2005. *Exploratory Social Network Analysis with Pajek*. New York, NY: Cambridge University Press.

Flaherty, Karen E., John C. Mowen, Tom J. Brown, and Greg W. Marshall. 2009. "Leadership Propensity and Sales Performance Among Sales Personnel and Managers in a Specialty Retail Store Setting." *Journal of Personal Selling and Sales Management* 29:43-59.

doi:10.2753/PSS0885-3134290103

Franke, George R., and Jeong-Eun Park. 2006. "Salesperson Adaptive Selling Behavior and Customer Orientation: A Meta-Analysis." *Journal of Marketing Research*. 43:693-702. doi:10.1509/jmkr.43.4.693

Freeman, Linton C. 1979. "Centrality in Social Networks: Conceptual Clarification." *Social Networks* 1:215-39. doi:10.1016/0378-8733(78)90021-7

Friedkin, Noah E., and Karen S. Cook. 1990. "Peer Group Influence." *Sociological Methods & Research* 19:122-43. doi:10.1177/0049124190019001006

Geiger, Susi, and Paolo Guenzi. 2009. "The Sales Function in the Twenty-First Century: Where Are We and Where Do We Go From Here?" *European Journal of Marketing* 43:873-89. doi:10.1108/03090560910961434

Glass, Gene V. 1976. "Primary, Secondary, and Meta-Analysis." *Educational Researcher* 5:3-8. doi:10.2307/1174772

Hedges, Larry V., and Theres D. Pigott. 2001. "The power of Statistical Tests in Meta-Analysis." *Psychological Methods* 6:203-17. doi:10.1037/1082-989X.6.3.203

Hensel, Paul J., and Gordon C. Bruner, II. 1992. "Scaling and Measurement: Multi-Item Scaled Measures in Sales Related Research." *Journal of Personal Selling and Sales Management* 12:77-82. doi: 10.1080/08853134.1992.10753919

Hunter, John E., and Frank L. Schmidt. 2004. *Methods of Meta-Analysis: Correcting Error and Bias in Research Findings*. Thousand Oaks, CA: Sage Publications, Inc.

Jaramillo, Fernando, Douglas B. Grisaffe, Lawrence B. Chonko, and James A. Roberts. 2009. "Examining the Impact of Servant Leadership on Sales Force Performance." *Journal of Personal Selling and Sales Management* 29:257-75. doi:10.2753/PSS0885-3134290304

------, Jay P. Mulki, and Greg W. Marshall. 2005. "A Meta-Analysis of the Relationship between Organizational Commitment and Salesperson Job Performance: 25 Years of Research." *Journal of Business Research* 58:705-14. doi:10.1016/j.jbusres.2003.10.004

Lagace, Rosemary R., Jerry R. Goolsby, and Jule B. Gassenheimer. 1993. "Scaling and Measurement: A Quasi-Replicative Assessment of a Revised Version of INDSALES." *Journal of Personal Selling and Sales Management* 13:65-72. doi:10.1080/08853134.1993.10753937

Le, Huy, Frank L. Schmidt, James K. Harter, and Kristy J. Lauver. 2010. "The Problem of Empirical Redundancy of Constructs in Organizational Research: An Empirical Investigation" *Organizational Behavior and Human Decision Processes* 112:112-25. doi:10.1016/j.obhdp.2010.02.003

Lipsey, Mark W., and David B. Wilson. 2001. *Practical Meta-Analysis*. Thousand Oaks, CA: SAGE Publications, Inc.

Luce, Duncan R., and Albert D. Perry. 1949. "A Method of Matrix Analysis of Group Structure." *Psychometrika* 14:95-116. doi:10.1007/BF02289146

Mahajan, Jayashree, Gilbert A. Churchill, Jr., Neil M. Ford, and Orville C. Walker, Jr. 1984. "A Comparison of the Impact of Organizational Climate on the Job Satisfaction of Manufacturers' Agents and Company Salespeople: An Exploratory Study" *Journal of Personal Selling and Sales Management* 4:1-10. doi: 10.1080/08853134.1984.10754363

Monge, Peter R., and Noshir S. Contractor. 2003. *Theories of communication networks*. Oxford, NY: Oxford University Press.

Nerur, Sridhar P., Abdul A. Rasheed, and Vivek Natarajan. 2008. "The Intellectual Structure of the Strategic Management Field: An Author Co-Citation Analysis." *Strategic*

Management Journal 29:319-36. doi:10.1002/smj.659

Palmatier, Robert W., Rajiv P. Dant, Dhruv Grewal, and Kenneth R. Evans. 2006. "Factors Influencing the Effectiveness of Relationship Marketing: A Meta-Analysis." *Journal of Marketing* 70:136-53. doi:10.1509/jmkg.70.4.136

Panagopoulos, Nikolaos G., and George J. Avlonitis. 2008. "Sales Force Control System: A Review of Measurement Practices and Proposed Scale Refinements." *Journal of Personal Selling and Sales Management* 28:365-85. doi:10.2753/PSS0885-3134280403

Plouffe, Christopher R., Brian C. Williams, and Trent Wachner. 2008. "Navigating Difficult Waters: Publishing Trends and Scholarship in Sales Research." *Journal of Personal Selling and Sales Management* 28:79-92. doi: 10.2753/PSS0885-3134280106

Polites, Greta L., and Richard T. Watson. 2009. "Using Social Network Analysis to Analyze Relationships among IS Journals." *Journal of the Association for Information Systems* 10:595-636.

Ramaswami, Sridhar N., Srini S. Srinivasan, and Stephen A. Gorton. 1997. "Information Asymmetry between Salesperson and Supervisor: Postulates from Agency and Social Exchange Theories." *Journal of Personal Selling and Sales Management* 17:29-50. doi: 10.1080/08853134.1997.10754098

Singh, Jagdip. 1991. "Redundancy in Constructs: Problem, Assessment, and an Illustrative Example." *Journal of Business Research* 22:255-80. doi:10.1016/0148-2963(91)90006-J

Sutton, Robert I., and Barry M. Staw. 1995. "What Theory is Not." *Administrative Science Quarterly* 40:371-84. doi:10.2307/2393788

Valentine, Sean, and Tim Barnett. 2007. "Perceived Organizational Ethics and the Ethical Decisions of Sales and Marketing Personnel." *Journal of Personal Selling and Sales Management*. 27:373-88. doi:10.2753/PSS0885-3134270407

Verbeke, Willen, Bart Dietz, and Ernst Verwaal. 2011. "Drivers of Sales Performance: A Contemporary Meta-analysis. Have Salespeople Become Knowledge Brokers?" *Journal of the Academy Marketing Science* 39:407-28. doi:10.1007/s11747-010-0211-8

Viswesvaran, Chockalingam, and Deniz S. Ones. 1995. "Theory Testing: Combining Psychometric Meta-Analysis and Structural Equations Modeling." *Personnel Psychology* 48:865–83. doi:10.1111/j.1744-6570.1995.tb01784.x

Wasserman, Stanley, and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications*. New York, NY: Cambridge University Press.

Wellman, Barry, and Scot Wortley 1990. "Different Strokes from Different Folks: Community Ties and Social Support." *American Journal of Sociology* 96:558-88. doi:10.1086/229572

Williams, Brian C., and Christopher R. Plouffe. 2007. "Assessing the Evolution of Sales Knowledge: A 20-year Content Analysis." *Industrial Marketing Management* 36:408-19. doi:10.1016/j.indmarman.2005.11.003

Wood, John A., James S. Boles, Wesley Johnston, and Danny Bellenger. 2008. "Buyers' Trust of the Salesperson: An Item-Level Meta-Analysis." *Journal of Personal Selling and Sales Management* 28:263-83. doi:10.2753/PSS0885-3134280304

Yang, Zhiyong, Fernando Jaramillo, and Lawrence B. Chonko. 2010. "Productivity and Coauthorship in JPSSM: A Social Network Analysis." *Journal of Personal Selling and Sales Management* 30:47-71. doi:10.2753/PSS0885-313430010

APPENDIX

Betweenness The sum of all geodesics linking any two vertices that pass through the given
       vertex, the concept of centrality.
Clique The maximum number of vertices that have all possible ties present among themselves.
       Every vertex links others in the same subgroup (pairwise matrix).
Degree The number of vertices adjacent to a given vertex in a symmetric graph, a concept of
       centrality.
Effective size The number of alters that an ego has, minus the average number of ties that each
       alter has to other alters.
Efficiency The effective size divided by the number of alters in the ego network. The proportion
       of the ego's ties to its neighborhood is non-redundant.
Ego network The network formed by selecting a vertex, including all vertices that are connected
       to that vertex, and all the connections among the other vertices.
Isolate There are two definitions: 1) a vertex with degree zero (no connection with others); 2)
       subgroups that have no connection to the largest group.
Isolate from cliques Vertices that have no connection to any cliques.
Structure holes The missing ties between some sets of vertices and others in a network by
       examining the position of each vertex in their neighborhood for the presence of structural
       holes. This study used effective size and efficiency to measure structure holes.
Note: All definitions are adopted from Hanneman and Riddle (2005) or UCINET reference
manual and some descriptions may be adjusted by the author.
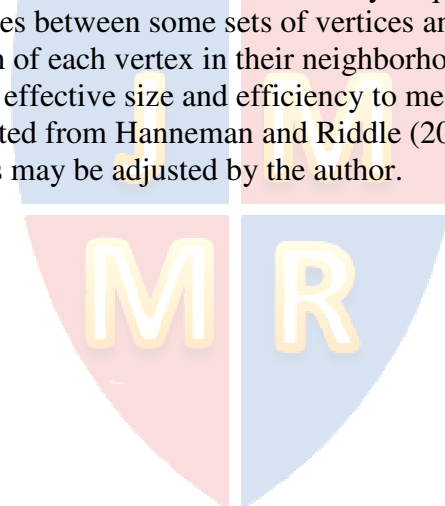
Table 1
Outcomes of Research Framework

Research Framework	Descriptive Statistics Analysis	Nomological Network (Nomological Matrix)	
		Social Network 1 (Frequency)	Social Network 2 (Correlation)

Outcomes	• Construct usage
	• Evolution of constructs over three time periods
		• Centrality
		  ○ Degree
		  ○ Betweenness
		• Cliques
		• Structural Holes
			• Cliques

Corresponding Research Objective(s)	1. Identify the central constructs to empirical sales research and understand the evolution of constructs over time.	1. Identify the central constructs to empirical sales research. 2. Explore the relationships between pairs of constructs in a nomological network. 3. Identify the missing links in the nomological network.	2. Explore the relationships between pairs of constructs in a nomological network.

Table 2
Data Sources

Journal	Period	No. of Articles	No. of Scales	No. of Constructs	Database
Journal of Personal Selling & Sales Management (JPSSM)	1980–2010(1)[1]	263	1087	370	EBSCO Host
Industrial Marketing Management (IMM)	1971–2009	63	302	152	Elsevier ScienceDirect Complete
Journal of the Academy of Marketing Science (JAMS)	1973–2009	59	294	118	Springer Standard Collection
Journal of Business Research (JBR)	1973–2010(1)	43	220	96	Elsevier ScienceDirect Complete
Journal of Marketing (JM)	1936–2010(1)	38	210	118	EBSCO Host
Journal of Business & Industrial Marketing (JBIM)	1994–2009	35	113	67	Emerald Current
Journal of Applied Psychology (JAP)	1965–2009	31	105	61	EBSCO Host
Journal of Marketing Theory and Practice (JMTP)	1992–2010(1)	26	106	70	EBSCO Host
Journal of Marketing Research (JMR)	1964–2009	15	66	44	EBSCO Host
International Journal of Research in Marketing (IJRM)	1984–2010(1)	13	62	44	Elsevier ScienceDirect Complete
Psychology & Marketing (P&M)	1984–2010(3)	7	25	22	EBSCO Host
European Journal of Marketing (EJM)	1967–2009	6	29	20	Emerald Current
Journal of Business Ethics (JBE)	1982–2009	6	13	9	EBSCO Host
Total		605	2632		

[1]Number in the parentheses is the issue number
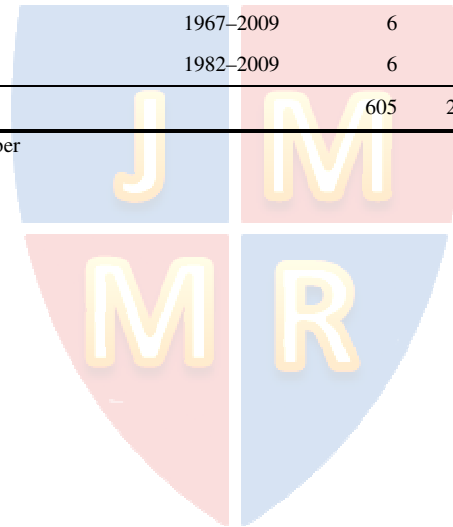
Table3
Frequency Ranking of Constructs (Top 34)

Construct	Frequency	Frequency/2632[1]	Cumulated Frequency%	Cumulated Construct[2]%
Job performance	239	9.08	9.08	0.21
Job satisfaction	180	6.84	15.92	0.41
Organizational commitment	103	3.91	19.83	0.62
Role ambiguity	102	3.88	23.71	0.83
Role conflict	78	2.96	26.67	1.04
Intention to leave	74	2.81	29.48	1.24
Customer orientation	47	1.79	31.27	1.45
Adaptive selling	42	1.60	32.86	1.66
Control system	32	1.22	34.08	1.87
Self-efficacy	30	1.14	35.22	2.07
Job involvement	28	1.06	36.28	2.28
Felt stress	27	1.03	37.31	2.49
Effort	26	0.99	38.30	2.70
Intrinsic motivation	26	0.99	39.29	2.90
Effectiveness	25	0.95	40.24	3.11
Motivation	24	0.91	41.15	3.32
Trust buyers-salespeople	23	0.87	42.02	3.53
Market conditions	21	0.80	42.82	3.73
Organizational citizenship behaviors	20	0.76	43.58	3.94
Trust managers-salespeople	20	0.76	44.34	4.15
Leadership behaviors	19	0.72	45.06	4.36
Satisfaction buyers-salespeople	17	0.65	45.71	4.56
Relationship buyers-salespeople	16	0.61	46.31	4.77
Salesperson attributes	15	0.57	46.88	4.98
Expectations	15	0.57	47.45	5.19
Learning orientation	15	0.57	48.02	5.39
Locus of control	15	0.57	48.59	5.60
Selling orientation	14	0.53	49.13	5.81
Organization performance	13	0.49	49.62	6.02
Personality	13	0.49	50.11	6.22
Service quality	13	0.49	50.61	6.43
Task attribute/characteristics	13	0.49	51.10	6.64
Technology adoption	13	0.49	51.60	6.85
Trust	13	0.49	52.09	7.05

[1] There are a total of 2632 scales collected
[2] There are a total of 482 constructs collected

Table 4
Frequency Rankings of Constructs (Top 18) for the 1980s, 1990s, and 2000s

Construct 80s and Before	Fq[1]	CumuFq %[2]	CumuCons %[3]	Construct 90s	Fq	CumuFq %	CumuCons %	Construct 00s	Fq	CumuFq %	CumuCons %
Job satisfaction	46	14.89	1.03	Job performance	76	9.67	0.44	Job performance	136	8.85	0.26
Job performance	27	23.62	2.06	Job satisfaction	57	16.92	0.87	Job satisfaction	77	13.86	0.52
Role ambiguity	24	31.39	3.09	Organizational commitment	38	21.76	1.31	Organizational commitment	58	17.63	0.78
Intention to leave	14	35.92	4.12	Role ambiguity	38	26.59	1.75	Role ambiguity	40	20.23	1.04
Role conflict	14	40.45	5.15	Role conflict	32	30.66	2.18	Customer orientation	34	22.45	1.30
Motivation	12	44.34	6.19	Intention to leave	26	33.97	2.62	Intention to leave	34	24.66	1.55
Intrinsic motivation	9	47.25	7.22	Adaptive selling	13	35.62	3.06	Role conflict	32	26.74	1.81
Trust	8	49.84	8.25	Felt stress	13	37.28	3.49	Adaptive selling	29	28.63	2.07
Leadership behaviors	7	52.10	9.28	Job involvement	12	38.80	3.93	Self-efficacy	25	30.25	2.33
Organizational commitment	7	54.37	10.31	Customer orientation	11	40.20	4.37	Control system	20	31.55	2.59
Effort	5	55.99	11.34	Effort	11	41.60	4.80	Effectiveness	16	32.60	2.85
Self-esteem	5	57.61	12.37	Leadership behaviors	11	43.00	5.24	Market conditions	16	33.64	3.11
Core task variables	4	58.90	13.40	Control system	9	44.15	5.68	Trust buyers-salespeople	16	34.68	3.37
Felt stress	4	60.19	14.43	Effectiveness	8	45.17	6.11	Satisfaction buyers-salespeople	14	35.59	3.63
Job involvement	4	61.49	15.46	Intrinsic motivation	8	46.18	6.55	Trust managers-salespeople	14	36.50	3.89
Managers' power bases	4	62.78	16.49	Salesperson attributes	7	47.07	6.99	Learning orientation	13	37.35	4.15
Organizational climate	4	64.08	17.53	Motivation	7	47.96	7.42	Organizational citizenship behaviors	13	38.19	4.40
Self-esteem (task-specific)	4	65.37	18.56	Trust buyers-salespeople	7	48.85	7.86	Relationship buyers-salespeople	13	39.04	4.66
Total number of constructs		97				229				368	
Total number of construct usage		309				786				1537	
Total number of articles		95				194				313	
Average number of construct usage per article		3.25				4.05				4.91	

[1] Fq: Frequency; the number of construct usage
[2] CumuFq %: Cumulated Frequency %
[3] CumuCons %: Cumulated Construct %

Table 5
Nomological Network

Construct	Job performance	Job satisfaction	Organizational commitment	Role ambiguity	Role conflict	Intention to leave	Customer orientation	Adaptive selling	Control system	Self-efficacy
Job performance	0.836/191	0.089/0.408/ 0.014/1	0.079/0.433/ 0.016/1	-0.485/-0.06/ 0.022/1	-0.265/0.034/ 0.014/0.962	-0.434/0.043/ 0.027/1	0.029/0.671/ 0.042/1	0.093/0.665/ 0.035/1	-0.053/0.499/ 0.035/0.998	0.081/0.714/ 0.043/1
Job satisfaction	0.204/0.249/ 52/14149	0.828/168	0.417/0.914/ 0.025/1	-0.739/- 0.327/ 0.019/1	-0.745/- 0.231/ 0.028/1	-0.851/- 0.279/ 0.034/1	-0.118/0.514/ 0.041/0.795	0.246/0.352/ 0.005/0.987	0.119/0.589/ 0.025/1	-0.152/0.867/ 0.103/0.499
Organizational commitment	0.218/0.256/ 29/7970	0.572/0.665/ 53/13524	0.862/97	-0.655/- 0.372/ 0.011/1	-0.813/- 0.115/ 0.048/1	-0.784/- 0.469/ 0.012/1	0.06/0.579/ 0.03/0.98	0.19/0.19/ 0.002/0.656	0.317/0.317/ 0/0.834	
Role ambiguity	-0.217/- 0.273/ 37/10462	-0.431/- 0.533/ 57/15569	-0.431/- 0.514/ 30/8816	0.797/87	0.151/0.83/ 0.046/1	0.234/0.535/ 0.013/1	-0.231/- 0.231/ 0.004/0.95			-0.564/- 0.362/ 0.008/1
Role conflict	-0.088/- 0.116/ 28/7839	-0.396/- 0.488/ 46/12505	-0.392/- 0.464/ 26/7298	0.394/0.491/ 56/17261	0.795/73	0.162/0.619/ 0.024/1	-0.464/- 0.026/ 0.022/0.947		-0.395/- 0.395/ 0/0.93	
Intention to leave	-0.164/- 0.196/ 21/4837	-0.483/- 0.565/ 48/10416	-0.554/- 0.626/ 26/6678	0.325/0.384/ 26/6011	0.329/0.391/ 24/5105	0.878/49			-0.23/-0.23/ 0.004/0.613	
Customer orientation	0.296/0.35/ 19/4913	0.168/0.198/ 8/2331	0.272/0.319/ 9/2108	-0.185/- 0.231/ 5/1634	-0.201/- 0.245/ 5/1634		0.829/56	0.245/0.64/ 0.018/1	0.36/0.36/ 0/0.871	
Adaptive selling	0.322/0.379/ 36/7753	0.256/0.299/ 4/1167	0.169/0.19/ 2/769				0.369/0.443/ 9/2786	0.835/44		0.592/0.592/ 0.001/0.995
Control system	0.184/0.223/ 23/4273	0.302/0.354/ 7/1678	0.285/0.317/ 2/428		-0.314/- 0.395/ 2/494	-0.207/-0.23/ 2/454	0.298/0.36/ 2/437		0.803/29	
Self-efficacy	0.327/0.398/ 10/2021	0.286/0.357/ 3/502		-0.38/-0.463/ 3/808				0.444/0.592/ 2/421		0.825/26

Notes:
Diagonal: Average of Cronbach's alpha/Number of Cronbach's alpha
Upper diagonal: Low boundary of 95% confidence interval/High boundary of 95% confidence interval/Variance of correlation coefficients/the power of statistical tests
Lower diagonal: Average of correlation coefficients/Corrected correlation coefficient/Number of effect size/Sum of sample size
Control system: Includes all kinds of control scales that do not clearly indicate their specific attributions, such as behavior, output, knowledge control, etc.

Table 6
Symmetric Adjacency Matrix

	JP	JS	OC	RA	RC	IL	CO	AS	CS	SE	JI	FS	Et	MI
Job performance														
Job satisfaction	81													
Organizational commitment	48	71												
Role ambiguity	48	75	38											
Role conflict	36	57	34	77										
Intention to leave	35	60	37	33	27									
Customer orientation	22	7	7	5	5	1								
Adaptive selling	39	9	2	3	2	1	9							
Control system	26	12	10	3	4	4	0	0						
Self-efficacy	13	8	3	4	2	2	1	2	0					
Job involvement	11	17	13	8	8	6	1	0	2	1				
Felt stress	15	19	9	18	11	13	1	2	1	2	2			
Effort	17	9	5	5	4	2	1	3	0	6	4	2		
Intrinsic motivation	16	16	7	6	6	4	3	2	4	1	7	0	2	
Effectiveness	15	3	5	2	2	1	1	0	6	1	0	0	0	0

Table 7
Missing Relationship Analysis of Top 50 in Frequency Ranking

Order	Construct	Relations with JP Fq, Corr[1]	Known Relations out of 481 (%)[2]	Unknown Relations out of 481 (%)	Known Relations out of 49 (%)	Unknown Relations out of 49 (%)[3]
1	Job performance		247 (51%)	234 (49%)	47 (96%)	2 (4%)
2	Job satisfaction	81, 52	207 (43%)	274 (57%)	47 (96%)	2 (4%)
3	Organizational commitment	48, 29	154 (32%)	327 (68%)	36 (73%)	13 (27%)
4	Role ambiguity	48, 37	143 (30%)	338 (70%)	41 (84%)	8 (16%)
5	Role conflict	36, 28	116 (24%)	365 (76%)	40 (82%)	9 (18%)
6	Intention to leave	35, 21	98 (20%)	383 (80%)	32 (65%)	17 (35%)
7	Customer orientation	22, 19	85 (18%)	396 (82%)	33 (67%)	16 (33%)
8	Adaptive selling	39, 36	81 (17%)	400 (83%)	31 (63%)	18 (37%)
9	Control system	26, 23	61 (13%)	420 (87%)	27 (55%)	22 (45%)
10	Self-efficacy	13, 10	101 (21%)	380 (79%)	34 (69%)	15 (31%)
11	Job involvement	11, 7	55 (11%)	426 (89%)	26 (53%)	23 (47%)
12	Felt stress	15, 12	64 (13%)	417 (87%)	25 (51%)	24 (49%)
13	Effort	17, 18	61 (13%)	420 (87%)	29 (59%)	20 (41%)
14	Intrinsic motivation	16, 9	59 (12%)	422 (88%)	21 (43%)	28 (57%)
15	Effectiveness	15, 10	70 (15%)	411 (85%)	22 (45%)	27 (55%)
16	Motivation	10, 8	49 (10%)	432 (90%)	22 (45%)	27 (55%)
17	Trust buyers-salespeople	3, 0	52 (11%)	429 (89%)	17 (35%)	32 (65%)
18	Market conditions	10, 8	68 (14%)	413 (86%)	22 (45%)	27 (55%)
19	Organizational citizenship behaviors	15, 13	60 (12%)	421 (88%)	21 (43%)	28 (57%)
20	Trust managers-salespeople	7, 6	54 (11%)	427 (89%)	18 (37%)	31 (63%)
21	Leadership behaviors	6, 4	42 (9%)	439 (91%)	19 (39%)	30 (61%)
22	Satisfaction buyers-salespeople	1, 0	39 (8%)	442 (92%)	18 (37%)	31 (63%)
23	Relationship buyers-salespeople	4, 3	55 (11%)	426 (89%)	15 (31%)	34 (69%)
24	Salesperson attributes	11, 4	45 (9%)	436 (91%)	24 (49%)	25 (51%)
25	Expectations	5, 4	33 (7%)	448 (93%)	18 (37%)	31 (63%)
26	Learning orientation	10, 6	55 (11%)	426 (89%)	17 (35%)	32 (65%)

Order	Construct	Relations with JP Fq, Corr[1]	Known Relations out of 481 (%)[2]	Unknown Relations out of 481 (%)	Known Relations out of 49 (%)	Unknown Relations out of 49 (%)[3]
27	Locus of control	5, 4	49 (10%)	432 (90%)	20 (41%)	29 (59%)
28	Selling orientation	5, 4	22 (5%)	459 (95%)	13 (27%)	36 (73%)
29	Organization performance	3, 3	53 (11%)	428 (89%)	15 (31%)	34 (69%)
30	Personality	8, 6	15 (3%)	466 (97%)	8 (16%)	41 (84%)
31	Service quality	2, 2	37 (8%)	444 (92%)	18 (37%)	31 (63%)
32	Task attribute/characteristics	6, 6	26 (5%)	455 (95%)	17 (35%)	32 (65%)
33	Technology adoption	3, 3	42 (9%)	439 (91%)	11 (22%)	38 (78%)
34	Trust	2, 0	17 (4%)	464 (96%)	4 (8%)	45 (92%)
35	Expertise	3, 0	38 (8%)	443 (92%)	15 (31%)	34 (69%)
36	Fairness	4, 4	47 (10%)	434 (90%)	20 (41%)	29 (59%)
37	Selling skills	11, 9	42 (9%)	439 (91%)	20 (41%)	29 (59%)
38	Supervisory feedback	6, 5	42 (9%)	439 (91%)	22 (45%)	27 (55%)
39	Perceived usefulness of technology	2, 2	44 (9%)	437 (91%)	13 (27%)	36 (73%)
40	Burnout	7, 3	32 (7%)	449 (93%)	17 (35%)	32 (65%)
41	Commitment buyers-salespeople	0, 0	41 (9%)	440 (91%)	8 (16%)	41 (84%)
42	Empowerment	6, 5	42 (9%)	439 (91%)	23 (47%)	26 (53%)
43	Ethical climate	2, 2	18 (4%)	463 (96%)	10 (20%)	39 (80%)
44	Extrinsic motivation	5, 4	38 (8%)	443 (92%)	17 (35%)	32 (65%)
45	Multifactor leadership	8, 8	34 (7%)	447 (93%)	19 (39%)	30 (61%)
46	Participation	5, 5	49 (10%)	432 (90%)	21 (43%)	28 (57%)
47	Satisfaction buyers-company	0, 0	35 (7%)	446 (93%)	9 (18%)	40 (82%)
48	Self-esteem	4, 3	27 (6%)	454 (94%)	12 (24%)	37 (76%)
49	Coping styles	3, 0	21 (4%)	460 (96%)	9 (18%)	40 (82%)
50	Manager support	7, 7	41 (9%)	440 (91%)	17 (35%)	32 (65%)

[1]Fq: Frequency, the number of construct usage; Corr: the number of correlation coefficient
[2]481: Except the construct under discussion, there 481 out of all the 482 constructs; %: (Number of known relations) / 481
[3]49: Except the construct under discussion, there are 49 out of the top 50 constructs; %: (Number of unknown relations) / 49

Table 8
Missing Relationship Matrix of Top 25 in Frequency Ranking

Order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	-																								
2		-																							
3			-														0					0	0		
4				-																		0			
5					-																	0			
6						-										0		0				0		0	
7							-		0											0	0				0
8								-	0		0				0	0		0		0					0
9							0	0	-	0			0				0			0			0		
10									0	-							0	0		0			0		
11								0			-				0		0		0	0		0	0		
12												-		0	0	0	0	0	0			0	0	0	
13									0				-		0		0		0				0		
14												0		-	0		0	0	0	0		0	0	0	
15								0			0	0	0	0	-	0				0	0				0
16						0		0				0		0		-	0	0	0	0		0	0	0	
17			0						0	0	0	0	0	0		0	-	0	0	0	0			0	0
18						0		0		0		0		0		0	0	-	0		0	0			0
19											0	0	0	0		0	0	0	-	0	0	0	0		0
20							0	0	0	0	0			0	0	0	0		0	-	0	0	0	0	0
21							0								0		0	0	0	0	-	0	0	0	0
22			0	0	0	0					0	0		0		0		0	0	0	0	-			0
23			0						0	0	0	0	0	0		0			0	0	0		-	0	0
24						0						0		0		0	0			0	0		0	-	0
25							0	0							0		0	0	0	0	0	0	0	0	-

Note: Order numbers match those in Table 7.

Table 9
Centrality Rankings (Top 20)

Degree	Betweenness	Frequency
Job performance	Job performance	Job performance
Job satisfaction	Job satisfaction	Job satisfaction
Organizational commitment	Organizational commitment	Organizational commitment
Role ambiguity	Role ambiguity	Role ambiguity
Role conflict	Intention to leave	Role conflict
Self-efficacy	Customer orientation	Intention to leave
Intention to leave	Effectiveness	Customer orientation
Customer orientation	Organization performance	Adaptive selling
Adaptive selling	Market conditions	Control system
Effectiveness	Commitment buyers-salespeople	Self-efficacy
Market conditions	Adaptive selling	Job involvement
Felt stress	Self-efficacy	Felt stress
Control system	Role conflict	Intrinsic motivation
Effort	Satisfaction buyers-company	Effort
Organizational citizenship behaviors	Trust buyers-salespeople	Effectiveness
Intrinsic motivation	Technology orientation	Motivation
Job involvement	Relationship buyers-salespeople	Trust buyers-salespeople
Relationship buyers-salespeople	Market orientation	Market conditions
Learning orientation	Trust managers-salespeople	Trust managers-salespeople
Trust managers-salespeople	Satisfaction buyers-salespeople	Organizational citizenship behaviors

Table 10
Cliques of Social Network 1

Construct	Clique 1	Clique 2	Clique 3	Clique 4	Clique 5	…	Clique 1203
Job performance	x	x	x	x	x		
Job satisfaction	x	x	x	x	x		
Organizational commitment	x	x	x	x	x		
Role ambiguity	x	x	x	x	x		
Role conflict	x	x	x	x	x		
Intention to leave	x	x	x	x	x		
Self-efficacy	x	x	x	x	x		
Job involvement	x	x	x	x			
Felt stress	x	x	x	x	x		
Effort	x	x	x	x	x		
Expectations	x						
Burnout	x	x					
Job commitment		x					
Leadership behaviors			x		x		
Supervisory feedback			x		x		
Customer orientation				x			
Adaptive selling					x		

Note: "x" indicates that the clique has the construct.
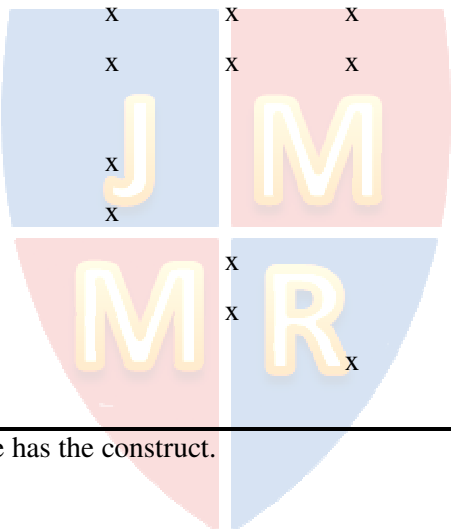
Table 11
List of Isolates from Cliques

Number	Construct
1	Attitudes toward personal selling
2	Buyers' attitudes toward salespeople
3	Managers' attitudes toward salespeople's failure
4	Salespeople's attitudes toward buyers
5	Beliefs toward personal selling
6	Channel management practices
7	Buyers' communication style
8	Salespeople communication style
9	Salespeople's cognitive complexity
10	CRM process performance
11	SERVQUAL
12	Customer experience
13	Customers' power
14	Drug abuse in sales force
15	Gender stereotype scores
16	Ingratiatory influence
17	Key account management
18	Managerial attitudes toward women executives scale
19	Marketing channel management
20	Marketing practices
21	Maslow satisfaction scales
22	Personal selling process scale
23	Problem-Solving approach
24	Purchase pal
25	Sales contest
26	Salespeople's accurate perceptions of customers
27	Salespeople's information acquisition process
28	Sex and residential real estate sales career field
29	Sex-role orientations
30	Sexual harassment
31	Source credibility
32	Standardization of hiring salespeople
33	Training agreement
34	Woman as Managers Scale (WAMS)

Table 12
Structural Holes

Construct Ego Network	Degree	Effective Size	Efficiency
Organization performance	53	48.13	0.91
Job performance	247	223.49	0.90
Satisfaction buyers-salespeople	39	35.00	0.90
Commitment buyers-salespeople	41	36.76	0.90
Satisfaction buyers-company	35	31.33	0.90
Market conditions	68	59.95	0.88
Influence salespeople-buyers	20	17.55	0.88
Trust buyers-salespeople	52	45.62	0.88
Self-efficacy	101	87.80	0.87
Relationship buyers-salespeople	55	47.70	0.87
Effectiveness	70	60.54	0.86
Social desirability	20	17.29	0.86
Salespeople influences in company	33	28.48	0.86
Service quality	37	31.70	0.86
Trust managers-salespeople	54	46.16	0.85
Locus of control	49	41.80	0.85
Coworker trust	24	20.47	0.85
Information asymmetry	19	16.19	0.85
Participation	49	41.76	0.85
Customer orientation	85	72.41	0.85
Brand adoption	4	1.00	0.25
Ethical hiring evaluation	4	1.00	0.25
Ethical training	4	1.00	0.25
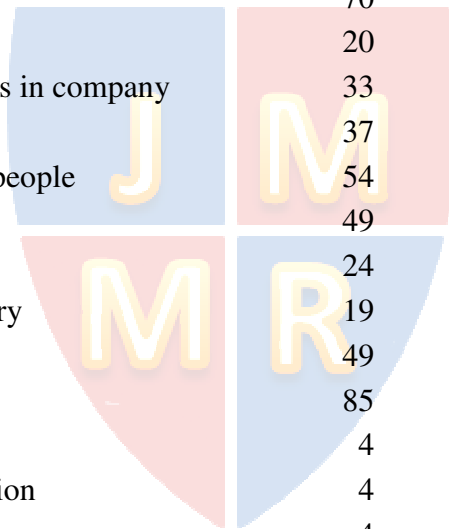
Table 13
Cliques of Social Network 2

Construct	Clique 1	Clique 2	Clique 3	Clique 4	Clique 5	…	Clique 167
Job performance	x	x	x	x	x		
Job satisfaction	x	x	x	x	x		
Organizational commitment	x	x	x	x	x		
Customer orientation	x	x	x	x	x		
Control system	x	x	x				
Intrinsic motivation	x			x			
Autonomy	x	x					
Job involvement		x					
Task attribute/characteristics			x				
Adaptive selling				x	x		
Service quality					x		

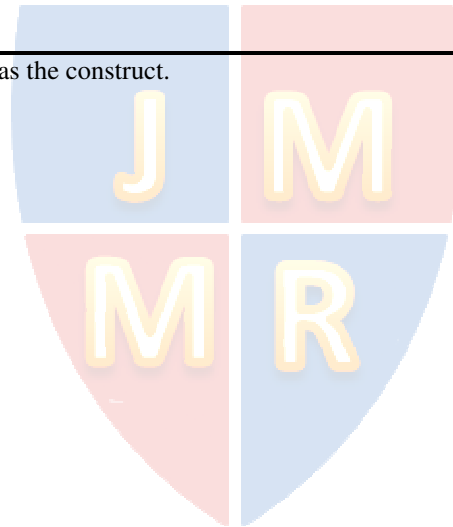Note: "x" indicates that the clique has the construct.

Table 14
Nomological Network of Clique 1 in Social Network 2

Construct	Job performance	Job satisfaction	Organizational commitment	Customer orientation	Control system	Intrinsic motivation	Autonomy
Job performance	0.836/191	0.089/0.408/ 0.014/1	0.079/0.433/ 0.016/1	0.029/0.671/ 0.042/1	-0.053/0.499/ 0.035/0.998	0.075/0.487/ 0.022/0.997	0.059/0.994/ 0.084/0.94
Job satisfaction	0.204/0.249/ 52/14149	0.828/168	0.417/0.914/ 0.025/1	-0.118/0.514/ 0.041/0.795	0.119/0.589/ 0.025/1	0.312/0.553/ 0.012/1	0.36/0.605/ 0.01/1
Organizational commitment	0.218/0.256/ 29/7970	0.572/0.665/ 53/13524	0.862/97	0.06/0.579/ 0.03/0.98	0.317/0.317/ 0/0.834	0.375/0.615/ 0.011/1	0.068/0.669/ 0.037/0.977
Customer orientation	0.296/0.35/ 19/4913	0.168/0.198/ 8/2331	0.272/0.319/ 9/2108	0.829/56	0.36/0.36/ 0/0.871	0.041/0.531/ 0.025/0.809	0.118/0.484/ 0.017/0.942
Control system	0.184/0.223/ 23/4273	0.302/0.354/ 7/1678	0.285/0.317/ 2/428	0.298/0.36/ 2/437	0.803/29	0.274/0.274/ 0/0.667	0.158/0.158/ 0/0.188
Intrinsic motivation	0.224/0.281/ 9/1906	0.351/0.432/ 6/1017	0.415/0.495/ 6/1110	0.231/0.286/ 3/1419	0.24/0.274/ 2/389	0.758/18	0.321/0.321/ 0.003/0.652
Autonomy	0.434/0.526/ 7/1565	0.383/0.483/ 10/2475	0.297/0.368/ 5/1489	0.268/0.301/ 3/713	0.125/0.158/ 2/200	0.247/0.321/ 2/349	0.781/26

Notes:
Diagonal: Average of Cronbach's alpha/Number of Cronbach's alpha
Upper diagonal: Low boundary of 95% confidence interval/High boundary of 95% confidence interval/Variance of correlation coefficients/the power of statistical tests
Lower diagonal: Average of correlation coefficients/Corrected correlation coefficient/Number of effect size/Sum of sample size
Control system: Includes all kinds of control scales that do not clearly indicate their specific attributions, such as behavior, output, knowledge control, etc.

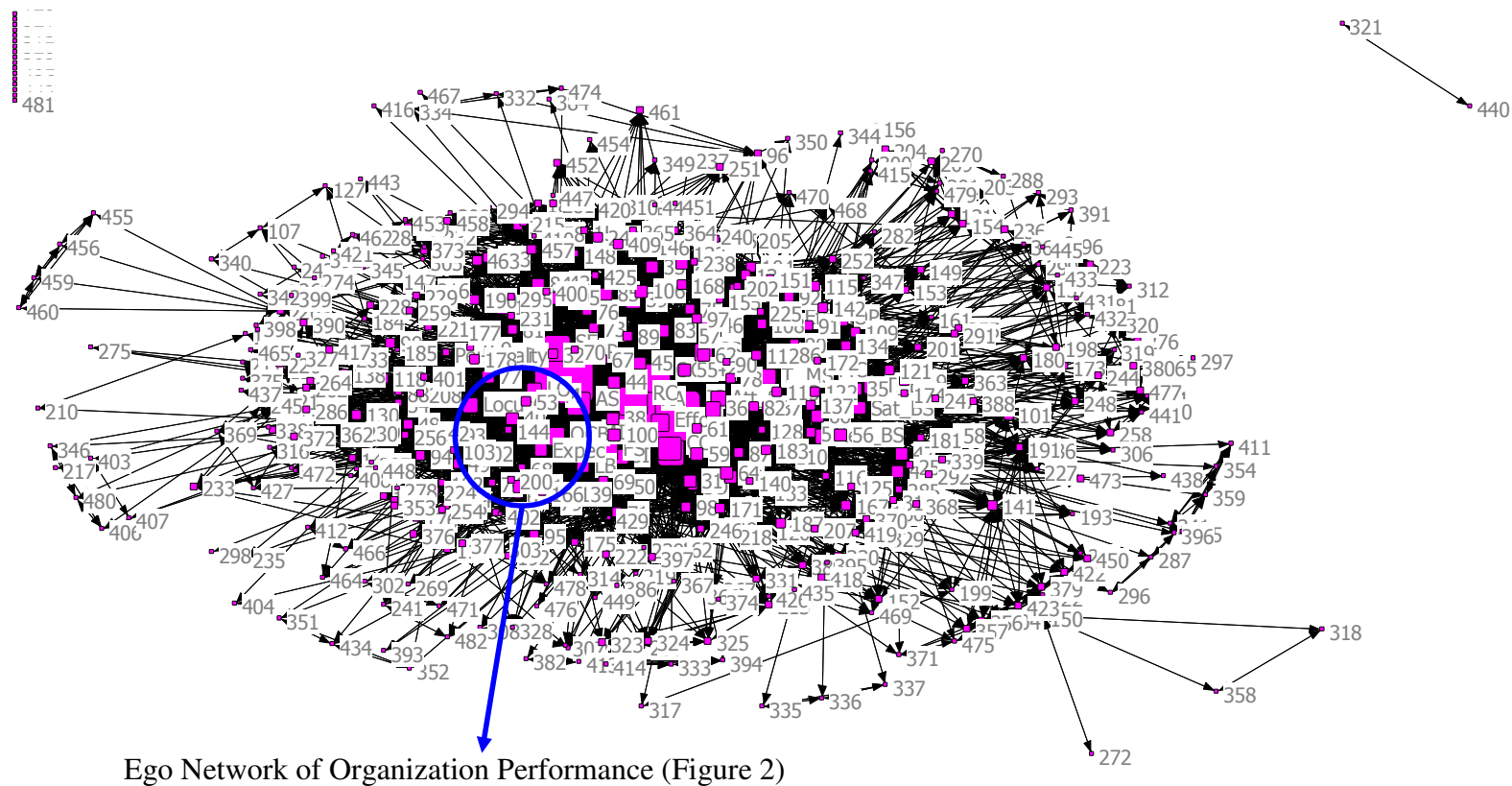Ego Network of Organization Performance (Figure 2)

Figure 1. Social Network 1 (Frequency). The size of the box represents the degree centrality of the nodes in the network, and the length of the line represents the strength of ties between two nodes. In addition, most construct names are replaced by numbers for clear vision.
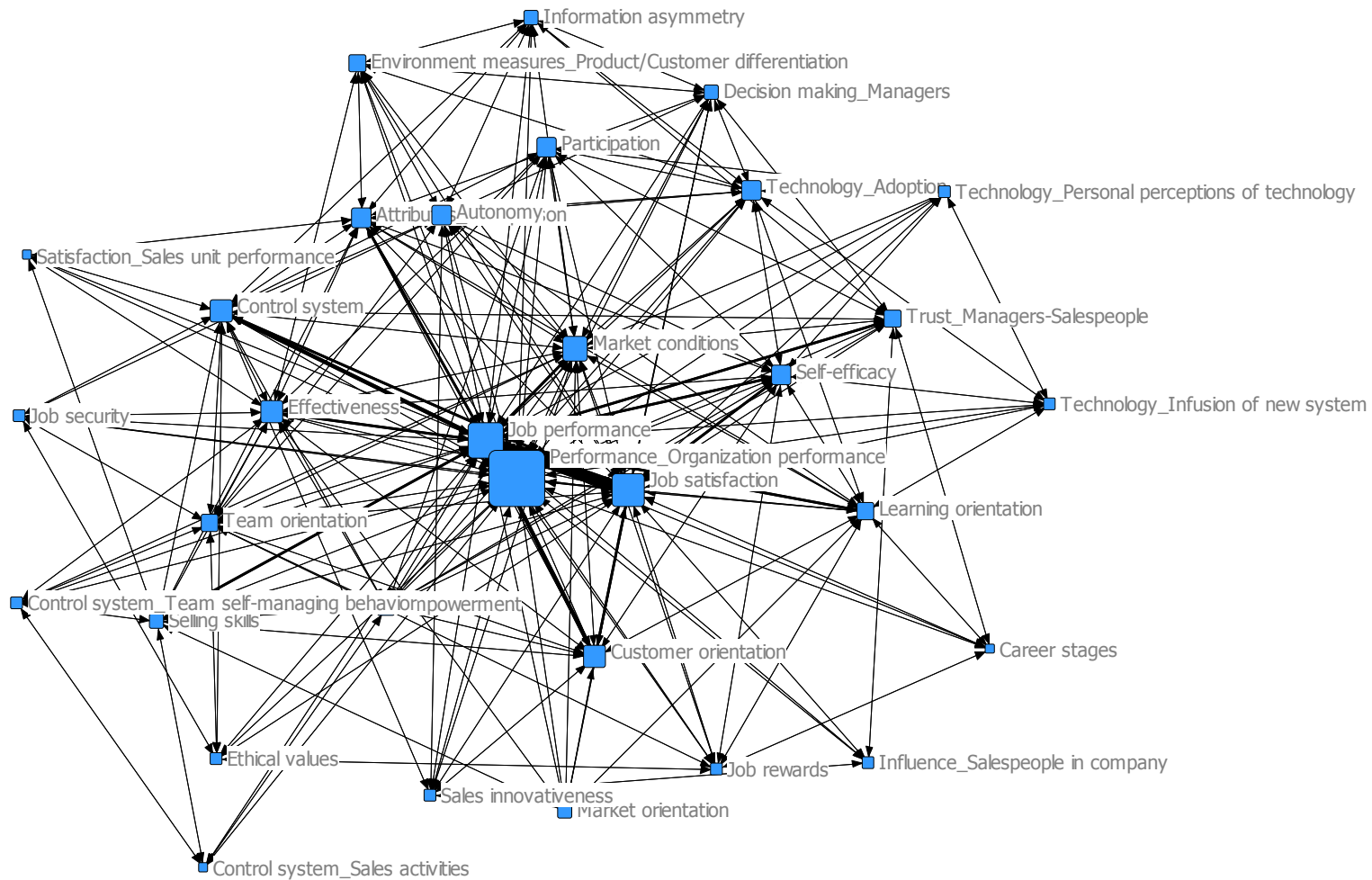
Figure 2. Structural Holes of Organization Performance. The size of the box represents the degree centrality of the nodes in the network, and the length of the line represents the strength of ties between two nodes.
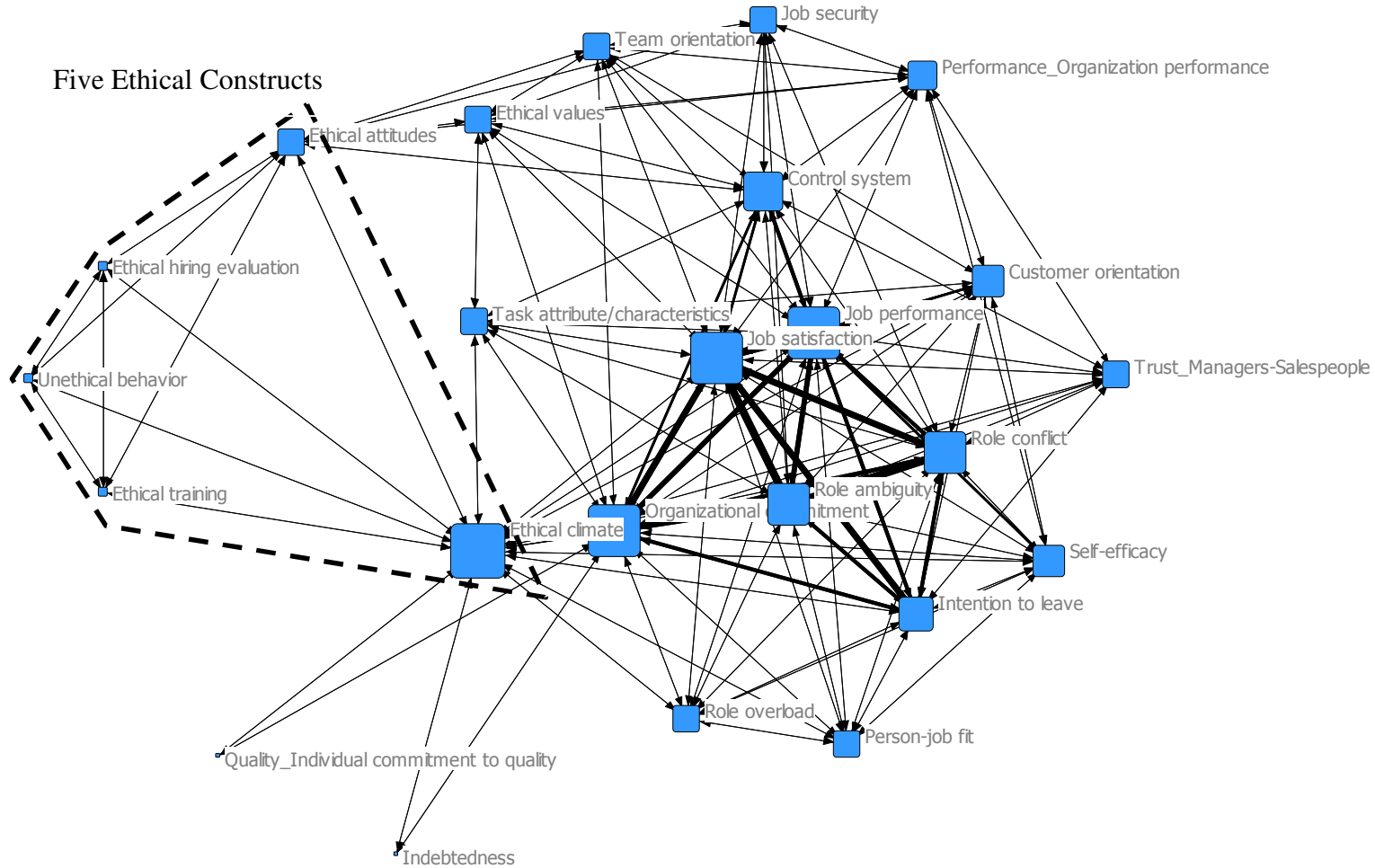
Figure 3. Ego Networks of Five Ethical Constructs. The size of the box represents the degree centrality of the nodes in the network, and the length of the line represents the strength of ties between two nodes