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Journal of Transportation Management

Editorial Policy

The primary purpose of the JTM is to publish managerial and policy articles that are relevant to academics, policymakers, and practitioners in the transportation, logistics and supply chain fields. Acceptable articles could include conceptual, theoretical, legal, case, and applied research that contributes to better understanding and management of transportation and logistics. Saying that, our policy requires that articles be of interest to both academics and practitioners, and that they specifically address the managerial or policy implications of the subject matter. Articles that are strictly theoretical in nature, with no direct application to transportation and logistics activities, or to related policy matters, would be inappropriate for the *JTM*. Articles related to any and all types of organizations, and of local to global scope, will be considered for publication.

Acceptable topics for submission include, but are not limited to, broad logistics topics, logistics and transportation related legal issues, carrier management, shipper management of transportation functions, modal and intermodal transportation, international transportation issues, transportation safety, marketing of transportation services, transportation operations, domestic and international transportation policy, transportation economics, customer service, and the changing technology of transportation. Articles from related areas, such as third party logistics, purchasing and materials management, and supply chain management, are acceptable as long as they are related to transportation and logistics activities.

Submissions from practitioners, attorneys or policymakers, co-authoring with academicians, are particularly encouraged in order to increase the interaction between groups. Authors considering the submission of an article to the *JTM* are encouraged to contact the editor for help in determining relevance of the topic and material.

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Publishing Data

Manuscripts. Submit manuscripts to the editor by email attachment at taylorjohn@wayne.edu. Manuscripts should be no longer than 30 double-spaced pages and 7000 words. Guidelines for manuscript submission and publication can be found in the back of this issue.

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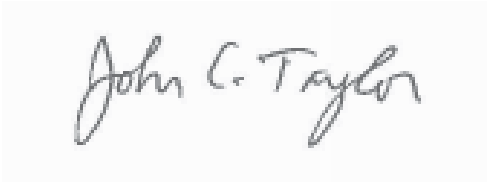
From the Editor…

Welcome to the Winter, 2017 issue of the Journal of Transportation Management, being Vol. 27 No 2! This issue of the Journal starts with an article on global modal choice, includes an article on supply chain collaboration, moves on to an article on internal market orientation and the benefits to a firm, and concludes with an article on international airline ancillary services for passengers.

Our first article examines global modal choice decisions. The research develops a model that can combine qualitative and quantitative factors in order to make the best modal choice decision. The second article uses a series of case studies to explore potential frameworks that can better categorize those factors that lead to exemplary supply chain collaboration. The third manuscript examines factors such as emotional intelligence that can lead to improved market oriented supervision in services businesses such as transportation and concludes that employees are better equipped to provide exceptional service when they are appropriately provided for and understand the company's value proposition. The fourth article on international airline ancillary services investigates which services customers are most interested in, and reports the results by various demographic grouping of passengers.

At the Journal, we are continuing to make a number of changes that will improve the visibility of JTM, and improve its position in the supply chain publishing world. These include registering and updating journal information with several publishing guides, placing the journal content with the EBSCO, Gale and JSTOR databases faculty have access to, and placing abstracts of all past journal articles on an open area of the Wayne State University Journal web page. Full journal article PDF's continue to be available to subscribers on the web page at www.business.wayne.edu/gscm

I look forward to hearing from you our readers with questions, comments and article submissions. The submission guidelines are included at the end of this issue's articles and I encourage both academics and practitioners to consider submitting an article to the Journal. Also included in this issue is a subscription form and I hope you will subscribe personally, and/or encourage your libraries to subscribe.



John C. Taylor, Ph.D. Editor, Journal of Transportation Management

USING AN ANALYTIC NETWORK PROCESS MODEL TO INCORPORATE QUALITATIVE FACTORS INTO MULTI-CRITERIA GLOBAL MODAL CHOICE DECISIONS

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ABSTRACT

This research develops and evaluates an Analytic Network Process (ANP) model to choose the correct mode of global transportation in the presence of complicating qualitative influences. The ANP model effectively combines important qualitative and quantitative factors into a global modal choice model. Although there is a great deal of research in the area of modal choice, the research often focuses singularly on cost or time factors. This research incorporates security, public opinion, and customer opinion into modal choice. One of the most difficult choices a transportation planner faces is deciding when qualitative factors outweigh the quantitative ones. A reliable tool to validate choice by including the important qualitative factors with the quantitative is quite valuable in military operations, humanitarian support, and disaster relief.

INTRODUCTION

Modal choice for global transportation requirements is a complex decision. Generally, sealift is slower, but more cost-effective, while airlift is faster and more expensive. The decision to move something by air or sea is influenced not only by cost and technical limitations, but also by qualitative factors. This seemingly simple decision is complicated by a myriad of influential factors.

Most transportation research has focused on measurable metrics that address such factors as how much it costs to move something, whether the cargo arrives on time, the volume of cargo moved, or the number of items moved. This research is useful, but sometimes falls far short of what's needed, as it neglects to consider the elements of the decision that aren't dependent on numbers. Examples of 'qualitative' factors include pressure from public opinion, urgent need of materials for human survival and the political message conveyed. One only needs to look at the news, both historical and modern day, to see how political, social, environmental, and public administration considerations affect the execution of many important endeavors.

Construction of the Trans-Alaskan pipeline is a vivid historical example of how a failure to consider the people and the environment, despite a national need for the oil, would cost billions of dollars and years of progress (Coates, 1991). A more recent example of choosing between 2 important alternatives in the face of many complicating factors is phase 4 construction of the Keystone Pipeline, also known as the Keystone XL Pipeline. The Keystone XL proposal faced criticism from environmentalists and a minority of the members of the United States Congress. In January 2012, President Barack Obama rejected the application amid protests about the pipeline's impact on Nebraska's environmentally sensitive Sand Hills region (Bloomberg BusinessWeek, 2012). The debate on building the pipeline rages on. These are just 2 examples of the difficulty that looms when many qualitative factors are involved. These factors are common in military transportation, humanitarian assistance and disaster relief efforts, but decisions must be made much faster, as lives are at state. There has not been a

systematic examination of qualitative factors in the area of global modal choice, yet these factors can greatly influence mode choice.

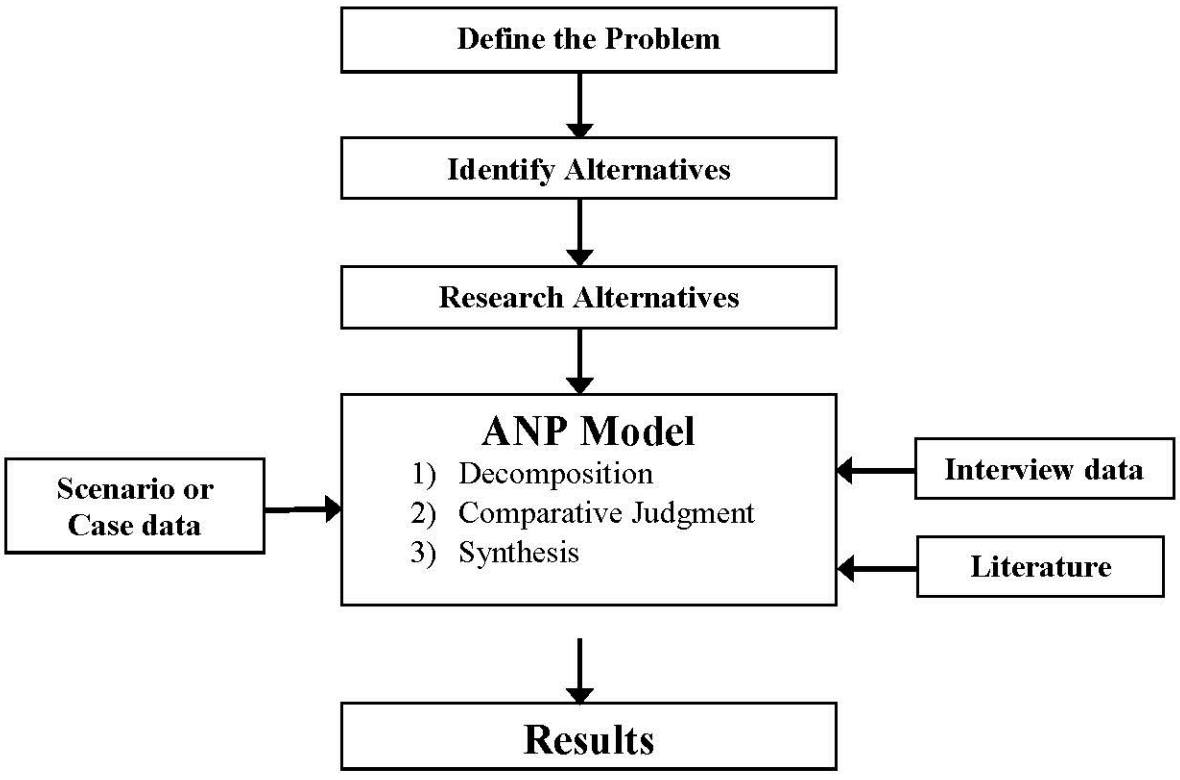
In order to address the problem of choosing the correct mode of global transportation in the presence of complicated qualitative influences, this research formulates an Analytic Network Process (ANP) model that effectively and efficiently combines the qualitative and quantitative factors into a single global modal choice model. The goal of the model is to get the required equipment to its destination at the required time, but to do it at the minimum total cost, while addressing the qualitative variables as best as can be done. The importance of incorporating qualitative factors into a transportation decision model is further demonstrated through the details of the High Mobility Multipurpose Wheeled Vehicle (HMMWV) case used to validate the developed model.

We will first use a Literature Review to show this research's position within the existing body of work, as well as to justify this research and the methodology. The development and use of the ANP model follows the literature review in the order presented in Figure 1. This figure shows both the flow and order of the discussion as well as the methodology used to create and utilize the ANP model. All of the inputs to the ANP Model are described in the Research Design (Building the ANP Model) section. ANP Model Implementation is described in the following section, and Model Building Results are shown in the next section. The paper concludes with the HMMWV Case and Recommendations for Future Research.

LITERATURE REVIEW

Perhaps the two most thorough reviews of modal choice research were conducted by McGinnis (1989) and Meixell & Norbis (2008). However, none of the examined models consider qualitative aspects, nor do they integrate experts' opinion into the decision.

FIGURE 1
DEVELOPMENT AND USE OF THE ANP MODEL



Some research efforts have attempted to identify the qualitative criteria that influence the freight mode choice like Brooks (1990), Lu (2003) and Jeffs and Hills (1990). Jeffs and Hills (1990) formulated a factor analysis of the determinants applicable to freight movement in the United Kingdom. They highlight six categories of variables that influence the decision, but they were unable to formulate an overall decision model that incorporated the complex interactions among the variables, as is needed for an accurate decision to be made in research such as this. Without modeling those interactions, accuracy of the results is not assured. Jeffs and Hills (1990) recommended future research focus on the specific situation, characteristics and needs of the organization. Their view of evaluating determinants of the mode choice with an organizational-specific model is shared by Young, Richardson, Ogden, and Rattay (1982).

In their examination of behavioral influence on freight mode choice criteria, Bolis and Maggi (2003) conclude that the mode choice must be in alignment with the organization's overall logistics strategy. The authors interviewed 4 logistics managers within an Adaptive Stated Preference experiment. While this is a small sample size, Bolis and Maggi (2003) argue that because of the expertise of these managers in the transportation system, their inputs can yield valid results. This paper utilizes a similar argument, but uses a greater number of interviews that better encompass the entire transportation system. Bolis and Maggi (2003) present the notion that an organization's overall logistics strategy will impact how important different criteria are to the decision maker in any given situation, which is also key to this research.

While existing research focuses on rail vs. truck modalities, Bergantino and Bolis (2004) considered the behavioral elements associated with a maritime mode choice. The study again shows that the particular situation and strategy of the customer plays an important role in determining applicable criteria for the mode choice. Their research relies on comparisons between the criteria, but also does not account for interactions among the criteria in a systematic way. Therefore, it is not particularly useful for a high visibility global mode choice.

The ability to consider both quantitative and qualitative data in a systematic way is a particular strength of an Analytic Hierarchy Process (AHP). Liberatore and Miller (1995) considered the mode choice between sealift and airlift using the AHP methodology with a focus on the entire logistics strategy of the focal firm. The authors note that their research represents the first time that AHP had been specifically applied to mode choice (Liberatore and Miller, 1995). They conclude that AHP offers a comprehensive, yet flexible methodology for addressing transport carrier and mode selection problems (Liberatore and Miller, 1995). Hundreds of researchers have used this methodology to model and make real-world decisions, such as choosing a subway layout in Istanbul or determining an appropriate mix of advertising media (Saaty, 2000).

The AHP decision model approach has also been subject to some criticism. Some authors have voiced objections to the model's mathematical and theoretical base, arguing that relative comparisons can be arbitrary, and that the higher and lower criterion of the decision can have interdependencies (Dyer, 1990; Harker and Vargas, 1987). The basis of this criticism is that the AHP only allows unidirectional influence along the hierarchical relationships (Cheng, Li, and Yu, 2005). Another limitation of the AHP is that the criteria at any given level of the hierarchy are considered to be mutually independent (Büyükyazici and Sucu, 2003). While this may be true in some cases and may be assumed in some cases to simplify the decision model, real-world problems are seldom so simple. Saaty (1999) points out that assuming independence unnecessarily limits interactions among elements within the same level and at different levels of the hierarchy. Another criticism of the model is that the decision maker can introduce inconsistencies into the model. For example, suppose in a car purchase example the buyer said that speed was more important than style, that style was more important than cost, but that cost was more important than speed. This is the circular inconsistent logic of A>B, B>C, but C>A.

To properly deal with these criticisms, the decision model developed here has been generalized to include interdependencies between internal elements and feedback between hierarchical criteria levels of the decision. This generalization of the AHP is termed an Analytic Network Process (ANP) model (Saaty, 2001). Feedback and inner dependence are included by way of another matrix transformation on relative priorities. Inner dependence is observed when an element within a cluster influences another element within the same cluster. A cluster is a group of closely related model elements, like the sub-criteria of an overall criterion or the alternatives to be considered. This model is also seeing wide usage in academic and professional arenas to assist in decision making (Coulter and Sarkis, 2005; Cheng and Li, 2005; Shang, Youxu, and Yizhong, 2004; Lee and Soung, 2000).

The ability of ANP to model inner dependence and feedback within a decision hierarchy makes it an appropriate model for mode choice. Ali Görener provides significant proof and further validation that ANP is the proper and most suitable method to use. His comparison of ANP and AHP in a manufacturing setting shows that there are significant differences between AHP and ANP outcomes derived from interdependencies, outerdependencies and feedbacks (Görener, 2012). In Rozann Saaty's paper "A Validation of the Effectiveness of Inner Dependence in an ANP Model," she shows at each step the results are nearer what we know occurs in the real world. Using a direct comparison of the AHP and ANP models, this validation shows that using feedback and dependence in an ANP model can get us closer to reality (Saaty 2013).

However, a review of the literature revealed no previous research of modal choice using the ANP methodology.

RESEARCH DESIGN (BUILDING THE ANP MODEL)

To build an ANP model, we begin with the three distinct steps of problem identification (Forman and Selly, 2001). These steps are - 1) defining the problem, 2) identifying alternatives and 3) researching the alternatives. The first two steps are straightforward, as our problem is in choosing the correct mode of global transportation, and the choices are airlift or sealift. Researching the alternatives for step 3 is quite challenging and reflects most of the effort and reason behind this research. ANP was chosen as the modeling methodology for the third step, due to its capacity to incorporate complex interactions among criteria and to capture qualitative and quantitative variables. After the three problem identification steps are properly addressed, the ANP model is constructed for determining global modal choice.

To build the model, data is incorporated from the literature and personal interviews with transportation experts in different regions. Existing literature and interviews are used to determine appropriate criterion to include in the decision model, as well as their relative importance. Subjects for the interviews were selected by contacting the U.S. Transportation Command for experts in the matching of sealift or airlift assets to a movement request. Ten subject matter experts, of those requested, agreed to be interviewed. The interviewees consist of both service providers and customers in different regions of the world and all four service branches of the U.S. military (Army, Air Force, Navy and Marines). Experience ranges from a senior leader with 34 years of logistics experience to an interviewee with seven months experience in coordinating movement requests. All interviewed subjects have detailed knowledge of transportation functions and limitations and are experienced in both movement requests and mode selections. The subjects collectively have experience in all major regions of the world.

Interviews were conducted with subject matter experts during which each was asked seven primary and very open ended questions as follows:

1. Where do you work? How long have you worked in the transportation system? What do you do in the strategic Airlift/sealift system?
2. How does a movement request happen?
3. What do you perceive as the major criteria to consider when requesting sealift or airlift as a mode of transportation?

4. How often does the lift occur exactly as requested? Can you recall any cases where one mode was requested, but a different mode was used?
5. From your perspective, what are a few **major** Criteria that complicate the modal choice?
6. What could be done to improve the decision making process?
7. Is there someone else you could recommend I talk to about these kinds of issues?

An affinity diagram procedure was used to organize the ideas using the following steps (Brassard, 1989):

Step 1 - Generate Ideas. The survey questions were used to generate a list of ideas. Interviews were recorded and subsequently transcribed to text. All subjects were advised that the interview would be recorded and that their identities would remain confidential.

Step 2 - Display the Ideas. The ideas were posted randomly on a table. Each interview was decomposed into discrete statements of the criteria that influence the mode decision, resulting in 240+ individual statements. Each statement represented a specific criterion and element applicable to the mode choice, and could also indicate interaction with other elements.

Step 3 - Sort the Ideas into Related Groups. The researchers physically sorted the individual statements and they were then reorganized into related concepts and groupings, using the following process:

- Start by looking for two ideas that seem related in some way. Place them together in a column off to one side.
- Look for ideas that are related to those you've already set aside and add them to that group.
- Look for other ideas that are related to each other and establish new groups.

Step 4 - Create Header Cards for the Groups. A header is an idea that captures the essential link among the ideas contained in a group of cards. This idea is written on a single card or post-it and must consist of a phrase or sentence that clearly conveys the meaning. The researchers developed headers for the groups by:

- Finding already existing cards within the groups that will serve well as headers and placing them at the top of the group of related cards.
- Alternatively, discussing and agreeing on the wording of cards created specifically to be headers.
- Discovering a relationship among two or more groups and arranging them in columns under a superheader. The same rules apply for superheaders as for regular header cards.

Step 5 - Draw the Finished Affinity Diagram.

- Write a problem statement at the top of the diagram.
- Place header and superheader cards above the groups of ideas.
- Review and clarify the ideas and groupings.
- Document the finished Affinity Diagram.

Once the cards have been sorted into groups, large clusters are sorted into subgroups for easier management and analysis. The result of the affinity diagramming procedure is a cause and effect diagram. Once the statements are transformed into the needed criterion, elements, and interactions that represent policy, practice, and priorities, they are all inputted to the *SuperDecisions 1.6.0* software selected for this task and utilized for the mathematical formulation of the mode choice. Data for needed mode decisions are inputted to the model for recommendation as discussed later in the HMMWV case study.

ANP MODEL IMPLEMENTATION

Now that we have developed our ANP model, we discuss the steps the model goes through in modeling a decision and presenting a recommendation. *SuperDecisions 1.6.0* software is utilized for the mathematical formulation of the model in this research, where the pairwise

judgments and synthesis are performed via graphical user interface (Super Decisions, 2006). There are three basic steps to modeling a decision using AHP that are also applicable to ANP: 1) decomposition, 2) comparative judgment, and 3) synthesis (Saaty, 1990; Büyükyazici and Sucu, 2003).

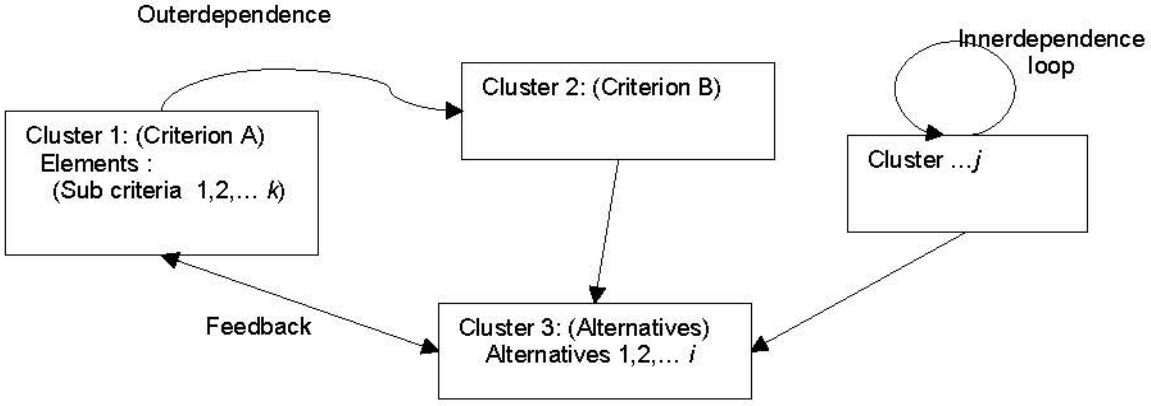
Decomposition

Decomposition of the decision problem is very similar between ANP and AHP and is the first phase of AHP model development. Since ANP breaks down the traditional one-way influence of the hierarchy, it is graphically represented differently as seen in the following figure as adapted from Büyükyazici and Sucu (2003).

There are several important differences in this ANP network model. The first is terminology. The numerous criteria and alternatives depicted in the model are represented by the multiple *clusters* and the sub-criterion are called *elements*. When an element within a cluster influences another element within the same cluster, this relationship is called *inner dependence* and is represented by the arrow looping back to the same cluster as shown above. Similarly, when an element from one cluster influences an element from another cluster, this relationship is called *outer dependence* and is represented by the arrows between clusters. When the characteristics of one of the alternatives influences a criterion or sub-criterion, this relationship is called *feedback* and is represented by an arrow moving from the alternatives cluster to a criterion cluster. In this way, the importance of the criteria and their sub-criteria not only influence the priority of the alternatives, but also influence the priority of the various criteria and other elements within the model. Saaty (1990/1997) helps us understand these relationships with a couple of examples.

> "In inner influence one compares the influence of elements in a group on each one. For example if one takes a family of father mother and child, and then take them one at a time say the child first, one asks who contributes more to the child's survival, its father or its mother, itself or its father, itself or its mother. In this case the child is not so important in contributing to its survival as its parents are. But if we take the mother and ask the same question on who contributes to her survival more, herself or her husband, herself would be higher, or herself and the child, again herself. Another example of inner dependence is making electricity. To make electricity you need steel to make turbines, and you need fuel. So we have the electric industry, the steel industry and the fuel industry. What does the

FIGURE 2
ANP MODEL REPRESENTATION



> electric industry depend on more to make electricity, itself or the steel industry, steel is more important, itself or fuel, fuel industry is much more important, steel or fuel, fuel is more important. The electric industry does not need its own electricity to make electricity. It needs fuel. Its electricity is only used to light the rooms, which it may not even need. If we think about it carefully everything can be seen to influence everything including itself according to many criteria. The world is far more interdependent than we know how to deal with using our existing ways of thinking and acting. The ANP is our logical way to deal with dependence."

This powerful network model can also represent extremely complex decision making by including as many clusters and elements as required for the objective, and each cluster can also entirely contain sub networks of criteria. The depth and complexity of the network model is limited only by the needs of the decision maker. The network model can also be expanded to incorporate different dimensions of the decision, each of which corresponds to a given preference for an alternative based on an overall environment. For example, in estimating market share one might evaluate different alternatives based on the risk, opportunity, costs, or benefits each alternative presents (Saaty, 2003). These higher level dimensions are called *control hierarchies,* and represent a separate network of the same criteria for each dimension being considered (Saaty, 1999). The control hierarchies can be viewed as important higher level aspects in choosing between the model alternatives identified by the decision maker and integrated via the questions asked to gather the needed data. Saaty shows some example questions on bringing in data for a control hierarchy:

> "For benefits and opportunities, ask what gives the most benefits or presents the greatest opportunity to influence fulfillment of that control criterion. For costs and risks, ask what incurs the most cost or faces the greatest risk. Sometimes (very rarely), the comparisons are made simply in terms of benefits, opportunities, costs, and risks in the aggregate without using control criteria and subcriteria."

In this transportation model the control hierarchy encompasses the entire model represented by the overall objective of "Sealift or Airlift for Global Modal Choice?"

In this research, data is drawn from interviews with subject experts in the military distribution system, and it is compiled to determine appropriate criteria to include in the model. Decomposition of the decision through interviews has been used by many researchers such as Bolis and Maggi (2003). After decomposition is complete, we begin the second phase of AHP building, which is comparative judgment.

Comparative Judgement

The comparative judgment phase of ANP is essentially the same as AHP. Each cluster is compared in a pairwise fashion relative to its importance to the objective. Similarly, pairwise comparisons of each element within a cluster are also constructed using the same qualitative and quantitative methods as described with AHP models. The comparisons are done to establish their relative importance to weight the corresponding blocks of the supermatrix and make it column stochastic. A cluster impacts another cluster when it is linked from it, that is, when at least one node in the source cluster is linked to nodes in the target cluster. The clusters linked from the source cluster are pairwise compared for the importance of their impact on it with respect to mode choice, resulting in the column of priorities for that cluster in the cluster matrix. The process is repeated for each cluster in the network.

Relative comparisons for all of the information in the decision can be interpreted as pairwise judgments and included in the overall decision model. In Saaty's *SuperDecisions 1.6.0* software, this

pairwise comparison can be made by pie chart, bar chart, questionnaire, or input directly into a pairwise comparison matrix (Super Decisions, 2006).

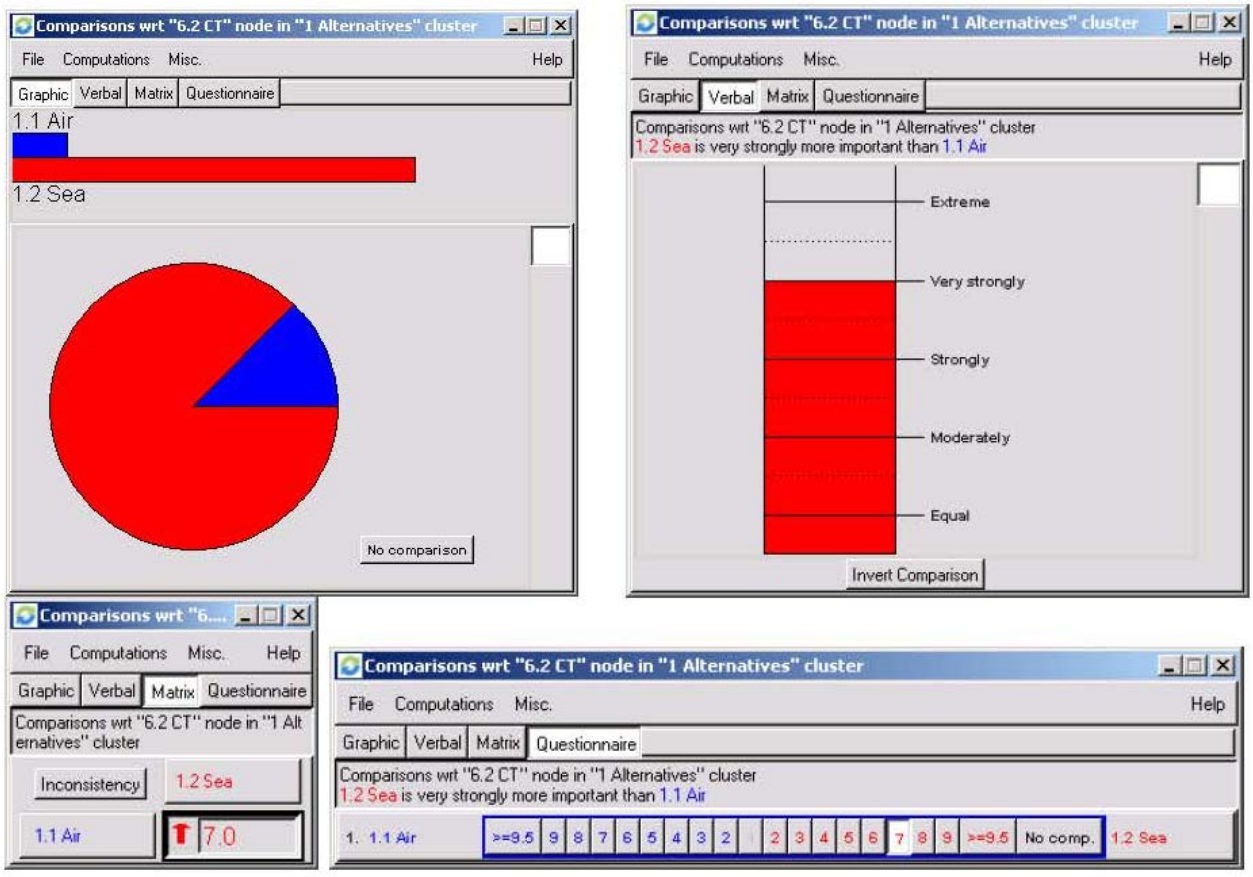
A node is a sub-division of a cluster and typically represents the lowest level of input data that is examined. If customers is a cluster, then age, gender, and salary could be used as nodes. After all the nodes are created, nodes are chosen and linking to the other nodes in the model that influence it. The "children" nodes will then be pairwise compared with respect to that node as a "parent" node. An arrow will automatically appear going from the cluster the parent node cluster to the cluster with its children nodes. When a node is linked to nodes in its own cluster, the arrow becomes a loop on that cluster and we say there is inner dependence (Saaty, 1990/1997).

As an example, Figure 3 shows a notional model node that indicates that the type of cargo being transported "very strongly" favors the use of sealift. The reason for the strength of the pairwise comparison might be that the commodity is extremely dense or heavy and might not be able to be transported by air. Within the software, a similar comparison is accomplished for each sub-criterion with respect to the alternatives.

Synthesis

After the second phase of AHP development is complete, we can begin the third and final stage of model development, known as Synthesis. The synthesis phase of ANP is much different than in AHP. In ANP, a supermatrix of the pairwise comparisons is constructed. This supermatrix consists of several partitions or sub-matrices which take into account the impact of elements on each other (Büyükyazici and Sucu, 2003). The supermatrix is organized with each element of the model occupying a column and a row. These columns and rows are grouped by their parent

FIGURE 3
PAIRWISE PREFERENCES IN SUPERDECISIONS 1.6.0 SOFTWARE



cluster. In this way, there is a representation for how much each element of the model influences every other element of the model. Of course, elements can also exert no influence on each other, and a '0' is entered in the matrix where these two elements intersect. The intersection of two clusters of elements represents a single pairwise comparison matrix, and the supermatrix represents the compilation of all the priorities derived from pairwise matrices (Büyükyazici and Sucu, 2003). An important point is that the supermatrix must be column stochastic (Saaty, 1999). This means that the sum of each column within the supermatrix must sum to one so that the supermatrix converges when raised to an acceptably large power (Büyükyazici and Sucu, 2003). This can be done by multiplying the values within the sub-matrix by the relative weight of their interaction. Saaty (1999) represents the supermatrix using the notation: W is the supermatrix, N represents the number of clusters, C_N represents each cluster, e_{Nn} represents each element of the model, and W_{Nn} represents the appropriate sub-matrix weight.

The desirability of an alternative can then be computed in a similar fashion to AHP while incorporating the effects of dependence between the elements of the model. While Saaty uses matrix representation for deriving the priority of alternatives, this process can also be represented mathematically. The following summation was adapted from the work of Meade and Sarkis (1999) to represent the needed ANP related decision variables and represents the desirability of an alternative for a given control hierarchy.

$$D_i = \sum_{j=1}^{J} \sum_{k=1}^{K_j} P_j W_{kj}^{D} W_{kj}^{I} S_{ikj} \qquad (1)$$

Where:

D_i is the desirability of alternative *i*.

P_j is the relative importance weight of the criterion *j* for the control hierarchy,

W_{kj}^{D} is the relative importance weight for element *k* of criterion *j* for dependency between component levels of the model.

W_{kj}^{I} is the stabilized relative importance weight as determined by the supermatrix for element *k* of criterion *j* for interdependency relationships between elements of the model.

S_{ikj} is the relative preference of alternative *i* with respect to element *k* under criterion *j*.

K_j is the index set of elements for criterion *j*, and *J* is the index set for all criterion.

The synthesis step is accomplished after entering all the pairwise comparisons. The relative priority of the alternatives will be displayed graphically and in terms of the raw derived priorities.

MODEL BUILDING RESULTS

The following table summarizes the model elements of the developed modal choice model.

Criteria 1.0 represents the alternatives available to the decision maker, and criteria 2.0 to 7.0 represent elements of the decision. This procedure resulted in the identification of six main criteria elements and 28 sub-criteria elements for consideration in modal choice decisions (not including the airlift and sealift alternatives in this total). Throughout the interview process, it became apparent that criteria were indeed highly influential to each other. For example, the availability of aircraft was influenced to a high degree by worldwide global demand for airlift. These various relationships are captured by including inner dependence and outer dependence loops within the decision network. The interdependencies (both inner and outer dependence) can be seen in the following table by the many sub-criterion that influence other sub-criterion.

Table 2 shows that the subjects indicated a high degree of interaction among the elements of the model. The left most column indicates the element that has influence over the criteria to the right. Some elements such as Leader's Preferences and Platform Availability have a widespread influence over many other elements in the model. These criteria, sub-criteria and their dependencies were all entered into *Super Decisions* 1.6.0 (Super

TABLE 1
TABLE OF MODALITY DECISION CRITERIA

Main Criteria	Sub-Criteria (Elements)	Abbr.
1.0 Alternatives	1.1 Airlift	Air
	1.2 Sealift	Sea
2.0 Costs	2.1 Monetary Considerations	MC
	2.2 Security Considerations	SC
3.0 Geography	3.1 Distance to be moved	DM
	3.2 Location of the Port	LP
	3.3 Weather Considerations	WC
4.0 Operational Requirements	4.1 Higher Headquarters taskings	HT
	4.2 Mission Type	MT
	4.3 Standard Operating Procedure	SO
	4.4 Time Phased Deployment layout	TL
5.0 Political Influences	5.1 Leader's Preferences	CP
	5.2 Host Nation Sensitivities	HN
	5.3 Inflated Requirements	IR
	5.4 Organizational Bias	OB
	5.5 System Knowledge	SK
	5.6 Trust	TR
	5.7 Visibility in the System	VS
6.0 System Limitations	6.1 Cargo Handling Limitations at the Port	CH
	6.2 Cargo Type	CT
	6.3 Load Efficiency	LE
	6.4 Platform Availability	PA
	6.5 Speed of Delivery	SD
	6.6 Volume of Cargo	VC
7.0 Time Available	7.1 Advanced Notice	AN
	7.2 Criticality	CC
	7.3 Emerging Requirements	ER
	7.4 Force Flow Model	FF
	7.5 Force Provider Availability	FA
	7.6 Late Requests	LR

Decisions, 2006) software to arrive at an overall network model.

Now that the decision model has been developed, it is necessary to evaluate the model. We will examine a specific case to validate the developed model. Complete data for a situation such as is modeled here is not easy for everyone to obtain, as many factors we consider are often either not collected or the data is not freely distributable. We were able to obtain needed data for validation and used the very relevant Department of Defense case of transporting up-armor kits and armored High Mobility Multipurpose Wheeled Vehicles (HMMWVs).

HMMWV CASE (MODEL VALIDATION)

On December 25, 2003 The New York Times published the story "Army Stepping Up Its Humvee Orders For Troops in Iraq" where they expound on how the U.S. Army sent out an urgent call for armored HMMWVs, realizing that it had not ordered enough to protect its troops. In April 2005, the Government Accountability

TABLE 2
SUB-CRITERIA INFLUENCE OTHER ELEMENTS

Sub-Criterion	Is Influenced by:
2.1 Monetary Considerations	3.1 Distance to be moved 6.6 Volume of Cargo 7.1 Advanced Notice 7.5 Force Provider Availability
2.2 Security Considerations	6.5 Speed of Delivery
3.2 Location of the Port	6.2 Cargo Type
4.2 Mission Type	2.1 Monetary Considerations
4.3 Standard Operating Procedure	2.2 Security Considerations 3.2 Location of the Port 5.4 Organizational Bias 6.2 Cargo Type 7.2 Criticality
4.4 TPFDD layout	5.1 Leader's Preferences 6.5 Speed of Delivery 7.4 Force Flow Model 7.5 Force Provider Availability
5.1 Commander's Preferences	2.1 Monetary Considerations 4.2 Mission Type 4.3 Standard Operating Procedure 5.3 Inflated Requirements 5.4 Organizational Bias 5.5 System Knowledge 5.7 Visibility in the System 6.2 Cargo Type 6.5 Speed of Delivery 7.3 Emerging Requirements 7.5 Force Provider Availability
5.2 Host Nation Sensitivities	6.2 Cargo Type
5.3 Inflated Requirements	2.1 Monetary Considerations 5.1 Commander's Preferences 5.4 Organizational Bias 5.5 System Knowledge 5.6 Trust
5.4 Organizational Bias	3.2 Location of the Port 4.2 Mission Type 5.5 System Knowledge 6.2 Cargo Type 6.4 Platform Availability
5.5 System Knowledge	3.2 Location of the Port 4.3 Standard Operating Procedure
5.6 Trust	2.1 Monetary Considerations 5.1 Commander's Preferences 5.4 Organizational Bias 5.5 System Knowledge 6.5 Speed of Delivery 6.6 Volume of Cargo
5.7 Visibility in the System	3.2 Location of the Port
6.1 Cargo Handling Limitations at the Port	3.2 Location of the Port 5.3 Inflated Requirements 5.5 System Knowledge
6.3 Load Efficiency	5.5 System Knowledge 6.4 Platform Availability
6.4 Platform Availability	2.2 Security Considerations 3.2 Location of the Port 3.3 Weather Considerations 5.2 Host Nation Sensitivities 5.3 Inflated Requirements 6.2 Cargo Type 6.3 Load Efficiency 6.6 Volume of Cargo 7.2 Criticality 7.3 Emerging Requirements 7.5 Force Provider Availability 7.6 Late Requests
6.5 Speed of Delivery	3.1 Distance to be moved 3.2 Location of the Port 4.3 Standard Operating Procedure 6.1 Cargo Handling Limitations at the Port 6.6 Volume of Cargo
6.6 Volume of Cargo	3.2 Location of the Port 5.3 Inflated Requirements 6.1 Cargo Handling Limitations at the Port 7.2 Criticality 7.3 Emerging Requirements
7.1 Advanced Notice	4.3 Standard Operating Procedure 5.6 Trust 6.4 Platform Availability 7.5 Force Provider Availability
7.2 Criticality	4.3 Standard Operating Procedure 5.1 Commander's Preferences 6.2 Cargo Type 7.3 Emerging Requirements 7.5 Force Provider Availability
7.3 Emerging Requirements	7.1 Advanced Notice 7.2 Criticality
7.4 Force Flow Model	5.3 Inflated Requirements 6.2 Cargo Type 6.5 Speed of Delivery
7.5 Force Provider Availability	6.2 Cargo Type
7.6 Late Requests	7.5 Force Provider Availability

Office published a report to Congressional Committees identifying nine commodities that were subject to systemic deficiencies and five reasons the shortfalls were realized. Ineffective distribution of armored HMMWVs and up-armored kits was cited as one of the prevalent systemic deficiencies (GAO-05-275, 2005).

Sealift is generally about 1/10th the cost of airlift, and it is the obvious choice for bulk and heavy assets to be moved, especially over long distances. However, monetary considerations were considered less important because armor kits and vehicles were considered critical to troop survival. News stories of American casualties due to roadside bombings of HMMWVs without armor led to heavy political influence on mode choice. Security and time considerations favor the use of airlift. Geographical

influence on mode choice is mixed. While the items are heavy and the distance to move them is great, which would favor sealift, the required location for these items is inland, which would favor airlift. Another important factor in this decision is that during the initial stages of the transportation problem there were very few armor kits to aggregate to an entire shipload for transportation.

The following table summarizes the data for sub-criteria preference with respect to the alternatives:

The table represents preference for sealift or airlift based on the HMWVV data and can be interpreted as the relative importance of one criteria over another with respect to a given criteria. For example, in the 2.0 Costs table in Table 3 the bolded entry indicates that operational requirements are 2 times as important as system limitations with respect to the costs criteria. When a criterion does not have an impact on another criterion, it is not included in the pairwise comparison.

Once the steps of ANP are completed, as previously discussed, the resulting vector is obtained from the HMMWV data and presented in Table 4.

The bolded priorities within the table for airlift and sealift match the priorities derived using the *Super Decisions 1.6.0* software, and represent a preference for using airlift for mode choice using the HMMWV case data (Super Decisions, 2006). The derived priorities for the individual sub-criteria presented in the table indicate the amount of influence each of these elements had in identifying airlift as the mode of choice. Each of the elements grouped in their main criteria display the amount of influence each main criteria had in the overall mode choice.

HMMWV CASE CONCLUSIONS

Overall, the developed ANP decision model shows a relative preference for airlift to deliver the HMMWV armor requirements. In practice, this is the actual outcome chosen by decision makers. In a hearing of the House Armed Services Committee, Congressman Hunter relayed that even much later in the conflict airlift delivered the majority of level 2 armor due to the "extreme importance to our warfighters" (Hunter, 2006).

Although the choice of airlift or sealift is a seemingly simple binary choice, it is anything but simple. One of the most difficult choices a transportation planner faces is deciding when qualitative factors outweigh the quantitative ones. Having a reliable tool to validate that choice by including the important qualitative factors with the quantitative is quite valuable.

TABLE 3
MAIN CRITERIA PAIRWISE PREFERENCES

2.0 Costs

	4 Op. R	5 Pol.	6 Sys.
1 Alter	0.22	0.50	0.50
4 Op. R		2.30	**2.00**
5 Pol.			0.83

3.0 Geography

	2 Costs	4 Op. R	5 Pol.	6 Sys.
1 Alter	1.20	3.00	6.00	2.22
2 Costs		2.50	2.50	1.00
4 Op. R			2.00	1.00
5 Pol.				0.50

4.0 Operational Requirements

	2 Costs	4 Op. R	5 Pol.	6 Sys.	7 Time
1 Alter	2.00	1.00	1.00	1.00	1.00
2 Costs		1.00	0.33	0.33	0.25
4 Op. R			2.00	0.50	0.33
5 Pol.				1.00	0.50
6 Sys.					0.50

5.0 Political Influences

	4 Op. R	5 Pol.	6 Sys.	7 Time
1 Alter	1.20	0.60	2.00	4.00
4 Op. R		0.33	2.00	1.20
5 Pol.			2.00	3.00
6 Sys.				0.50

6.0 System Limitations

	2 Costs	3 Geo	4 Op. R	5 Pol.	6 Sys.	7 Time
1 Alter	3.00	1.20	0.80	2.00	0.90	0.80
2 Costs		0.25	0.25	0.50	0.25	0.25
3 Geo			0.50	2.00	1.00	2.00
4 Op. R				2.00	0.50	2.00
5 Pol.					0.20	0.33
6 Sys.						3.00

7.0 Time Available

	2 Costs	4 Op. R	5 Pol.	6 Sys.	7 Time
1 Alter	5.00	1.00	3.00	1.00	1.20
2 Costs		0.17	0.17	0.17	0.17
4 Op. R			1.00	1.20	0.50
5 Pol.				0.50	0.33
6 Sys.					0.50

TABLE 4
OVERALL PRIORITIES

			Priorities (N. EV)	
		EV	Sub. Criteria	Main Criteria
1 Alt.	1.1 Air	0.197	**0.561**	1.000
	1.2 Sea	0.155	**0.439**	
2 Costs	2.1 MC	0.007	0.011	0.015
	2.2 SC	0.002	0.004	
3 Geo	3.1 DM	0.000	0.000	0.000
	3.2 LP	0.000	0.000	
	3.3 WC	0.000	0.000	
4 Op. Req.	4.1 HT	0.000	0.000	0.111
	4.2 MT	0.007	0.011	
	4.3 SO	0.027	0.041	
	4.4 TL	0.039	0.059	
5 Pol. Inf.	5.1 CP	0.059	0.091	0.258
	5.2 HN	0.000	0.000	
	5.3 IR	0.047	0.073	
	5.4 OB	0.020	0.031	
	5.5 SK	0.004	0.006	
	5.6 TR	0.037	0.057	
	5.7 VS	0.000	0.000	
6 Sys. Lim.	6.1 CH	0.003	0.005	0.326
	6.2 CT	0.000	0.000	
	6.3 LE	0.065	0.100	
	6.4 PA	0.098	0.152	
	6.5 SD	0.020	0.031	
	6.6 VC	0.025	0.038	
7 Time Av.	7.1 AN	0.046	0.071	0.290
	7.2 CC	0.059	0.091	
	7.3 ER	0.066	0.101	
	7.4 FF	0.018	0.027	
	7.5 FA	0.000	0.000	
	7.6 LR	0.000	0.000	
		0.648	1.000	

FUTURE RESEARCH

The presented decision model was built using the inputs of 10 experts in the mobility system. One area of future research that could add validity to the model is to evaluate the accuracy and completeness of the model through additional case studies or by using a Delphi Methodology. Additional case studies would further validate the model, as would a follow-up survey of all subjects or examining the inputs of new experts. A survey could easily be built using *WebSurveyor Desktop 4.1*, and contain Likert scale ratings of each criteria and sub-criteria with respect to how frequently it impacts the modal choice, and how important it is to the modal choice.

CONCLUSSIONS

This research presents a unique decision model as well as a unique method of developing mode choice using ANP. Tools such as this decision model and other initiatives serve to aid decision makers by allowing them to make more thoroughly informed decisions in a systematic way that includes both quantitative and qualitative inputs not included in previous modal choice models. This multi-criteria integrated methodology and modeling technique could be applied to other transportation problems that require an important degree of qualitative factor decision making integration. This could include other military operations, humanitarian assistance/ logistics, or disaster relief where many qualitative factors need to be considered and priorities are not solely cost based.

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CULTURAL AND STRUCTURAL FORCES: A POTENTIALLY SYMBIOTIC OR DYSFUNCTIONAL RELATIONSHIP IN THE JOURNEY TOWARDS SUPPLY CHAIN COLLABORATION

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ABSTRACT

Despite its promises to generate superior supply chain performance, supply chain collaboration remains an elusive goal for many organizations. While much research has explored various facets of successful management of supply chain relationships, the complexity of factors that can impact the quality of collaboration make implementation difficult to achieve. This paper uses a series of case studies of twelve exemplary European firms from a supply chain standpoint to explore potential frameworks that can better categorize those factors that lead to exemplary supply chain collaboration. Both barriers and initiatives to overcome those barriers are identified and categorized as either structural or cultural. The study reveals an interesting relationship between these categories and provides a series of propositions that can inform future confirmatory studies in supply chain collaboration.

INTRODUCTION

What began in the 1950's as an awareness of the need to understand and manage the cross-functional and interfirm physical flow of products (Bowersox, 1969) has evolved into an entire discipline dedicated to understanding the value creation process of the end-to-end supply chain and its constituents (Mentzer et al., 2001). Supply chain management continues to evolve with an ever-dynamic global business environment and continuous technological advances in order to meet the changing needs of today's consumers (Drucker, 1994; Gattorna, 2010; Arora et al., 2016; Stevens and Johnson, 2016). Further, the supply chain organization is now being called upon to not only lower total operational costs (bottom line impact), but also to help the firm achieve desired outcomes commensurate with firm strategy (top line impact) such as innovation, sustainability, resilience, responsiveness and security (Melnyk, Davis, Spekman, & Sandor, 2010; Terjesen et al., 2012; Wiengarten et al., 2014) all of which ultimately impact customer satisfaction (Anderson & Sullivan, 1993; Mentzer et al., 2001).

Collaboration among supply chain partners is a key initiative needed to capitalize on the full advantages of supply chain management. Collaboration with both upstream and downstream partners has been shown in the literature to result in improved performance (Ellram & Cooper, 1990; Frankel, et al., 2008; Nyaga et al., 2010; Huo 2012; Schoenherr & Swink, 2012; Enz & Lambert, 2015). Logistics network planning tools, automated material handling systems, connectivity and other technological advances over the past decades have all served to support and further the cause of supply chain collaboration. Despite these advances, however, collaboration within supply chains remains elusive. This paradox suggests that while progress in structural elements within a supply chain may provide the means for improved collaboration, achieving actual collaboration may lie more in

cultural human elements than in the structural elements discussed above (Beth et al., 2003). This research focuses on exploring the paradox by developing a richer understanding of the interactions among the cultural and structural barriers and initiatives within an organization that is seeking to embrace supply chain collaboration.

Fawcett et al. (2008) applies the dual lens of field theory (Lewin, 1951) and open systems design to explain how firms can successfully make the shift towards a collaborative paradigm in firm strategy and supply chain practice. Understanding what forces work for the change and what forces work against the change is an important consideration in the successful operationalization of this theory. While Fawcett et al. (2008) propose an overall three-staged framework for change implementation, this paper takes a focused look at how the choice of structural versus cultural initiatives as propelling forces for change may or may not impact the ability of the firm to proceed in their journey towards supply chain collaboration.

Given the exploratory nature of this research question, we conducted 12 separate case studies of European firms in order to identify real-world situations where these complex dynamics take place. Analysis of these case studies allows us to identify some potential relationships between the types of initiatives a firm undertakes to become a collaborative organization and the types of barriers that these initiatives are working to overcome. We find that not only are structural and cultural variables interrelated, but they also may take on a symbiotic or dysfunctional relationship, depending on how they are implemented. More specifically, in order for structural initiatives to take hold in an organization, it seems that they are preceded or coupled with cultural initiatives focused on the same goals. If not, progress achieved under the structural initiatives will likely be tenuous at best and highly susceptible to reversal. In the section that follows, we discuss the theoretical background that underpins our research. We then present the methodology and findings of the 12 case studies and conclude the paper with a synthesis of our findings and propositions for future confirmatory research.

Theoretical Background

Firms are not closed systems, but rather are open systems, susceptible to the influences of environmental forces (Emery & Trist, 1965; Katz & Kahn, 1966). In order to be successful, firms should consider the impact and relevance of such environmental forces in formulating strategic and operational goals, priorities and tactics. Open systems theory helps explain the impetus for firms to engage in supply chain collaboration. Globalization, outsourcing and electronic connectivity are all environmental forces that changed the nature of the value-add process of products and services from one of vertical integration within a small number of firms to that of a globally dispersed supply chain where oft times the final product manufacturer is not even aware of where its components originate (New, 2010). Supply chain collaboration within such a complex context is necessary to effectively bring together the signals of supply and demand across the value chain in a way that firms can make the most efficient use of their resources to satisfy customer demand profitably. Thus, open systems theory combined with the global sourcing and technological dynamism of the past few decades help explain why supply chain collaboration is an important and relevant topic to understand.

Collaboration is defined as "…a process of decision making among interdependent parties…involves joint ownership of decisions and collective responsibility for outcomes" (Stank, Keller, & Daugherty, 2001). Supply chain collaboration can take place within the four walls of a single firm (intrafirm collaboration) or across firm boundaries (interfirm collaboration). Intrafirm supply chain collaboration involves coordinating functional groups (e.g. marketing, logistics, manufacturing and purchasing) within a single firm to share relevant information so that the groups can align goals and processes to achieve a common supply chain objective. Interfirm supply chain collaboration takes place when a firm reaches across firm boundaries to similarly involve supply chain partners in the sharing of information, process and goal harmonization. Recent studies have shown empirical support for the hypothesis that internal integration capabilities precede external integration capabilities (Zhao, Huo,

Selen, & Yeung, 2011; Huo, 2012; Schoenherr & Swink, 2012; Stevens & Johnson, 2016). Aligned with these findings, we assume collaboration to be a journey that begins first with developing internal collaborative capabilities and then extends to developing external collaborative skills. As such, we recognized among the 12 firms studied that some firms were farther along the journey as compared to others. While some firms were preoccupied with how to improve collaboration with suppliers and customers, others were still trying to figure out how to collaborate with other internal functions of the focal firm. Since both types of collaboration involve different stages of the same journey, we did not force the firms studied to focus on one type of collaboration or the other; rather we generalized both types as simply "supply chain collaboration".

A collaborative organization is not a natural state that firms find themselves in. Studies in change management from the organizational behavior and general management literature have explored how firms embrace new paradigms and adjust to changing environments. We therefore integrate some of these concepts into supply chain management to enrich our understanding and to develop theory as to how firms can change from a natural state of non-collaboration to that of collaboration. One framework that is used to understand how firms can drive lasting change is field theory (Lewin, 1951). This theory highlights three key steps that organizations undergo in such a transformation: unfreeze, change and freeze. A company must first unfreeze from the status quo. This event is often characterized by an awareness of those in the organization that change is needed and typically coincides with a significant event that causes leadership and employees to question the assumptions of business previously held (Drucker, 1994). This critical step sets the stage for change to actually occur, which is our second step. Cultural and/or structural initiates are then implemented to execute the needed change and place the firm into the changed, desired state based on the awareness that took place in step one. Once the firm has achieved the desired change it must then freeze itself in the new desired state in such a way as to avoid regressing back to the original current state. Our research includes companies that have already decided to "unfreeze" and are in the process of "change" - the second step of Lewin's field theory. We therefore focus our study on this aspect of the change management process.

An important dynamic that is critical to the successful implementation of the steps discussed above is the interplay between the forces driving change and the forces resisting the change. If the forces resisting change are greater than forces driving change, then successful movement between any of the three steps above will be undermined and the firm will find itself not only regressing back to its original state, but potentially may find itself in a worse state given the potential increase in cynicism in the workforce that can arise when change management goes awry. In this study, the forces that act for change are defined as structural and cultural initiatives to increase supply chain collaboration; the forces that act against change are the structural and cultural barriers that management identifies as impeding the firm's journey to improving supply chain collaboration.

RESEARCH METHODS

As we launched the initial study, the importance of supply chain collaboration as a differentiating competency had emerged as a topic of interest. It was evident, however, that the enablers of collaboration and their interactions were not well understood. The following steps were therefore taken to ground the research in existing literature and in managerial relevance. First, we conducted a literature review going back to the early 1980s using the *ABI Inform* and *ProQuest* databases. This review identified over 150 relevant articles that were subsequently used to design our interview guide. Second, we conducted six informal pilot interviews with supply chain managers to refine the questions and ensure managerial relevance. Third, we assembled an advisory board including managers and academicians, who provide us feedback on the research content and process.

This three-step approach led to an open-ended, semi-structured interview guide that converged on five central themes that permeate the design of collaborative systems (Fawcett, Fawcett, Watson & Magnan, 2012).

1. Why should managers be motivated to adopt collaborative practices that are difficult, demand new skills, require technology investment, and expose the organization to new risks?
2. What are the enablers of a collaborative capability?
3. What process factors make it difficult to develop collaborative capabilities?
4. Given the paucity of successful collaborative programs, what is the nature of the resistors that make the transformation to collaborative management so difficult?
5. Given the high transformation costs/risks, can collaboration lead to sustained competitive success? Simply stated, is it worth it to invest in a collaborative inventory capability?

Table 1 links these research themes to the core elements of systems design.

Sample and Context

The pre-field work also instilled context to interpret our findings about the construction of a collaborative supply chain capability. To build theory related to the interactions among the cultural and structural barriers and initiatives within an organization that is seeking to embrace supply chain collaboration, we sought a context that could serve as an "extreme case" (Eisenhardt, 1989; Pettigrew, 1990). Extreme cases are useful in theory building since the dynamics under investigation are often better defined and more easily documented than in other scenarios (Pratt, Rockmann, & Kaufmann, 2006). We therefore selected companies largely on the basis of their reputation for supply chain collaborative excellence. Participants were active industry leaders in supply chain education.

In order to control for environmental variables while still maximizing the variation in the studied variables of interest, we narrowed our analysis to 12 European cases studies where the firms analyzed operate in a similar cultural environment and context. Each company was involved in one or more collaborative initiatives with customers, suppliers, or both at the time of the interviews. Table 2 shows the demographic statistics for the interview companies.

Case Study Process

We employed a multi-case, interview-driven methodology to explore the intricate what, why, and how questions associated with collaboration

TABLE 1
THE LINKAGE BETWEEN SYSTEMS THEORY, THE LITERATURE, AND FACETS OF THE DESIGN PROCESS

Elements of Systems Theory	Literature-Driven Research Themes	Facets of Systems Design Process
Relation between Organization and its Environment	Why should managers be motivated to adopt collaborative practices?	Motives
Nature of Systems Design Process	Why have so few companies developed effective collaborative practices?	Resistors
	What is the nature of the resistors that impede the collaborative transformation?	
	What are the enablers of a collaborative capability?	Enablers
Organizational Goals	Can collaboration lead to sustained competitive success?	Outcomes

TABLE 2
COMPANY DEMOGRAPHICS

Type of Company	Headquartered	# of Employees	# of Suppliers/ Customers	Global Presence	Interviewees	Estab lished
Financial Services	Switzerland	64,617	N/A	Europe US & Canada Asia Pacific Middle East & Africa Latin America & Caribbean	Director, IT Global Technology Sourcing Directory, IT Operating Systems	1854
Logistics Provider	United States	40,000	N/A	United States Latin America Canada	Member of the Executive Board	1985
Manufacturer	Switzerland	12,908	2000 Suppliers	Europe Asia Middle East US Australia	Head of Strategic Sourcing	1802
Manufacturer	Switzerland	281,000	N/A	Europe Americas Asia Oceania & Africa	Co-Manufacturing Manager	1866
Manufacturer	Switzerland	1,200	N/A	Europe US Asia	Head of Purchasing	1857
Pharmaceutical Distributor	Switzerland	800	3,900 Customers	Switzerland	Director, Sourcing	1927
Retailer	Switzerland	11,000	6000 Suppliers	Switzerland China	Supply Chain Manager	1902
Retailer	Switzerland	83,000	N/A	Europe	Supply Chain Manager	1925
Sourcing and Packaging	Switzerland	565	300 Customers 10 “A”	Europe	CEO Procurement and Logistics Manager	1945
Sourcing	Germany	4,400	N/A	Europe Middle East Africa North, Central and South America Asia	Supply Chain Manager	1830
Tele-communications	Switzerland	19,664	10,200 Suppliers 250 “A”	Switzerland	Head of Procurement—Retailer	1998
Tele-communications	Switzerland	19,664	10,200 Suppliers 250 “A”	Switzerland	Head of Procurement—Retailer	1998

(McCutcheon & Meredith, 1993; Meredith, Raturi, Amoako-Gyampah, & Kaplan, 1989; Yin, 1981). Interviews provide a robust opportunity to explore collaboration since they enable managers to elaborate on the challenges they encounter—as well as the solutions they employ—as they seek to create deep functional skills while simultaneously fostering collaboration capabilities (Dyer & Wilkins, 1991; Eisenhardt, 1991). Multiple cases enable a replication logic, allowing researchers to confirm or disconfirm inferences drawn from each case and yielding more generalizable results (Spradley, 1979; Yin, 1981).

Once a company agreed to participate, a brief overview of the research objectives and a copy of the interview protocol were provided (Spradley, 1979). A semi-structured interview guide populated with open-ended questions was used to 1) allow managers to describe events and processes, 2) assure comparability of findings, and 3) provide flexibility in pursuing insight into unique practices and programs that became evident during the interview. The typical interview lasted 2 to 4 hours and involved senior managers who had responsibility for their company's collaborative supply chain initiatives.

During each interview, extensive notes were made for later reflection. In addition, secondary sources such as company presentations, new releases, process documentation, program descriptions, and performance scorecards were used to supplement interview findings. Together, the interview notes and background materials were used to 1) create rich and reliable structured case write-ups (Graebner & Eisenhardt, 2004) and 2) avoid "data asphyxiation" from the large amounts of data (Pettigrew, 1990). As the interview process continued, the researchers spoke often to compare notes regarding both the process and the content. This iterative discussion-based process was used to improve research reliability and validity as well as derive a consensus regarding their meaning (Eisenhardt, 1989).

Data Analysis Process

Each case write-up was used for two analyses: within-case and cross-case (Eisenhardt, 1989; Ellram, 1996; Yin, 1981) First, each case was viewed as a "stand-alone entity" to help describe the process and identify the issues encountered by each firm as it pursued a collaboration capability. Importantly, following the inductive process, we allowed ideas and themes to emerge from the data. Although we noticed similarities and differences among the cases, we refrained from further analysis until we had completed the interview process so that we could maintain the independence of the replication logic.

Second, only after we completed all of the write-ups did we begin the cross-case analysis. Our goal was to identify and match patterns in order to develop a more robust and complete theoretical picture (Eisenhardt, 1991). Because of the varied and nuanced answers as well as the diversity of language and terms used by the interview managers, we determined that a careful manual evaluation process would provide the best interpretation of the interviews. This analysis consisted of three major steps.

1. Using the literature as background, we pursued an iterative, open-coding process—i.e., we traveled back and forth among the case write-ups and emerging constructs. As we began to identify common statements, we formed provisional categories and first-order codes. We used NVivo 8.0 for coding and analysis.
2. The two-person analysis team used a process of individual coding, collaborative discussion, and concurring to derive theoretical meaning from the cases. The team consisted of one of the original interviewers as well as one new researcher. The new researcher was brought in to avoid data processing bias (Pagell and Wu 2009). We repeated this process for every case until all of the cases were coded. As new concepts were discovered, the researchers returned to the previously coded cases to look for evidence of the newly identified phenomena. This process forced 100 percent inter-rater reliability among the researchers.
3. To focus our findings on the most critical issues, we employed two decision rules as part

of the axial coding process. First, phenomena that were infrequently encountered deleted. Second, we consolidated specific, but related codes into broader, more theoretical categories.

From this process, we gained greater insight into key facets of system design identified in Table 1. Ultimately, a systems model emerged describing the dynamic tension involved in building a collaboration capability. We found that the balance between the desire to establish a collaborative capability and the forces resisting organizational change is influenced by management's ability to identify and employ the correct enabling mechanisms. We continue with a brief overview of our findings, which are organized using the four facets of systems design operationalized in Figure 1. We follow this discussion by proposing a more general theoretical model of collaboration capability construction.

CROSS CASE ANALYSIS AND PROPOSITIONS

Edgar Schein (1985) defines cultures as: "… a pattern of basic assumptions – invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration – that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems (Schein, 1985 pg.9). Accordingly, we coded comments related to basic assumptions such as vision and commitment as *cultural* elements. Other comments related to metrics, organizational structure, processes and procedures and technological tools were coded as *structural* elements. Tables 3 and 4 give an overview for the number of comments made in the interview for each company related to both cultural and structural barriers and initiatives. Tables 5 and 6 are proof quotes from the coded data.

Company 2, for example, expressed two unique comments regarding barriers to supply chain organization; of these two barriers, one was cultural in nature and the other was structural in nature. The cultural barrier encountered was related to trust. In expressing frustration for the lack of collaboration with a customer, the CEO of Company 2 explained, "... Trust is critical both ways; they must trust us to come up with solutions that can help them win. You can't enter a building if you don't have a door!" Later this CEO discussed the drawbacks of what he termed "the reverse auction game". Regarding participation in reverse auctions, he stated, "We refuse to seriously participate in many reverse auctions. We join a few just to see what is going on." In the first example, lack of trust is categorized as a cultural barrier to collaboration while the second example, reverse auctions, is an example of a structural (process) barrier to collaboration.

Inspection of the data reveals an interesting insight. The largest preponderance of barriers is cultural in nature (Table 3) while the largest preponderance of initiatives is structural in nature (Table 4). There are a few possible explanations for this phenomenon: one is that structural initiatives are effective tools to overcome cultural barriers thus being the instrument of choice for firms, while another explanation is that firms are engaged in a mismatched effort to overcome the barriers of supply chain collaboration. Supply chain research has shed enough light on this topic such as to cast doubt on the first explanation (Beth et al., 2003; Fawcett & Magnan, 2002), therefore guiding us to explore more deeply the second alternative. This leads us to a new research question that was not anticipated previously: *can a firm overcome cultural barriers to supply chain collaboration using only structural initiatives*?

While the data from this study show that there is a preponderance of mismatched effort between types of barriers and initiatives, limited evidence also from the study suggest that a mismatched effort does not actually lead to success in achieving improved supply chain collaboration. A supply chain executive of Company 12 opined, "Collaboration is a cultural phenomenon and we have spent the last year emphasizing soft issues in a cultural transformation". Speaking regarding his firm's attempt to improve their supply chain collaboration capability, an executive from Company 10 explained, "This is a two-step process: first, change mindsets and second, provide skills". In addition to these comments, responses from those firms not engaged

FIGURE 1
OVERVIEW OF THE DATA STRUCTURE

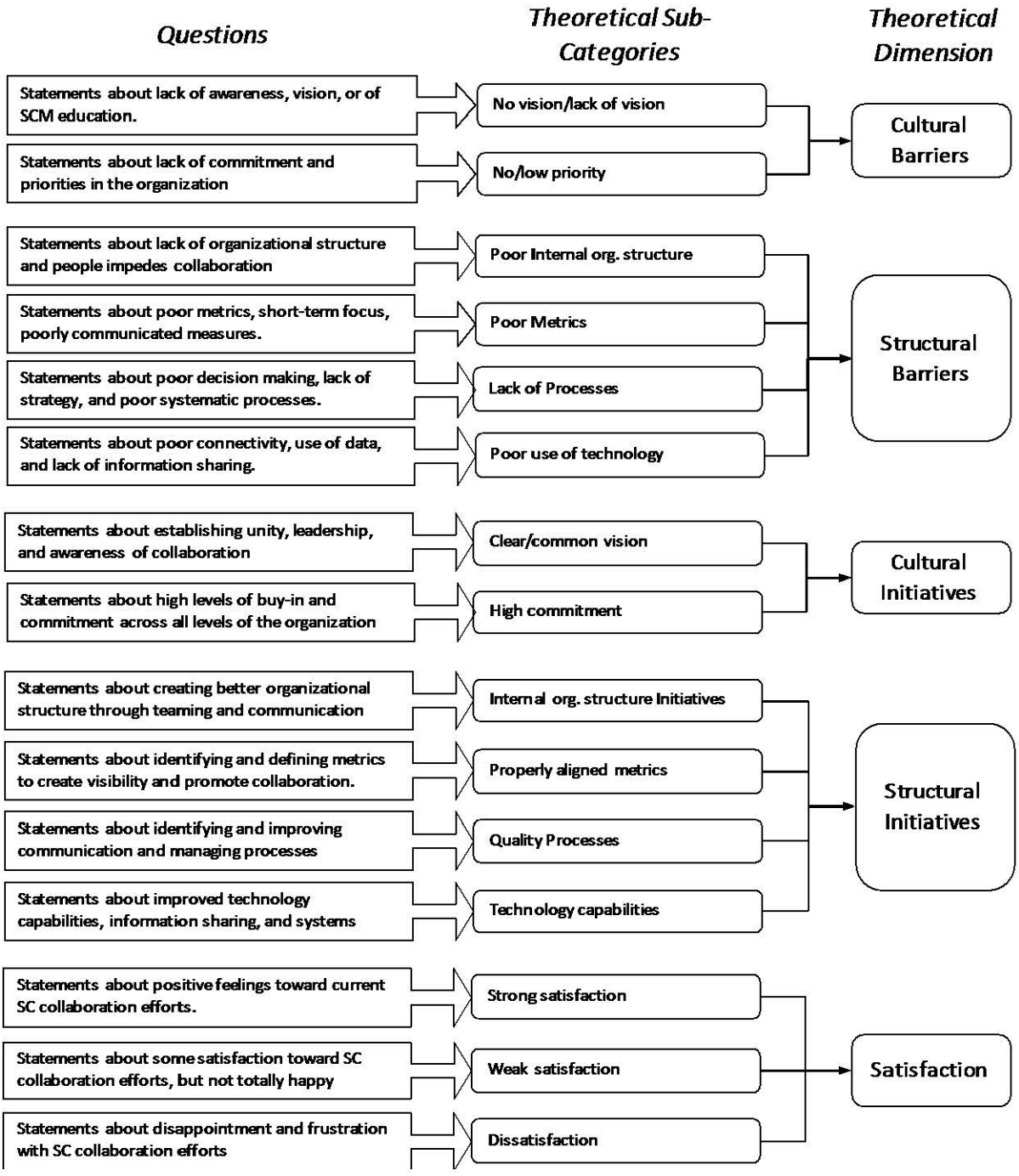

TABLE 3
BARRIERS TO SUPPLY CHAIN COLLABORATION

	Cultural Barriers		Structural Barriers				Total	
Company	No vision/lack of vision	No/low priority	Poor internal org. structure	Poor metrics	Lack of Processes	Poor use of technology	Cultural Barriers	Structural Barriers
1	1	1	1	0	0	0	2	1
2	1	0	0	0	1	0	1	1
3	1	1	0	1	0	0	2	1
4	2	1	0	1	1	0	3	2
5	2	2	1	0	1	1	4	2
6	3	1	1	1	2	1	4	5
7	3	1	1	0	1	0	4	2
8	5	2	1	1	0	0	7	2
9	2	0	2	0	1	0	2	3
10	4	1	2	1	0	0	5	2
11	1	1	1	0	0	1	2	2
12	2	1	0	1	0	0	3	1
Total	27	12	10	6	7	3	39	26

TABLE 4
INITIATIVES TO OVERCOME SC COLLABORATION BARRIERS

	Cultural Initiatives		Structural Initiatives				Total	
Company	Clear/ common vision	High commitment	Internal org. structure initiatives	Properly aligned metrics	Quality processes	Technology capabilities	Cultural Initiatives	Structural Initiatives
1	1	0	1	1	1	1	1	4
2	0	0	2	0	0	1	0	3
3	0	0	3	0	2	1	0	6
4	1	1	1	0	2	0	2	3
5	0	0	0	0	1	0	0	1
6	2	0	1	0	5	0	2	6
7	1	0	3	0	1	0	1	4
8	0	0	0	0	1	0	0	1
9	2	1	2	1	3	0	3	6
10	1	0	0	0	2	0	1	2
11	0	0	0	0	2	1	0	3
12	1	0	0	0	1	0	1	1
Total	9	2	13	2	21	4	11	40

TABLE 5
PROOF QUOTES: CULTURAL AND STRUCTURAL BARRIERS

Theoretical Dimension	Sub-Categories	Proof Quotes
Cultural Barriers	No vision/lack of vision	"People do not think in process or quality terms" "Lack of awareness os systematic working in areas like forecasting" "...we have to convince people by showing them how..." "we are establishing... a unified doctrine"
	No/low priority	"Lack of priority to explore electronic linkages for invoicing, dispatch advice, etc" "Each one of the cooperatives focuses on its own little area (or "garden") and forgets that there are other gardens that make up the whole." "lack of managerial commitment to collaboration is a major barrier"
Structural Barriers	Poorly formed Internal Org Structure	"Lack of collaboration channels (across functions)" "Worker turnover and loss of talent." "we have good people that do not accept that others do great work."
	Poor Metrics	"reward mechanisms are short term, functional, cost-oriented" "we don't have the luxury to spend time with the metrics" "People probably don't understand the metrics that drive the business "
	Lack of Processes	"We are not very disciplined...decision making comes from the gut" "People spend too much time putting out fires and not managing strategically" "Lack of awareness of systematic working in areas like forecasting"
	Technology	"Lack of priority to explore electronic linkages for invoicing, dispatch advice, etc" "We have plenty of data but we can't get it to decision makers sp they can use it." "They lack the interfaces to make great things happen"

TABLE 6
PROOF QUOTES: CULTURAL AND STRUCTURAL INITIATIVES

Theoretical Dimension	Sub-Categories	Proof Quotes
Cultural Initiatives	Vision	"establishing the unified doctrine" "...we have to convince people by showing them how..." "launched an SCM awareness campaign"
	Commitment	"Buy-in and managerial commitment from the highest levels." "Needed to build a critical mass of interest and support to get commitment to the VISION" "Only advantage comes from his passion and commitment to customer service" "There is a greater degree of commitment across functional areas
Structural Initiatives	Organizational structure	"established account management teams to manage internal accounts in other divisions." "Established a senior management team to smooth out the wrinkles." "Establish targets and put teams together to resolve open points" "Key outputs were the building of new relationships and better cross-divisional communication"
	Metrics	"trying to establish common KPIs" "driving suppliers to higher-level metrics" "Performance metrics are getting much more specific, drilling down to the activity level and the hour cycle "
	Processes	"Frequent meetings (weekly) to go over jointly (retail and ops) defined metrics" "We are taking a TQM approach to managing processes, communicating successes and training..." "we are establishing standard processes..."
	Technology	"Technology is making a different level of process management possible" "Implemented a SAP information system" "Information system allows suppliers access to forecasts and MRP updates (weekly)"

in cultural initiatives showed a lower level of satisfaction with supply chain collaboration efforts as opposed to those firms that did engage in at least one cultural initiative. Table 7 summarizes the responses of each company with respect to their level of satisfaction and compares these responses side-by-side with the summarized number of cultural and structural initiatives that the firms has engaged in. Table 8 identifies some proof quotes on satisfaction.

In only one instance (Company 10) did a firm engaged in a cultural initiative express any level of dissatisfaction with supply chain collaboration efforts. The same executive who discussed his firm's two-step process quoted above also explained, "While we have made progress, I'm not sure that everyone understands that we are a supply chain or that we participate in a SC environment." While this firm was coded as being dissatisfied with their supply chain collaboration efforts, it is more a reflection of an executive's frustration with the pace of progress rather than the direction of progress. We also observe in Table 7 that of the six companies engaged in at least one cultural initiative, three reported strong levels of satisfaction in their supply chain collaboration efforts while of the six not engaged in any cultural initiatives, four reported indifference or dissatisfaction all together. Additionally, we also observed that no company engaged in only cultural initiatives; in fact, all companies are engaged in at least one structural initiative. While we are not claiming statistical power in these findings, the results from this multi-case research initiative suggest a potentially symbiotic relationship between cultural and structural supply chain initiatives. This leads us to the following three propositions:

Proposition 1: When combined and aligned, cultural and structural supply chain initiatives work in a symbiotic relationship that supports lasting change regarding implementation of supply chain collaboration initiatives.

Proposition 2: Structural initiatives are sufficient to overcome structural barriers to supply chain initiatives only when there is an absence of cultural barriers.

Proposition 3: In the presence of cultural barriers to collaborative supply chain initiatives, structural initiatives alone are insufficient to overcome the cultural barriers.

TABLE 7
SATISFACTION WITH SUPPLY CHAIN COLLABORATION EFFORTS

	Satisfaction					Total	
Company	Satisfied	Somewhat satisfied	Dissatisfied	Total		Cultural Initiatives	Structural Initiatives
1	1	0	0	1		1	4
2	0	0	1	-1		0	3
3	0	1	0	0		0	6
4	1	0	0	1		2	3
5	0	1	0	0		0	1
6	1	0	0	1		2	6
7	1	0	0	1		1	4
8	0	0	0	0		0	1
9	0	1	0	0		3	6
10	0	0	1	-1		1	2
11	1	0	0	1		0	3
12	0	1	0	0		1	1
Total						11	40

TABLE 8
PROOF QUOTES: SATISFACTION WITH SUPPLY CHAIN COLLABORATION EFFORTS

Theoretical Dimension	Sub-Categories	Proof Quotes
Satisfaction	Strong satisfaction	"Other companies come to ... to benchmark [our} practices in the areas of automatic rassortment, daily fulfillment, ABC costing, forwarder integration, performance management SCM cockpit" "Satisfied but not by any means finished." "In the high-90s."
	Weak satisfaction	"We are doing OK. Are we where we need to be? No! But we are getting ourselves ready." "We are doing much better, especially in standardizing processes across the stores; however, we know that we have a long way to go" "We could take at least another 20 percent of the costs out of the supply chain."
	Dissastifaction	"We have to be better in process discipline and operational excellence" "[We do] not have the money to invest in the initiatives to take SCM to the next level!!! " "We are crawling!"

Much research over the past few decades has addressed the role that metrics, processes and technology play in supporting supply chain initiatives such as cross-functional and inter-firm collaboration. Terms related to these initiatives include metrics alignment, business process re-engineering and ERP technological investments. Organizational structure is another structural initiative that has also garnered attention and support over the past few decades. The emergence of the matrix organization has been the most prominent of these in its attempt to drive organizations to think and act cross-functionally for the good of the entire firm rather than with a myopic silo mentality. Firms have struggled, however, to leverage these structural initiatives to drive meaningful change (Beth et al., 2003). Not that structural changes in and of themselves are difficult to implement, but the negative impact of cultural barriers has acted in a dysfunctional manner with the structural barriers thus impeding the ability of structural initiatives to achieve their desired means. A non-supportive supply chain culture within a firm thus acts as an undertow that impedes and pulls back on any forward progress that pro-supply chain structural initiatives may provide. The supply chain manager interviewed at Company 7 recognizes the interdependent nature of these concepts and explained how his firm focuses first on training his people: "We now bring together all of our people together for training. This also helps everyone see the big picture and get to know each other so that we can better work together in the future."

When a firm's leadership decides to make the paradigm shift towards developing a more collaborative supply chain, it may find that the existing cultural and structural elements in the firm are in conflict with those cultural ideals that it has just decided to embrace. A firm, for example, that decides to engage in strengthening supplier relations may find that current business practices such as engaging in reverse auctions do not serve the new vision and have thus become obsolete. As was articulated by Schein (1985), culture is the result of a certain assumption or belief that has generated repeated success in the past. Therefore, asking an organization to abandon a paradigm that has been repeatedly used to a certain degree of success in the past becomes a difficult proposition. Not until the new paradigm has proven itself repeatedly will the new culture take hold. When initiatives that require cultural paradigm shifts yield long-term versus short-term benefits, the cultural transition becomes that more difficult. Investments in time, people and cash are often then needed to align the structural elements of the firm with its new cultural paradigm. This can become particularly challenging if the skill sets and cultural paradigms of the workers of the firm are so entrenched that implementation becomes resisted and sabotaged despite appropriate training. In such cases, firms must invest further in acquiring the necessary human resources to achieve the transformation implementation needed to succeed. One CEO of the companies interviewed acknowledge that not everyone in the company is willing to give up the control required to collaborate

and in these instances personnel changes may be necessary. "Sometimes you have to say, 'If you don't join us, you are going to have to leave us.'"

If cultural initiatives are indeed required as an antecedent to lasting cultural and structural changes in a firm, why do we still witness a propensity for firms to engage in structural initiatives to improve supply chain collaboration? The answer to this question may be a function of the degree of empowerment of middle management, which has the authority to drive structural initiatives within its sphere of influence while meaningful cultural initiatives are left at the purview of top executive leadership. Middle managers who see the benefits of supply chain collaboration may attempt to implement structural elements to achieve their vision. It is even probable that if successfully executed positive benefits may result. However, unless the changes become embedded in the corporate culture of the firm, the undertow of a non-supportive executive leadership will hinder the initiative from growing further and will deem those initiatives a temporary aberration.

This leads to the next proposition:

> Proposition 4: In the absence of top leadership commitment to engage in meaningful cultural initiatives, supply chain managers will still engage in those structural initiatives that are actionable, despite the lack of probable longevity of those initiatives.

It appears that lasting change for those firms desiring to embrace supply chain collaboration requires a true and lasting change in culture; this change can only be lasting if it comes from top leadership (Felton, 1959; Hambrick & Mason, 1984). Those companies in our data set that engaged in cultural initiatives exuded more confidence that their structural initiatives would take hold as compared to those companies that were not engaged in cultural transformation initiatives. One company, for example, spent an entire year executing a carefully planned vision and strategy development initiative calculated to prepare the organization for further structural initiatives related to supply chain collaboration. In the words of this company's chief procurement officer,

> While the process took over a year, it identified needs and critical performance gaps. It prioritized those gaps and developed a strategy to collaboratively resolve them. It developed critical relationships and generated buy-in not only from sourcing, but across functions and at higher levels of the organization. Ultimately, it created a vision of how and why the different groups should work collaboratively together. The process was arduous and cumbersome, but it demonstrates the idea that 'People support what they help create.' It has set in place the foundation for successful strategy execution.

CONCLUSIONS

Supply chain collaboration remains elusive for many firms. To the best of our knowledge, no one has yet studied how the interactions of structural and cultural forces (barriers and initiatives) impact a firm's journey toward developing a collaborative supply chain. This exploratory study of 12 European firms revealed some interesting patterns in this regard. First, while firms experienced more cultural barriers than structural barriers to supply chain collaboration, initiatives taken to overcome those barriers were overwhelmingly structural in nature and outnumbered cultural initiatives four to one. Second, those firms that combined cultural and structural initiatives generally experienced higher levels of satisfaction in their collaboration efforts than did those that pursued solely structural initiatives.

A further line of research that can extend this current study could explore what bundles of structural and cultural initiatives best contribute to the implementation of lasting change regarding improving collaboration with supply chain partners. It may be that certain bundles are more effective than others. For example, it may be that the cultural

initiative of achieving a higher level of cross functional commitment may be best achieved when bundled with the structural initiative of increasing metrics alignment as opposed to bundling it with improving technological capabilities. Discovering what bundles are most effective would be a valuable contribution to both theory and practice.

Another research extension could explore how such bundles may change according to how far along a firm is in their collaboration journey. In other words, what bundles apply to the stage when a firm is developing an intrafirm collaboration capability versus when a firm is seeking to develop an interfirm collaboration capability. Do the same bundles apply to the entire journey or are some more relevant at different stages? While interfirm and intrafirm collaboration both require similar aspects of collective action, the cultural and structural initiatives most effective in one may not be the same as that of the other; this may be due to differences in the cultural and structural barriers encountered in the two scenarios.

One limitation to this research is that while we were able to identify the presence of different barriers and initiatives across the twelve companies, a more in-depth exploration of why specific bundles worked better than others was not captured in the interviews. In order to capture this data, researchers may consider first conducting a large sample analysis to identify the most effective practice bundles and then conduct one or two deep dive case studies that can shed light to how and why the interactions of these practice bundles lead to improved performance.

The awareness of the ineffectiveness of stand-alone structural initiatives identified in this paper is an important contribution to practice and can help managers avoid unfruitful investments in collaboration. Cultural initiatives start at the top and require top leadership support in order to be implemented successfully and maintained over time. When structural investments for improved collaboration are coupled with leadership-led cultural initiatives, firms are able to better progress in the journey towards effective collaboration. These findings provide a better understanding of the influencing factors at play related to the force field change management framework cited earlier in this paper (Lewin, 1951). Further research that builds on the findings of this study will provide further insight into the mechanics of how supply chain managers can successfully lead their organizations down the path towards successful collaborative initiatives that benefit both the firm and the overall supply chain.

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DISCOVERING THE POWER OF EMOTIONAL INTELLIGENCE AND ORGANIZATIONAL IDENTIFICATION IN CREATING INTERNAL MARKET-ORIENTED SUPERVISION

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ABSTRACT

Employees are better equipped to provide exceptional service when they are appropriately provided for and understand the company's value proposition (Berry and Parasuraman, 1991). Internal market-orientation (IMO) pertains to a specific workplace environment that fosters employees who are trained and believe in the value offered by the company. Such support and development translates into higher quality service employees interacting with customers and their products (Lings, 2004). Linkages between IMO, emotional intelligence (EI) and organizational identification (OI) are evaluated within a supply chain and logistics context. Results indicate the direct influence of OI on IMO, and a supervisor's ability to help employees manage emotions mediates the relationship between the ability of a supervisor to self-manage emotions and his or her propensity to create an internal market-orientation. An internal market-orientation is beneficial to the customer experience, and ultimately benefits the firm.

INTRODUCTION

Research has discovered critical connections between supervisor behaviors when interacting with frontline service personnel and the ability of the firm to carry out its marketing strategy (Sasser and Arbeit, 1976; Berry, 1984; Berry and Parasuraman, 1991). In retail banking, hospitality, and other service industries it is difficult for customers to separate perceptions of the service provided from the service provider. The underlying premise is that a supervisor should interact with and treat subordinates in the manner that the company desires employees treat external customers. In managing the supply chain, logistics, transportation and package handling personnel are the final representatives to touch and inspect products, verify accuracy of documentation, and ensure timely delivery of customer orders. Essentially, achieving the "perfect order" for the customer ultimately is entrusted to frontline logistics service personnel. Interactions with products during each activity within the various supply chain logistics processes provide employees with opportunities to influence customer perceptions of the service provided and the firm. Workforce supervision can facilitate frontline service employee success by developing a market-orientation *within* the organization.

Internal market orientation (IMO) is a workplace environment dynamic that instills care and concern through manager-to-subordinate interactions similar to that expected of all service employees when interacting with external customers and their products (Lings, 2004). Research has discovered multiple critical components of IMO (Tansuhaj, Wong, and McCullough, 1987). It seems reasonable to suggest that all managers could develop an internal market-orientation within the workplace by treating their immediate subordinates in this prescribed manner. To the contrary, however, research suggests that not all logistics

supervisors are equally equipped to demonstrate and instill IMO tendencies (Keller, Voss and Ozment, 2010).

Variations exist when it comes to individual capabilities to create an IMO environment for employees. An area of research stemming from psychology offers a potential explanation for such variations. Managers possessing characteristics of high emotional intelligence (EI) are said to be better equipped to manage workplace situations involving employees with varying emotional status, as well as, manage their own emotional state while interacting with subordinates (Salovey and Mayer, 1990; Mayer and Salovey, 1997; Mayer et al., 2003; Salovey and Grewal, 2011). Perhaps supervisors with greater EI may also be better at creating a workplace that is focused on achieving the very best in employee treatment and success that transfers into quality marketing and service delivery to customers.

Social identity theory may offer another potential influence. Organizational identification (OI) pertains to a person feeling strongly toward a company to the extent that the person begins to view themselves as an extension of the company, and in turn, acts in the best interest of the firm (Ashforth and Mael, 1989; Pratt, 1998; Ashforth et al., 2008). That is, they believe that their own reputation is a reflection of the reputation of the company. They want to help the company succeed, because, they see the company's success as their own success, as well.

The current study sets-forth to discover the linkages between three critical areas important for developing successful supervision of frontline employees within logistics operations. The underlying research questions are: What is the value of a supervisor's ability to manage emotions and his or her propensity to create an internal market-oriented workplace? And secondly, whether supervisors who strongly identify with their companies are more likely to create an internal market-oriented workplace?

LITERATURE REVIEW

Internal Market Orientation

Theoretical and practical roots of internal market-orientation emerged from research pertaining to the concept of internal marketing (Berry 1980; Berry 1981; Berry 1983; Grnroos 1981; Grnroos 1983; and George 1990). Particularly within service industries, research suggests that employees are better equipped to provide exceptional service to external customers when employees are appropriately provided for and understand the company's value proposition marketed to customers. Scholars have compared company exchanges with customers to company exchanges with employees. Both customers and employees provide resources to the company in exchange for something of value, such as, services, products, or paychecks. Frontline employees trained in and believing in the value offered by the company will be better positioned to communicate and demonstrate the value to end customers upon delivery. Piercy and Morgan (1991) conceived an internal marketing framework that included providing employees, especially frontline employees, with the knowledge, skills and support needed to be successful and satisfied on the job and to carry-out the marketing strategy of the organization. Providing meaningful training to employees, appropriate workplace environment, tools for the trade, pertinent communication and information exchange were identified as critical for developing a workplace conducive for generating the highest customer value. Rafique and Ahmed (1993) extended the framework and suggested management focus on developing employee values and attitudes that parallel the company's values.

Empirical research by Tansuhaj, Wong, and McCullough (1987) resulted in a scale to measure internal marketing and included training, information sharing, open communication and praising employees. Other research followed by extending the multi-dimensional nature of the concept to include managers and employees following formal and informal processes for sharing highly accurate information, demonstrating respect for employees, and training supervisors to be proactive to identify

potential employee issues before they escalate (Conduit and Mavondo 2001; Quester and Kelly 1999; Finn et al. 1996).

Logistics processes are composed of activities performed sequentially or in parallel that require employees performing activities earlier in the process (internal service providers) to transmit important physical, service and informational outputs to their next-in-line co-workers (internal customers). Ultimately, the goal is to perform activities with the same care and produce the same level of output quality that the company markets and expects to provide to external customers.

One obvious external customer touch-point occurs when field personnel deliver products to customers in exchange for payment or proof-of-delivery signatures. While the delivery driver ultimately is the final logistics person to handle products prior to exchange with customers, delivery personnel are reliant on warehouse and distribution center personnel to assure the perfect order is provided to customers. Inventory control personnel, order pickers, checkers and loaders directly influence the accuracy of the documentation and product shipped, condition of the product loaded for delivery, timeliness of shipment, and cost for customers.

Lings (2004) distinguishes between internal customer-orientation (ICO) and internal market-orientation (IMO). While overlapping in concept, ICO focuses on a company developing quality internal transactions with and between employees so that employees will help to improve transactions with customers. In essence, each organizational member is an internal customer (receiving work output from a co-worker) and internal supplier (providing work output to a co-worker) (Kennedy, Lassk, Goolsby, 2002; and Chebat and Kollias, 2000). IMO pertains to the human resources dimension of internal marketing, whereby, the creation of satisfied and motivated employees will provide exceptional services to external customers. Achieving such success with employees requires that supervisors provide subordinates with critical job inputs, such as, providing a positive working environment, enabling knowledge development, supplying quality job information, and being a facilitator of employee success (Foreman and Money, 1995; Piercy and Morgan, 1991; and Rafiq and Ahmed, 1993). The present study applies the concept of IMO.

Keller et al. (2006) and Keller, Voss, and Ozment (2010) demonstrated that product distribution operations provide exceptional work environments for creating an internal market-orientation to benefit the logistics associates involved in the processes and activities integral to customer order fulfillment. Leveraging the three-factor model of Foreman and Money (1995), employee development, rewards, and instilling employee understanding for the organization's vision, Keller and his colleagues empirically established a six-dimensional internal market orientation construct. Supervisors of frontline logistics personnel may adopt an internal customer orientation by providing frontline employees:

1. A positive and non-threatening workplace.
2. Formal and informal opportunities for employee knowledge development.
3. Timely and accurate information in an efficient form.
4. Specific and timely feedback pertaining to employee issues.
5. Methods for driving employee success.
6. A customer orientation toward other organizational departments.

Emotional Intelligence

Supervisors interact with subordinates under varying environmental dynamics. Emotions displayed between supervisors and employees while facing differing situations can influence the value and outcome of the interaction. Research indicates the need for managers to possess a high caliber of emotional intelligence when discoursing with employees during highly emotionally charged circumstances (Salovey and Grewal, 2011; Mayer, Roberts, and Barsade, 2008; Salovey and Mayer, 1990).

Managerial intellect with respect to emotions in the workplace has been theorized to consist of multiple

dimensions (Salovy and Mayer 1990; Mayer and Salovy 1997). A person must be able to perceive or be aware of the existence of an emotion (Salovey and Grewal 2005). Without perceiving that an employee is experiencing an emotional state, a supervisor would not be well-equipped to productively manage the emotion any further. Emotions must also be understood. A manager is deemed to have a higher level of emotional intelligence to the extent that a manager can recognize the type of emotion displayed by an employee or differentiate between emotions when they change. Leveraging emotions to gain advantages in problem solving, overcoming obstacles, or generating new ideas is a third dimension of emotional intelligence. For example, tapping into the memory of a time when a manager successfully accomplished a similar goal could generate the confidence the manager needs to forge ahead through obstacles (Salovey and Grewal 2005).

A fourth component of emotional intelligence pertains to the managing of emotions (Salovey and Grewal 2005). It is perhaps the more complex aspect of the concept and consists of managing emotions of self and others. During exchanges with employees a supervisor will be a more effective leader if he or she can control the emotions they may feel and help employees do the same. For example, a manager skilled in managing emotions will remain calm when facing adversity in the workplace. Moreover, supervisors capable of helping a subordinate move from being in a bad mood to feeling better about things is deemed to have the intellect for managing emotions. Being able to understand, handle, and attune employees' emotions in the workplace towards better decision making reflects the success of a manager as an influential leader within the organization. Managing the emotions of one's self and of others are the two dimensions proposed to directly link together the emotional and physical interactions that allow a supervisor to conduct successful interpersonal exchanges (Mayer, Caruso, and Salovey 1999).

Organizational Identification

Mael and Ashforth (1992) define organizational identification as "the perception of oneness with or belongingness to an organization, where the individual *defines* his or herself in terms of the organization(s) in which he or she is a member." By identifying with the organization, a manager's self-concept is affected and, in turn, his or her commitment to work for that company reflects characteristics that make up the core elements of the organization. In essence, identifying with an organization becomes a catalyst to enable a manager's achievement of personal career goals. Moreover, individuals identifying with the organization engage in behaviors beneficial to the company while on and off the workday clock (Mael and Ashforth, 1989). As the company and job become increasingly significant dimensions of the manager's personal identity, the motivation of the individual to adopt the role as corporate ambassador toward external constituents is enhanced.

Managerial perceptions can have both positive and negative effects as managers identify public impressions as defining characteristics of the organization and as defining characteristics of themselves (Dutton et al., 1994). Organizational failures are perceived as the manager's own failures.

Lichtensein, Netemeyer, and Maxham III (2010, p. 85) explain that "one person's level of identification with a company may serve as an influence for that of another's." Corporate employees adopt critical roles as communicators of a company's identity. The "chain of influence" phenomenon applies to manager-subordinate relationships, as well. Supervisors who identify with the organization will adopt internal market-oriented behaviors toward subordinates, because, such actions will provide for a positive and productive workplace. Customer-contact employees, acting as ambassadors for the company and with a market-oriented focus, communicate positive organizational values to external customers with a market-oriented focus. Most importantly, customers attracted by the true values of the organization perceive a certain level of distinctiveness established through the transparency of the organization's members and become loyal to the experience associated with the company's products, services and people

(Fombelle et al., 2012). Loyalty is strengthened as customers perceive their social identities are manifested and reinforced with each experience.

HYPOTHESIS DEVELOPMENT

By nature business operations pertaining to logistics and supply chain management are labor intensive and require skillful supervision (Myers et al., 2004). Of course not all managers will possess equivalent levels of skill when it comes to managing their own emotions while on the job. Likewise, helping others manage emotions may be equally, if not more difficult.

George (2000) theorized a causal relationship, but did not offer empirical evidence, between the level of a manager's emotions and leadership character. Attributes of leadership discussed by George (2000) possess some similarity to the six attributes of IMO. Logistics and supply chain service-type companies will find it beneficial to have a workforce driven by managers equipped to create customer-focused employees. It is not enough to charge service employees to "be customer-focused." Managers successful at creating such positive environments must deliberately engage employees in the work planning process and illustrate how employee success leads to company success. They must help employees obtain information most useful in performing the job well and must be proactive and responsive when it comes to employee needs. These along with creating an affirming culture within and across departments are known to be associated with improved customer service and employee performance (s.f. Andraski and Novak, 1996; LeMay et al., 1999; Voss et al., 2004; Keller et al., 2006; and Ellinger et al., 2005).

A manager possessing the ability to manage their own emotions, regardless of the workplace situation, will be better equipped at producing a customer-focused workgroup of employees through his or her supervisory abilities. Hypothesis 1 is designed to test this proposition.

> Hypothesis 1: A higher level of emotional intelligence, with respect to a supervisor's ability to *manage his or her emotions* in the workplace, is significantly related to a supervisor's ability to *create an internal market-oriented workplace*.

Perhaps to a greater extent, a manager possessing the ability to help his or her employees manage their emotions will be better equipped at producing a customer-focused workgroup of employees through his or her supervisory abilities (George 2000). Hypothesis 2 is designed to test this theory.

> Hypothesis 2: A higher level of emotional intelligence, with respect to a supervisor's ability to *help his or her employees manage their emotions* in the workplace, is significantly related to a supervisor's ability to *create an internal market-oriented workplace*.

Another critical distinction yet to be tested in the literature is the potential *mediating role* of a supervisor's ability to help others manage their emotions. It is important to discover the degree to which the relationship between a supervisor's ability to self-manage his or her emotions and the skill level of a supervisor to facilitate an internal market-oriented workplace is facilitated by (*mediated*) his or her ability to help subordinates manage their emotions while on the job?

> Hypothesis 3: A supervisor's ability to *help his or her employees manage their emotions* in the workplace mediates the relationship between a supervisor's ability to *manage his or her own emotions* and a supervisor's ability to *create an internal market-oriented workplace*.

The major focus of the research is to evaluate the antecedents to creating a customer-focused workplace. Toward this end, managers who relate well to the organization and view themselves as a virtual extension of the organization will act and manage with the best interest of the organization at the forefront. (Ashforth and Mael, 2011). For a service organization the path to success requires customers being satisfied with the services rendered by the personnel of the service company. Research demonstrates the need for service employees to be managed in ways consistent with the expectations

that the company has for employees who engage external customers. For these reasons, Hypothesis 4 is offered.

> Hypothesis Four: Higher levels of organizational identification are significantly related to higher levels of internal market-orientation.

The measures and their psychometric properties, and the methodology to examine the direct and mediating effects of antecedents on internal customer orientation are presented in the following section.

METHODOLOGY

There is no disputing the importance of personnel in achieving company initiatives entailing logistics and managing the various facets of the supply chain (c.f. Autry and Daugherty, 2003; Peraitt, Chakrabarty and LeMay, 2007; Gibson and Cook, 2001; Myers et al., 2004; Gowen III and Tallon, 2003; Harvey and Richey, 2001; Keller, Voss and Ozment, 2010; and Ellinger et al., 2002). All of the marketing strategizing, planning, and execution will have substantially less value to a customer if the business fails to satisfy the customer in quality service and cost.

In order to test the hypotheses electronic questionnaires were distributed to logistics managers. One hundred and fifty-five out of 500 managers responded with completed questionnaires (31% participation rate). Managers were in charge of warehousing and distribution center operations (19%), transportation (26%), customer service (3%), inventory control (3%), administration (10%), and in other areas of logistics planning, strategy, and freight sales (38%). Managers reported an average of 6 years in their current job and 13 years with their current employer. Direct reports averaged 13, and the facilities averaged a total of 683 employees.

Definition of Measures

The following sub-sections define each of the constructs further in terms of their various dimensions, and explain how each dimension is measured.

Conceptualization and Measurement of Internal Marketing-Orientation

Pioneers of internal marketing recognized the impact that service personnel can have on the value delivered. Without supervision equipped to provide a marketing-like environment, whereby employees feel supported and valued similar to that shown to external customers, the service value delivered by the frontline is left to chance (c.f. George, 1990; Grnroos, 1985; Piercy and Morgan, 1991). Measures of internal market-orientation have been developed throughout the years. Six components of the concept have emerged and are utilized in this study. Collectively, the dimensions represent the breadth of the IMO concept from the perspective of the supervisor in providing for the needs of subordinates. Items representing each dimension appear in the Appendix.

> Dimension 1: Creating a positive working environment for employees.
> (Measures based on Finn et al., 1996; Tansuhaj, Randall, and McCullough, 1991; Tansuhaj, Wong, and McCullough, 1987).

Positive workplaces encompass fairness, praise, approachability, assurance, and appreciation. Supervisors trained and motivated to act deliberately in assuring subordinates that decisions affecting them are made with an eye toward fairness create positivity among the workforce. Moreover, supervisors contribute to a positive environment by ensuring that the workplace is a safe place to discuss issues, approach management, and celebrate successes of all individuals.

> Dimension 2: Facilitating employee knowledge development.
> (Measures based on Ballantyne, 2000; Berry, Conant, Parasuraman, 1991; Foreman and Money 1995; Grnroos, 1994; and Rafiq and Ahmed 1993).

Knowledge development encompasses understanding, preparedness, training, and education beyond the basics. Oftentimes, employees are hired, trained, and expected to perform without fully understanding their role within the organization. Taking training a step further,

progressive supervisors' assist subordinates in understanding how their roles affect and are affected by the responsibilities of their direct supervision. Higher-level knowledge development beyond the specifics of job tasks is of equal importance in developing motivated and customer-focused employees. One author is reminded of a time when a warehouse employee consistently performed tasks according to how the employee *felt* the tasks should be accomplished. Every instance the employee diverted from performing the task, as stated in the manual, resulted in a service failure in the form of a late shipment and delayed payment by the customer. Simply telling the employee *how* to do the task was not enough. A resolution to the situation came when the supervisor realized the employee wasn't deliberately sabotaging the process. The employee simply needed an explanation as to *why* the task must be performed in a specific manner.

Dimension 3: Managing the productive flow and quality of information.
(Measures based on Ballantyne, 2000; Finn et al., 1996; Grnroos, 1994; Rafiq and Ahmed 1993; Tansuhaj, Randall, and McCullough, 1991; Tansuhaj, Wong, and McCullough, 1987).

Internal marketing-oriented supervisors ensure that their employees receive accurate and timely information that is in a ready and easy to utilize form. Supervisors leverage their skills in record-keeping and scheduling of information dissemination on regular time schedules.

Dimension 4: Fostering employee success.
(Measures based on Ballantyne, 1997; Hartline and Ferrell, 1996; Hartline, Maxham, and McKee, 2000; Hauser, Simester, and Wernerfelt, 1996; Kennedy, Lassk, and Goolsby, 2002; Pitt and Foreman, 1999; Singh, 2000; and Tansuhaj, Randall, and McCullough, 1991).

Successful management stands on the shoulders of successful employees. Understanding and perpetuating employee success is the job of the IMO manager. It is accomplished through helping employees set goals toward achieving advancement, and by setting joint goals to improve co-working relationships. Sharing rewards of the job with subordinates is another aspect of fostering success among employees.

Dimension 5: Responding to the needs of employees.
(Measures based on Brooks, Lings, and Botschen, 1999; Finn et al., 1996; Grnroos, 1994; Hirshman, 1970; Tansuhaj, Randall, and McCullough, 1991; Tansuhaj, Wong, and McCullough, 1987).

Supervisory responsiveness entails the provision of prompt feedback to all employee concerns and needs. The key to successful supervisory responsiveness is not contingent on the outcome of the response being in favor of the employee, rather, it is the act of responding to employee inquiries with a sense of urgency and care.

Dimension 6: Demonstrating to employees an interdepartmental customer-orientation.
(Measures based on Conduit and Mavondo, 2001).

The sixth dimension of internal market-orientation pertains to a supervisor assuring that his or her department demonstrates internal service-like behaviors toward employees within other departments. In doing so, the supervisor instills in his or her subordinates the behaviors most productive in creating successful internal-customer exchanges throughout the organization. This, too, will ensure the success of employees when conducting service exchanges with each other. As a result, they will treat others who receive their work-output like internal customers as they perceive themselves as internal suppliers. They will be conditioned to measure and improve the value of output they provide to their co-departments, as well as, to seek understanding of the on-going requirements of other departments.

Conceptualization and Measurement of Emotional Intelligence

Perhaps some managers believe that personal emotions play no productive role in supervising subordinates within daily operations of a company. To the contrary, however, modern-day scholars

have identified the importance of leaders being able to reason about their emotions and to help followers to do the same. In turn, they find emotions valuable in the development of cognitive reasoning ability (Mayer, Roberts, and Barsade, 2008). Considering the theoretical and practical importance of EI, researchers have worked to operationalize the construct and its multiple dimensions. Measurement approaches stem from task-based to self-reported. Debate is ongoing as to the most successful method of measuring EI (Salovey, Woolery, and Mayer, 2001, pp. 289-294; and Mayer, Roberts, and Barsade, 2008).

Two critical dimensions of EI are employed in the current research pertaining to a supervisor's ability to manage their own emotions and to help subordinates manage their emotions. The abilities are of particular interest because of their proposed linkages to m*anaging* emotions with IMO. Salovey and Mayer's (1990) model of emotional intelligence provides for the conceptualization of the dimensions, and Schutte et al. (1998) provided a foundational study that developed and utilized self-reported measures for the dimensions. The current study measures are based on these works and include:

> Dimension 1: Perceived ability to self-manage emotions.
> Dimension 2: Perceived ability to help others manage emotions.

Conceptualization and Measurement of Organizational Identification

Organizational identification (OI) as operationalized in the current study is based on the scale developed by Mael and Ashworth (1992) and a subset of the items by Mael and Teitrick (1992). OI, derived from social identity theory, pertains to an individual's perception of themselves in terms of the character of the organization to which they belong. It is that portion of personal identity derived from a feeling of "belongingness" to a specific organization that is psychologically void in the absence of membership (Mael and Ashforth, 1992). The scale (see Appendix) has widely been utilized as a means to measure OI. Riketta's (2005) meta-analysis of research on OI concluded the Mael and Ashworth scale appears to be the best method to measure OI available. According to Riketta (2005), specific benefits of the scale include, (1) the fact that it is superior than other scales in predicting extra role behaviors, and (2) represents a more narrowly and defined construct, (3) and is easy to administer and superior in terms of demonstrating reliability and validity when compared to other scales (Riketta, 2005).

RESULTS

Measurement descriptives, scale reliabilities, and coefficients utilized to evaluate the internal consistency of the scales are provided in Table 1.

Scale reliabilities all exceeded the baseline of .60 (Cronbach's Alpha > .60). Confirmatory factor analysis was conducted to evaluate the unidimensional nature of the six IMO dimensions (25 items) that ultimately make up the higher-order factor. Each of the measurement scales resulted in statistically significant factor loadings above .60 with the exception of 6 items resulting in loadings above .52 (retained for face validity). Ranges of item-to-total correlations were narrowly consistent within individual scales. Table 2 provides the results pertaining to the constructs evaluated in the final model. All measurement loadings were statistically significant and exceeded .60 with the exception of one at .56 (SME1). The item was retained to maintain the face validity of the construct. Further examination of the results in Table 2 indicates that discriminant validity exists between all constructs, whereas, the average variance extracted per construct exceeded the shared variance between all construct pairs. In total, the construct measures demonstrate unidimensionality, reliability, internal consistency, and validity.

Table 3 contains the results of multiple regression analyses for multiple models. The models allow for the testing of the direct relationships hypothesized, but when considered in total, the nature of the hypothesized mediating relationship is revealed.

A three-step analysis was performed to evaluate the potential mediating role of a supervisor's ability to

TABLE 1
DESCRIPTIVES, RELIABILITIES, AND INTERNAL CONSISTENCY

Construct/ Items	Mean	Standard Deviation	Item-To-Total Correlations	Cronbach Alpha for Scale
INTERNAL MARKET-ORIENTATION *(Higher-Order Construct)*				.87
Positive Environment	6.13	0.70	.74	
Knowledge Development	5.81	0.77	.69	
Information Flow & Quality	5.66	0.76	.68	
Employee Success	5.43	1.06	.66	
Employee Needs	5.99	0.79	.67	
Inter-Dept. Customer-Orientation	5.94	0.85	.60	
(Range of Correlations .46-61)				
Positive Environment				.77
PE1	5.86	1.05	.53	
PE2	5.97	1.09	.57	
PE3	6.37	0.85	.51	
PE4	6.14	0.93	.61	
PE5	6.30	0.85	.53	
(Range of Correlations .33-57)				
Knowledge Development				.73
KD1	5.79	1.03	.45	
KD2	5.79	0.94	.64	
KD3	5.52	1.24	.43	
KD4	6.16	0.96	.55	
(Range of Correlations .29-.59)				
Information Flow & Quality				.75
IFQ1	5.48	1.18	.51	
IFQ2	5.83	1.04	.45	
IFQ3	6.06	0.82	.63	
IFQ4	5.74	1.06	.60	
IFQ5	5.20	1.23	.45	
(Range of Correlations .18-.55)				
Employee Success				.81
ES1	5.47	1.35	.64	
ES2	5.41	1.30	.72	
ES3	5.55	1.30	.54	
ES4	5.27	1.34	.62	
(Range of Correlations .40-.62)				
				.77

Employee Needs				
EN1	5.80	1.03	.48	
EN2	6.00	1.13	.56	
EN3	6.10	1.03	.71	
EN4	6.06	0.92	.57	
(Range of Correlations .35-.60)				
Inter-departmental Customer-Orientation				.62
IDCO1	6.12	1.08	.48	
IDCO2	6.03	1.11	.47	
IDCO3	5.66	1.19	.35	
(Range of Correlations .29-.47)				
Self-Manage Emotions				.84
SME1	5.91	0.92	.53	
SME2	5.85	1.02	.79	
SME3	5.79	0.99	.81	
(Range of Correlations .50-.86)				
Help Others Manage Emotions				.81
HME1	5.01	0.93	.57	
HME2	5.60	1.07	.66	
HME3	4.85	0.89	.66	
HME4	5.53	1.04	.63	
(Range of Correlations .52-.60)				
Organizational Identification				.82
OI1	6.04	1.09	.66	
OI2	6.54	1.02	.53	
OI3	6.39	0.86	.71	
OI4	6.18	1.08	.70	
(Range of Correlations .29-.47)				

help others to manage emotions (HME) (Baron and Kenny, 1986). Table 2 illustrates the first regression model whereby the independent factor used to predict HME was the supervisor's ability to manage their own emotions (Self-Manage Emotions SME). It turns out that SME (as the independent variable) is a rather strong statistically significant predictor of HME (the mediator) as supported by an R^2 of .37. Condition 1 to test for mediation is satisfied. Model 2 results support condition 2 of a mediation test, in that, when SME is the sole predictor variable of IMO, the relationship is statistically significant (R^2=.24). Taken alone, this result would seem to support Hypothesis 1: *A higher level of emotional intelligence, with respect to a supervisor's ability to manage his or her emotions in the workplace, is significantly related to a supervisor's ability to create an internal market-oriented workplace.* However, a third condition must be tested to fully evaluate the potential independent role of SME, as well as the hypothesized mediating role of HME. Multiple-regression model 3 provides the results of the final condition. When HME and SME are included as independent variables predicting Internal Market-Orientation (IMO), then the previously established relationship between SME and IMO becomes statistically *insignificant* at the .12 level. Assessing models 1, 2, and 3 in progression illustrates the pure mediating role of HME on the relationship of SME and IMO. Specifically, a manager must be able to help his or her subordinates manage their emotions. This is a necessary ability that connects a supervisor's self-management of emotions with his or her capability

TABLE 2
MEASUREMENT MODELS AND CONSTRUCT UNIDIMENSIONALITY

Construct/ Items	λ	T Value	St. Error	Correlations\Shared Var. IMO OI	SME	HME		Avg. Var. Extracted
INTERNAL MARKET-ORIENTATION *(IMO: Higher-Order Construct)*				1.00	.06	.13	.18	.82
Positive Environment	.82	7.95	.13					
Knowledge Development	.73	9.55	.10					
Information Flow & Quality	.70	9.02	.10					
Employee Success	.73	9.49	.14					
Employee Needs	.73	9.62	.11					
Inter-Dept. Customer-Orientation	.63	7.95	.12					
Self-Manage Emotions				.24	1.00	.14	.03	.90
SME1	.56	7.52	.07					
SME2	.92	13.13	.08					
SME3	.94	13.25	.07					
Help Others Manage Emotions				.36	.37	1.00	.05	.80
HME1	.67	7.18	.12					
HME2	.76	7.94	.14					
HME3	.74	7.81	.11					
HME4	.72	7.18	.17					
Organizational Identification				.42	.16	.23	1.00	.83
OI1	.72	8.82	.13					
OI2	.60	7.22	.09					

OI3	.80	9.67	.13		
OI4	.82	8.82	.10		
Model Fit Chi. Sq. 202.69; df 116; p .00	CFI .93	IFI .93	TLI .92		

Construct correlation coefficients below diagonal are significant at the $p<0.01$ level. Shared variance for pairwise summated scales above diagonal. Variance extracted = $[\Sigma(\lambda)^2] / [\Sigma(\lambda)^2 + \Sigma var(\epsilon)]$ Fornell and Larcker 1981, pp. 45, 46).

TABLE 3
RESULTS OF MEDIATOR MULTIPLE REGRESSION ANALYSES

Models:	1	2	3	4
Independent Variable	Dependent Variable Help Others Manage Emotions (HME)	Dependent Variable INTERNAL MARKET-ORIENTATION (IMO)	Dependent Variable INTERNAL MARKET-ORIENTATION (IMO)	Dependent Variable INTERNAL MARKET-ORIENTATION (IMO)
Self-Manage Emotions (SME) (p-value)	.37 (.00)	.24 (.00)	.13 (.12)	.10 (.20)
Help Others Manage Emotions (HME) (p-value)	--	--	.32 (.00)	.25 (.00)
Organizational Identification (OI) (p-value)	--	--	--	.35 (.00)
Model F (p-value)	23.48 (.00)	9.46 (.00)	12.95 (.00)	17.67 (.00)
R^2	.37	.24	.15	.26

Standardized beta coefficients are reported with p-values in parentheses.

to generate an effective internal market-orientation among subordinates.

Taken in total, the results fail to support Hypothesis 1. Apparently, it is not enough for supervisors to possess the abilities to self-manage their own emotions (SME) if they in-turn wish to create an internal market-oriented (IMO) workplace. By definition, the self-management of emotions is focused on the manager. Whereas, the creation of an IMO workplace requires managers to focus on the needs of subordinates.

However, Hypothesis 2 is supported. HME (beta coefficient .32) is a significant predictor of IMO (R^2=.15). Table 3 results for models 3 and 4 support the mediating nature of HME and Hypothesis 3. In both models HME is a significant predictor of IMO (beta coefficients .32 and .25, respectively), while SME fails to have a direct impact on IMO. Moreover, when organizational identification (OI) is entered into the multiple-regression model 4, HME retains its predictive statistical significance (beta coefficient .25) while OI (beta coefficient .35) is also a statistically significant predictor of IMO (R^2=.26).

DISCUSSION

Logistics personnel operate in positions that are critical to providing customers with products in the right condition, time, and place, and impact the customer service, documentation accuracy and the overall cost of moving, holding and securing the product. Positions on the front line of logistics many times pay just above minimum wage and include fulltime, part time, and temporary unskilled labor. To enhance the workplace and better retain satisfied productive employees, managers must create working environments that appeal to employees in multi-dimensional ways.

This study has brought together three concepts of internal market-orientation, emotional intelligence, and organizational identification to analyze the nature of their relationships to one another. A better understanding will assist management in leveraging the practical power of emotions in the workplace and feelings toward the organization. The results suggest the need for hiring and developing supervisors that possess the skills to manage their own emotions and those of others which will generate beneficial outcomes for individuals and the company, overall. Managers skillful in emotional intelligence and who view themselves as extensions of the organization, as a whole, are best positioned to create working environments focused highly on providing for the customer within and, ultimately, external the organization. Such a customer-focus is especially important for logistics operations that are heavily process-oriented, and require many activities within each process often performed by multiple employees and multiple functions within the firm.

Perceiving "oneness" with the organization essentially means that a supervisor will consider that a win for the company is a win for themselves (Mael and Ashforth, 1992). A common saying in a stevedoring operation is "you're only as good as your last ship." For example, a dock or ship supervisor feels a sense of pride when the last container is loaded, all scheduled exports make it on the ship, no accidents or injuries occurred, and the liner ship sails as scheduled. The stronger the positive feeling the greater the supervisor identifies with the success of the company and considers it to be a position of honor having overseen the operation. Likewise, however, if the sailing schedule approached rapidly causing the supervisor to prematurely cutoff the loading of exports in order to make the sailing schedule, the stevedoring company would lose revenue associated with the containers left behind. Alternatively, delaying the ships departure to finish container loading would equate to cost increases as linemen, tugboat operators, and the pilot standby for the permission to sail. Supervisors that take such operational failures as their own, too, *identify* with the organization they represent.

The magnitude of emotional intelligence across supervisors, likely moves up and down a continuum. This research supports the need for companies to invest in the development of supervisory emotional intelligence. Education and experience creates intellect. Personnel that oversee others should

receive training and development designed to target their abilities to manage emotions. Ability-based learning could be achieved through supervisory-subordinate "practice" scenarios. A supervisor could be presented with varying employee exchange opportunities and under multiple emotional conditions. The supervisor's response to the situation could be evaluated by a panel of peers who demonstrate high levels of emotional intelligence tendencies. A discussion could encompass a critique of the supervisor's ability to leverage emotions for the betterment of the scenario outcome. Moreover, peer judges could offer alternative approaches to resolving the scenario through the power of emotional intelligence.

In conclusion, what we have learned from the results is that emotional intelligence and organizational identification directly influence a manager's ability to create a workplace that is internally market-oriented. Supervisors who possess the skills to recognize and deliberately manage their own emotions while on the job are also more skillful in helping subordinates work through and manage their emotions. Combined, the two skills of managing emotions provide the foundation for a supervisor to develop a market-oriented work environment for his or her employees. We have also discovered that managers are more likely to develop a market-oriented workplace when they are deeply emotionally connected to the firm and view the firm's wins and losses as their own.

What we have yet to discover is the impact that an employee's actual emotions and abilities to manage them have on the workplace environment. It isn't enough that a manager possesses the ability to help an employee manage emotions. The employee's capability upon receiving help is another factor that could influence the adoption and effectiveness of pursuing an internal market-orientation.

LIMITATIONS AND FUTURE RESEARCH

Measures within this study are perception-based questionnaire items. Studies have shown such measures to have reliability and validity in tapping into the constructs employed in the study (c.f. Riketta, 2004; Mael and Ashforth, 1992; and Schutte et al., 1998). However, literature exists that supports the utility of ability-based measures over perception-based, self-reported measures (Mayer, Roberts, and Barsade, 2008). While the authors generally agree with the argument, the utilization of perception-based questionnaires has been widely deployed across years of research to validly and reliably evaluate countless concepts and empirical models.

Future research could evaluate supervisor-subordinate dyadic data to evaluate differences, if any, that exist between the perceptions held by each party. Exposing potential gaps between, for example, how a supervisor perceives, compared to subordinates, how he or she handles difficult situations with a balanced level of emotional status. While a manager believes he or she is easy to talk to, an employee may not find the manager to be easily approachable. It is logical to expect that some open-door policies are ineffective because of such a gap in perceptions.

Supply chains are ever-changing in complexity. Change may be accompanied by emotional and identifying alterations in managers and employees. Managers must adequately be equipped to face such changes and to generate competitive advantages through internal market-orientation.

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APPENDIX
QUESTIONNAIRE SCALES AND ITEMS

INTERNAL MARKET-ORIENTATION (IMO)
Survey instructions: Please think about how you interact with your employees. Over the past month how frequently have you done the following?
Infrequently (1) to Frequently (7) Likert-type scale.

Creating a positive working environment for employees.
PE1: Thought through every decision that affected my employees to make sure that it was fair.
PE2: Praised my employees in front of others.
PE3: Let my employees know that I was always available to help them.
PE4: Showed appreciation to my employees.
PE5: Promoted fairness in the workplace.

Facilitating employee knowledge development.
KD1: Worked with my employees to provide them with a better understanding of hour our responsibilities affect each other.
KD2: Prepared my employees to perform well.
KD3: Went beyond training and educated my employees as well.
KD4: Taught my employees "why they should do things" and not just "how they should do things."

Managing the productive flow and quality of information.
IFQ1: Maintained good records for sharing information with my employees.
IFQ2: Made certain the information I gave my employees was in a form that was easy to use.
IFQ3: Made certain the information I gave my employees was provided on time.
IFQ4: Utilized well established procedures to make sure the information I provided to my employees was accurate.
IFQ5: Utilized an established schedule to get my employees the information that they needed.

Fostering employee success.
ES1: Routinely shared rewards of the job with my employees.
ES2: Helped my employees define goals that will lead to their advancement in the firm.
ES3: Set joint goals with my employees to improve our working relationship.
ES4: Provided a work environment that made it easy for my employees to advance.

Responding to the needs of employees.
EN1: Provided my employees with prompt feedback at all times.
EN2: Felt it was very important to respond to all of my employees' issues.
EN3: Always made time to get back with my employees about their concerns.
EN4: Responded to the needs of my employees.

Demonstrating to employees an interdepartmental customer-orientation.

IDCO1: Ensured that my department treated other departments as internal customers.
IDCO2: Consistently tried to increase the value of the output my department provided to other departments.
IDCO3: Collaborated with other departments to ensure that my department understood their on-going requirements.

EMOTIONAL INTELLIGENCE

Ability to self-manage emotions.
SME1: I know how to keep calm in difficult situations.
SME2: I am able to control my temper and handle difficulties rationally.
SME3: I am capable of keeping my emotions in check.

Ability to help others manage emotions.
HME1: I know how to help my employees get over feeling angry.
HME2: Other people find it easy to confide in me.
HME3: When an employee is in a bad mood, I can help them feel better quickly.
HME4: I am the type of person to whom employees go when they need help with a difficult situation.

ORGANIZATIONAL IDENTIFICATION

OI1: I am very interested in what others think about my company.
OI2: When I talk about my company, I usually say "we" rather than "they."
OI3: This organization's successes are my successes.
OI4: When someone praises this organization, it feels like a personal compliment.

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DATA-DRIVEN INSIGHTS: ASSESSMENT OF AIRLINE ANCILLARY SERVICES

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ABSTRACT

Airlines increasingly rely on ancillary service fees for revenue generation. As a result, many ancillary services have been conceived and implemented. However, each customer does not desire to purchase every ancillary service. This research examines the heterogeneity among U.S. international airline passengers and their willingness to pay for assorted ancillary services. Antecedents to purchase intention and actual purchase behavior were evaluated using Amazon Mechanical Turk for data collection. Our results show that there are differences in airline passenger preferences when purchasing ancillary services on international flights. The number of times a passenger flies in a year and the reason for travel are found to be consistently significant. Occasionally, age and income are found to be significant. These findings will be very useful to airline marketing executives and could help to assure consumers receive the services they want at the price levels they are willing to pay.

INTRODUCTION

Many organizations collected reams of data long before big data and data analytics became all the rage. Airlines for example, have amassed enormous amounts of data. We could assume that these vast amounts of data might lead company executives to manage organizations better, attract more customers, or increase revenue. However, a common theme appears. Executive's state that they have plenty of data, though they acknowledge that they do not know what to do with it all. Proponents of data analytics suggest that insights garnered from vast amounts of data lead to better decision-making, though if it is difficult to know how to use the data, then collecting vast amounts of data becomes counterproductive.

Even though airlines collect very large amounts of data about their customers and their ancillary purchases, it cannot be assumed that they are collecting the most useful data or that they are using the data to their benefit. Airlines may be missing opportunities to improve financial and operational performance from the use of their data.

Ancillary service fees for example, have become a popular revenue stream for airlines. After all, baggage fees alone brought in more than $3.1 billion for U.S. airlines in 2016 (USDOT Bureau of Transportation Statistics, 2017). Ancillary service revenue are "revenues beyond the sale of tickets and are indirectly seen as part of the travel experience" (Wittmer, Gerber and Boksberger, 2012). These fees are considered non-ticket revenues and are only paid when passengers choose the service. Even though airlines have collected large amounts of customer and ancillary service purchase data, could these data bring more value to the organization?

Ancillary services bring two areas of concern for airlines. One, when airlines implement new ancillary services, considerable amounts of resources are allocated and two, passengers might not purchase them. Therefore, airlines may be missing revenue maximization opportunities and optimal resource allocation by not providing appropriate ancillary services or developing marketing and sales strategies to account for the complexity of customer choice drivers (Teichert, Shehu and von Wartburg, 2008). Consequently, it is important for airline management to understand which ancillary services

passengers are likely to purchase and which passengers will purchase them. It is also important to consumers that airlines price these services appropriately and data can help airlines achieve this goal as well.

We explore using passenger ancillary service choice behaviors in a U.S. international network setting to identify whether a better approach to implementing and selling ancillary services can be identified. Accordingly, we set out to answer two research questions:

- RQ1. Which ancillary services should airlines sell and to whom should they sell on U.S. international flights?

- RQ2. Can airlines use *intention* to purchase to predict if customers will purchase ancillary services on U.S. international flights?

The remainder of this paper is organized as follows: literature review, research methodology, data analysis and results, and discussion and conclusion.

LITERATURE REVIEW

Despite the prevalence and growing importance of ancillary service fees, few academic studies have examined the factors that lead to customers purchasing ancillary services and their willingness to pay fees for such services (Mumbower, Garrow and Newman, 2015). Ancillary services are a relatively undeveloped academic research area and more research in this area could be done (Espino, Martiìn and Romaìn, 2008; Ødegaard and Wilson, 2016).

Stated choice experiments have been a popular research methodology for a majority of the previously conducted airline ancillary service studies (Espino, Martiìn and Romaìn, 2008; Martin, Romaìn and Espino, 2008; Balcombe, Fraser and Harris, 2009; Chen and Wu, 2009; Correia, PimpaÞo and TaÞo, 2012; Wittmer and Rowley, 2014). While these studies provide insight into how customers may behave in actual purchase situations, these studies have some limitations. One, they limit the number of attributes and levels in the experiment because increasing them greatly increases the size of the experimental design. Consequently, they limit the number of insights that can be found surrounding passenger heterogeneity. Two, stated choice experiments ask passengers at the time of booking travel, which airline would they choose given a set of attributes. However, a key component that is not identified is whether a passenger would purchase or intends to purchase a particular ancillary service. Fourth, these studies omit actual purchase behavior of ancillary services. Fifth, each of these studies was narrowly focused on a particular route, specific region, or type of airline and did not include the U.S. airlines. Thus, generalizability of their results could be a concern.

Two other ancillary service studies examined airline seating. Lee and Luengo-Prado (2004) compared business and leisure travelers and their willingness to pay for additional legroom on two U.S. legacy airlines and Mumbower, Garrow and Newman (2015) investigated influential factors that led airline customers' purchase of premium coach seats at JetBlue Airlines.

Lastly, two studies took a descriptive approach of examining ancillary revenue. Garrow, Hotle and Mumbower (2012) provide a review of product unbundling trends that have occurred in the U.S. airline industry, whereas O'Connell and Warnock-Smith (2013) provided an account of international passengers' acceptance of ancillary fees. Though these studies are important and provide insights into ancillary services, they do not seek to understand antecedents to passengers' intent to purchase or actual purchase behavior.

While there appears to be a need to add to the airline ancillary services stream of research, this paper strives to make several research contributions. First, we provide a comprehensive analysis of which ancillary services customers are willing to purchase by exploring U.S. international airline passenger heterogeneity and purchase intentions. Second, we add to the limited ancillary service research in the United States market. Third, our research is not narrowly restricted to leisure or business travelers, low cost or legacy carriers, or to

a particular route or airline. Thus, our results are generalizable. Last, and most importantly, we provide an illustration of how data insights can lead to better operations and financial performance for airline organizations.

RESEARCH METHODOLOGY

This research includes three separate analyses as shown in Figure 1. We follow the approach by Leon and Uddin (2017). In their study, they examined ancillary services in the U.S. domestic airline industry. This study extends their work to the international sector.

Model 1 and 2 are used to answer RQ1, which ancillary services should airlines sell and to whom should they sell on U.S. international flights? Model 3 helps to answer RQ2, can airlines use *intention* to purchase to predict if customers will in fact purchase ancillary services on U.S. international flights.

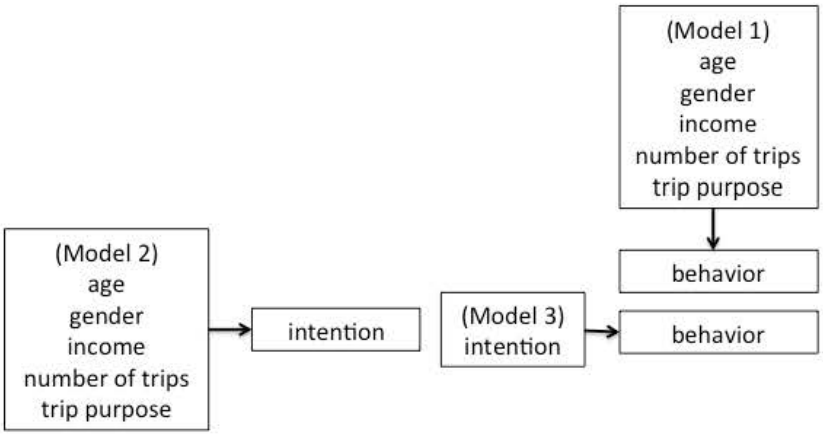
Model 3 is guided in part by the Theory of Planned Behavior (TPB). Fishbein and Ajzen (1975) suggest behavior can be predicted based on the intention to perform the behavior. TPB views behavioral intention as the immediate source of behavior. The stronger the intention, the more likely the behavior will be performed. Further, TPB has been used previously to explain behavior in the transportation domain (Bamberg, Ajzen and Schmidt, 2003; Chaney, Bernard and Wilson, 2013; Schniederjans and Starkey, 2014; Chen et al., 2016). If *intention* to purchase can predict if customers will purchase ancillary services, then airlines do not need to rely on actual purchase data, providing airlines the freedom to collect intention data from various sources.

Data Collection Instrument

An online survey was developed using items from previous research articles. Non-substantive changes were made to the survey after it was pretested on several subjects who would be typical survey respondents.

The categorical independent variables used for Model 1 and 2 are shown in Table 1. Usage frequency and number of trips have been widely used in previous studies (Harris and Uncles, 2007; Balcombe, Fraser and Harris, 2009; Leon and Uddin, 2017). The respondents were asked, on average, how many times they fly on domestic flights (DF) per year. Categories included 0, 1-2, 3-5, and more than 5 times. The reference category is more than 5 times. Respondents were also asked, on average, how many times they fly on international flights (IF) per year. Categories included 0, 1-2, and more than 2 times. The reference category is more than 2 times.

FIGURE 1
OVERVIEW OF RESEARCH



Trip purpose, age, gender, and total annual household income were included in previous studies and were included in this study as well (Harris and Uncles, 2007; Balcombe, Fraser and Harris, 2009; Leon and Uddin, 2017). Survey respondents were asked to select one: On most occasions, I am a *(business or leisure)* traveler (TP_B and TP_L). Leisure traveler is the reference category. Age was divided into two categories: born in 1981 (AGE_B) and earlier, and born in 1982 and later (AGE_A) (Pew Research Center 2011). The split in years was done to group Generation Y/Millennials into one group and to group earlier generations into another one. Since there is great interest in understanding Millennial behavior, this split was deemed most appropriate. The reference category is 1981 and earlier. The reference category for gender (GEN) is male. Total annual household income (INC) contains five categories, whereas more than $120,000 is the reference category.

The dependent variables are displayed in Table 2. For Model 1, respondents were asked to answer 13 behavior items related to actual purchases of various ancillary services on international flights. Behavior is a categorical dependent variable. An example of one of the 13 behavior items in the survey is, "On a past international flight, I have paid extra airline fees for an aisle seat. Yes, No, Not an Option." Each of the 13 behavior items is listed in Appendix A - Table A.1.

TABLE 1
SUMMARY OF INDEPENDENT CATEGORICAL VARIABLES

Categorical Variable	Variable Code	Model 1 and 3 Behavior Frequency (%)	Model 2 Intention Frequency (%)
Age			
1981 and before [a]	AGE_B	88 (29.33)	123 (32.71%)
1982-1998	AGE_A	212 (70.67)	253 (67.29%)
Gender			
Female	GEN_F	134 (44.67)	168 (44.68%)
Male [a]	GEN_M	166 (55.33)	208 (55.32%)
Income			
Less than $25,000	INC_0	67 (22.33)	69 (18.35%)
$25,000 - $45,000	INC_1	68 (22.67)	93 (24.73%)
$45,001 - $75,000	INC_2	84 (28.00)	112 (29.79%)
$75,001 - $120,000	INC_3	56 (18.67)	74 (19.68%)
More than $120,000 [a]	INC_4	25 (8.33)	28 (7.45%)
Domestic Flights Flown			
0	DF_0	14 (4.67)	
1-2	DF_1	141 (47.00)	193 (51.33%)
3-5	DF_3	102 (34.00)	131 (34.84%)
More than 5 [a]	DF_5	43 (14.33)	52 (13.83%)
International Flights Flown			
1-2	IF_1	227 (75.67)	285 (75.80%)
More than 2 [a]	IF_2	73 (24.33)	91 (24.20%)
Trip Purpose			
Business	TP_B	96 (32.00)	119 (31.65%)
Leisure [a]	TP_L	204 (68.00)	257 (68.35%)
n =		300	376

Note: a = reference category.

TABLE 2
SUMMARY OF INTENTION AND BEHAVIOR DEPENDENT VARIABLES

Ancillary Service	Behavior Model 1 and 3			Intention Model 2
	Yes Frequency (%)	No Frequency (%)	Not an Option Frequency (%)	Mean (Std. Dev.)
Aisle Seat	83 (21.50)	217 (56.22)	86 (22.28)	2.81 (1.44)
Extra Legroom	113 (29.27)	193 (50.00)	80 (20.73)	3.47 (1.35)
Window Seat	104 (26.94)	201 (52.07)	81 (20.98)	3.13 (1.47)
Seat Front of Airplane	77 (19.95)	227 (58.81)	82 (21.24)	2.65 (1.38)
Priority Boarding	111 (28.76)	205 (53.11)	70 (18.13)	2.69 (1.43)
Priority Deplaning	62 (16.06)	226 (58.55)	98 (25.39)	2.65 (1.42)
Reserved Seat	135 (34.97)	182 (47.15)	69 (17.88)	3.26 (1.44)
Reserved Overhead Space	81 (20.98)	199 (51.55)	106 (27.46)	2.88 (1.45)
Onboard Meals	157 (40.67)	167 (43.26)	62 (16.06)	3.61 (1.35)
Onboard Movies	124 (32.12)	200 (51.81)	62 (16.06)	3.25 (1.41)
Onboard TV	95 (24.61)	218 (56.48)	73 (18.91)	3.10 (1.45)
Onboard WiFi	123 (31.87)	186 (48.19)	77 (19.95)	3.61 (1.35)
Mobile Tablets Provided by Airline	71 (18.39)	161 (41.71)	154 (39.90)	2.75 (1.52)

Note: Intention – Behavior (model 3) uses intention data as the independent metric variable.

Respondents were also asked to answer 13 intention items related to their intention to purchase various ancillary services on international flights. Intention is a metric dependent variable for Model 2. Intention is used again as an independent metric variable for Model 3. An example of one of the 13 intention items in the survey is, respondents were asked using a five-point Likert scale anchored by 1 = Definitely Would Not and 5 = Definitely Would, "When I travel by air, I would pay extra fees for—an aisle seat." Each of the 13 intention items is listed in Appendix A Table A.1.

Data Collection Process

Sample data were collected from Amazon MTurk in October of 2015 over a four-day period. Amazon MTurk has been shown to be a viable data collection source used to obtain high-quality data economically and quickly, and where data obtained are at least as reliable as those obtained through traditional methods (Buhrmester, Kwang and Gosling, 2011; Germine et al., 2012; Holden, Dennie and Hicks, 2013). Researchers from diverse domains such as health (Boynton and Richman, 2014), retail (Munzel, 2016), transportation (Krupa et al., 2014; Winter et al., 2017) and tourism (Dedeke, 2016) have used this approach for collecting data. To ensure completion of the survey and lessen the likelihood of duplicates, $.20 was offered to respondents who completed the survey in full and to assure that surveys from the same IP address would not be counted.

DATA ANALYSIS AND RESULTS

The original survey collected data for two studies, one study concentrated on domestic flights of U.S. airlines and the second study concentrated on international flights of U.S. airlines. This study was aimed at airline passengers who have flown at least one international flight that had either departed or arrived in the United States. The original sample size consisted of 525 responses. Eight responses had identical IP addresses and were removed from the analysis. Eliminating these responses reduced the possibility of duplicate responses or responses that were intentionally altered to collect the cash reward. Incomplete surveys were also removed from the analysis. Further, if the respondent did not fly at least one international flight, their responses were removed from the analysis. In addition, if respondents answered that they did not have an

option to purchase ancillary services on their flights; their responses were removed from the behavior model analysis. The net sample size resulted in 300 useable responses available for behavior data analysis (Models 1 and 3) and 376 useable responses available for intention data analysis (Model 2).

Tables 2 and 3 summarize the responses and the variable coding. Table 2 indicates that airline passengers show a higher intention score to purchase onboard Wi-Fi, onboard meals, and extra legroom though these scores are not particularly high. Other ancillary service intention scores are even lower. This would suggest that ancillary services are not widely popular among passengers. This is corroborated by airline passengers actual purchase behavior of ancillary services.

The intention survey items show good reliability with a Cronbach's alpha reliability coefficient of 0.92 (Nunnally, 1978). Since independent and dependent variables were collected from the same survey instrument, a number of steps were taken to minimize the occurrence of common method variance. The survey was developed and administered in accordance with the recommendations from Podsakoff et al. (2003). Careful attention was given to the order and position of the survey items to create temporal distance. In addition, the independent and dependent items were displayed in different formats, using five-point Likert scales and dichotomous rating scales. Harman's single-factor procedure was also conducted and it was found that a single factor accounts for less than the majority of the variance at 39.67% (Podsakoff et al., 2003). Using separation, scale differences, and statistical methods provides added confidence in our research findings.

Model 1 Behavior Results

The dependent variable behavior represents the choice between "Yes, I bought the ancillary service," and "No, I have not bought the ancillary service." This is modeled using logistic regression, which is an acceptable method of analysis when modeling discrete choice behavior and is commonly employed when studying choice behavior. It facilitates the understanding of individual purchases, provides predictions, and includes characteristics of consumers and their behaviors (Harris and Uncles, 2007). We use the same approach as Leon and Uddin (2016) and Leon and Uddin (2017) did in previous studies that modeled behavior antecedents directly using logistic regression.

We find the probability of selecting "Yes, I bought the ancillary service," using the general formulation (1), where K is the number of independent variables in the equation.

(1) $$P(B) = \frac{e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k}}{1 + e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k}}$$

Thirteen (13) binary logistic regressions, one for each ancillary service, were conducted with the results shown in the Appendix - Table A.2. The column labeled Reciprocal of Odds Ratio exists to show the reciprocal of the Odds Ratio when the Odds Ratio is less than one. This helps to show which variables are most prominent and provides a more intuitive meaning of the results with less room for misinterpretation.

Age, the number of times a traveler flies domestic and international flights in a year, type of travel, and to a lesser extent, income are found to be significant factors. For example, the odds of fliers who were born in the years 1982-2000 choosing to purchase onboard TV on international flights over not purchasing Onboard TV on international flights is 1.865 times than that of those fliers born in 1981 or earlier. Likewise, the odds for purchasing onboard movies are 1.707 times and the odds for purchasing mobile tablets provided by airline are 2.883 times than that of the older travelers.

The odds of business travelers choosing to purchase an aisle seat on an international flight over not purchasing an aisle seat on an international flight is 2.786 times than that of leisure travelers. Similar results are seen for extra legroom, reserved seats, seat front of airplane, priority deplaning, and reserved overhead space.

TABLE 3
GLM ANCILLARY SERVICE MODEL 2 RESULTS

Ancillary Service	Comparisons of Least Square Means														
	DF1	DF3	DF5	DF1 vs DF3	DF1 vs DF5	DF3 vs DF5	IF0	IF1	IF2	IF0 vs IF1	IF0 vs IF2	IF1 vs IF2	TP_B	TP_L	TP_B vs TP_L
Aisle Seat	2.71	3.20	3.37	***	***	Ns							3.35	2.83	***
Extra Legroom	3.29	3.61	4.02	**	***	*									
Window Seat							3.31	2.89	3.66	***	*	***			
Seat Front of Airplane	2.71	3.06	3.06	**	ns	Ns	2.70	2.70	3.44	ns	***	***	3.14	2.75	***
Priority Boarding	2.76	3.05	3.49	**	***	**	3.03	2.81	3.46	ns	**	***	3.34	2.86	***
Priority Deplaning							2.68	2.57	3.33	ns	***	***	3.05	2.67	**
Reserved Seat													3.62	3.13	***
Reserved Overhead Space							2.96	2.84	3.46	ns	**	***	3.31	2.86	***
Onboard Meals															
Onboard Movies															
Onboard TV	2.93	3.18	3.78	*	***	***									
Onboard WiFi	3.49	3.63	4.19	ns	***	***									
Mobile Tablets Provided by Airline							2.47	2.61	3.53	ns	***	***			

Note: Numerical values are Least Square Means; *$p < 0.10$; **$p < 0.05\%$; ***$p < 0.001$; ns and empty cells = not significant.

The odds of those travelers with income of less than $25,000 choosing to purchase reserved overhead space on an international flight over not purchasing reserved overhead space on an international flight is 3.176 times than that of those travelers with income levels of more than $120,000. The odds of those travelers with income of less than $25,000 choosing to purchase priority deplaning on an international flight over not purchasing priority deplaning on an international flight is 2.365 times than that of those travelers with income levels of more than $120,000.

Model 2 Intention Results

SAS Proc GLM (General Linear Model) was used to identify significant independent variables as they relate to the continuous dependent variable intention to purchase. Since each of the independent variables is categorical, GLM is an appropriate analysis method. GLM has become a popular means of estimating ANOVA and MANOVA models because of its flexibility and simplicity in model design (Hair et al., 2006).

GLM analysis was conducted 13 times, one for each ancillary service. The results of the analysis, including Least Square Means (LSMeans - SAS keyword) and significant differences between air traveler characteristics when the dependent variables are intention to purchase ancillary services are displayed in Table 3.

The number of times a traveler flies on domestic and international flights in a year is significant. When domestic fliers were asked about their intention to purchase ancillary services on international flights, there were differences in fliers purchase intentions of aisle seats, extra legroom, and priority boarding, onboard TV and onboard Wi-Fi. There were no significant differences between domestic flyer purchase intentions on international flights for window seats, priority deplaning, reserved overhead space, meals, movies, and tablets.

When international fliers were asked about their intention to purchase ancillary services on international flights, there were differences in fliers purchase intentions of window seats, seats in the front of the airplane, priority boarding and deplaning, reserved overhead space and mobile tablets provided by the airline.

Trip purpose is also a significant factor. When travelers were asked about their intention to purchase ancillary services on international flights, business travelers were more intent to pay for an aisle seat, seats near the front of the airplane, priority boarding and deplaning, reserved seats, and overhead space than leisure travelers. While there is no difference in the purchasing intention for extra legroom, window seats, meals, movies, TV or Wi-Fi.

Age, gender, and the level of income were not found to be significant factors, thus there is no difference in the purchase intention between fliers from different age or gender groups, or income brackets.

Model 3 Intention - Behavior Results

Intention is the single independent metric variable and behavior is the binary dependent variable. This is modeled 13 times, one for each ancillary service, using logistic regression (Ajzen, 1991; Ajzen and Driver, 1992)

These models seek to understand whether or not the choice behavior of purchasing ancillary services for international flights can be predicted by a respondent's stated intention to purchase the ancillary services. Thirteen binomial logistic regressions were conducted with behavior representing the choice of "*Yes*, I bought the ancillary service," or "*No*, I have not bought the ancillary service."

From the previous equation (1), we reduce K to equal one (1) independent variable X , where is the intention score. Given the intention score, we are determining the probability of selecting "*Yes*, that a passenger will purchase the ancillary service" using the general formulation in equation (2).

(2) $$P(B) = \frac{e^{\beta_0 + \beta_1 X_1}}{1 + e^{\beta_0 + \beta_1 X_1}}$$

The results of the 13 binary logistic regressions are shown in Table 4 and indicate that intention may indeed predict behavior.

For each of the 13 international ancillary service models, intention is significant, thus as the intention score increases, fliers tend to purchase the respective ancillary services. For example, one-unit increase in a flier's intention to purchase an aisle seat on an international flight will increase the odds of choosing to purchase an aisle seat over not purchasing an aisle seat by approximately 143% (odds ratio = 2.425).

Model Validation We tested the prediction accuracy of Intention – Behavior probability model (Model 3) by comparing the predicted outcome with the actual outcome using the Brier score. The Brier score is a measure of the deviation from a perfect model fit (Bukszar, 2003).

The Brier score in equation (3) is the mean squared error of the probability forecast and is a measure of forecast accuracy. It was first introduced by Brier (1950) and is frequently used to examine forecast accuracy (Bukszar, 2003; Brozyna, Mentel and Pisula, 2016).

(3) Brier Score = [2] $\frac{1}{N}\sum_{t=1}^{N}(P(B)_t - B_t)$

Where {\displaystyle f_{t}}*P(B)* is the probability that was forecast, *B* is the actual behavioral outcome of the event at instance *t* and N is the number of forecasting instances. The score is reported between and including 0 and 1, where a lower score is better. Zero implies a perfect prediction.

Using the general probability equation (2) a determination of the probability of "*Yes*, that a passenger will purchase the ancillary service" is made. is , where *B* is behavior and is either 0 or 1, are coefficient estimates derived from the sample data, and *X* is the intention score. The Brier score results, displayed in Table 4, are low implying that the prediction models developed using the sample data are reliable.

DISCUSSION AND CONCLUSION

This study comprehensively examined a number of airline ancillary services and factors that may influence the purchase of them on international flights to or from the United States. In the investigation of ancillary services, we answered: 1) which ancillary services should airlines sell and to whom should they sell on U.S. international flights, and 2) can airlines use *intention* to purchase to predict if customers will purchase ancillary services on U.S. international flights.

TABLE 4
INTENTION-BEHAVIOR MODEL 3 AND VALIDATION RESULTS

Dependent Variable	Intercept	Coefficient	Std. Error	Wald Chi-square	Significance	Odds Ratio	Brier Score
Aisle Seat	-3.9348	0.8858	0.1339	43.7354	<.0001	2.425	0.16
Extra Legroom	-3.9032	0.903	0.1392	42.0731	<.0001	2.467	0.19
Window Seat	-4.0927	0.979	0.1316	55.2982	<.0001	2.662	0.17
Seat Front of Airplane	-3.9885	0.8984	0.1274	49.7058	<.0001	2.456	0.15
Priority Boarding	-3.826	1.0573	0.1201	77.5375	<.0001	2.879	0.15
Priority Deplaning	-4.2211	0.9171	0.1391	43.4902	<.0001	2.502	0.13
Reserved Seat	-2.9835	0.777	0.1068	52.921	<.0001	2.175	0.19
Reserved Overhead Space	-3.8623	0.8794	0.1303	45.5271	<.0001	2.409	0.16
Onboard Meals	-2.406	0.6135	0.1068	32.972	<.0001	1.847	0.22
Onboard Movies	-3.465	0.8375	0.1157	52.3922	<.0001	2.311	0.19
Onboard TV	-3.883	0.8575	0.126	46.3264	<.0001	2.357	0.17
Onboard WiFi	-3.902	0.9004	0.1381	42.5159	<.0001	2.460	0.19
Mobile Tablets Provided by Airline	-3.299	0.7435	0.1253	35.1881	<.0001	2.103	0.16

As with the finding in Leon and Uddin (2017), answering these questions has several managerial applications. First, the findings can assist airline management in developing current and prospective ancillary services. Second, the findings can assist in developing associated sales, marketing, and training strategies, leading to increases in revenue. Taking a keen approach to sales and marketing efforts toward customers who are most likely to purchase ancillary services, airlines can increase revenue and reduce the risk of new ancillary service implementation.

Such a pointed approach enables a better understanding of the passengers' traits that lead to ancillary purchases, and which ancillary services customers are willing to purchase. Generally though, passengers are not fond of purchasing ancillary services in the first place. However, compared to the U.S. domestic airline study by Leon and Uddin (2017), this study found that passengers on international flights have higher intention scores. Thus, international passengers are more likely to purchase ancillary services on longer flights. This study also found that the number of domestic and international flights a passenger flies in a year and trip purpose were significant factors when examining intention to purchase ancillary services. Moreover, the significance of these factors change based on the ancillary service in question. Thus, some passengers show a clear preference for certain ancillary services.

When actual ancillary service purchase behavior was investigated, this study found that, the number of domestic and international flights a passenger flies in a year, trip purpose, and to a lesser extent income levels and age, were significant factors. Our results show that gender is not a significant factor in predicting intent to purchase or the actual purchase of ancillary services. In their daily lives, Generation Y/Millennial behave differently than older generations in many ways. However, we found that this is not true in the case of purchasing airline services.

If passengers are grouped together and asked which ancillary services they have purchased or are likely to purchase, onboard meals, onboard Wi-Fi, and extra legroom rank higher than others. However, without taking the analysis further we lose some of the heterogeneity among passengers, and airlines might be leaving money on the table. For example, passengers who have flown more than five domestic flights in a year are more likely to purchase extra legroom and Wi-Fi than those who have flown fewer flights. Moreover, while paying extra for aisle seats, seats in front of the airplane, and reserved overhead space does not appear high on the list of ancillary purchases, passengers who have flown three or more domestic flights or two or more international flights are more likely to purchase these ancillary services.

Given these insights, airlines now have a path to increasing revenue per passenger by narrowly focusing on which passengers are most likely to purchase a specific ancillary service. Airlines can provide information and training to front line employees such as gate and reservation agents, and flight attendants in the identification of more likely buyers, and sales techniques where they can offer the most relevant ancillary services, at the appropriate time, and to the most appropriate customers.

This study also supports the belief that intent to purchase ancillary services predicts actual purchases behavior of ancillary services. This is important because it provides an opportunity to reduce the risk of implementing new ancillary services. If airlines survey customers and non-customers about their intention to purchase certain ancillary services, the airline gains valuable information about whether passengers will purchase the ancillary service, prior to any significant investment or asset allocation.

This study followed the same approach as Donald, Cooper and Conchie (2014), Stran et al. (2016), and Leon and Uddin (2017) where intention and behavior were measured at the same time. However, a longitudinal study could reaffirm our results. Additionally, potential studies could include other factors that might influence ancillary purchases such as traveling in groups or families, or whether passengers are frequent fliers or not.

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APPENDIX 1

TABLE A.1: ANCILLARY SERVICE SURVEY ITEMS

Intention	Ancillary Service	Behavior	Ancillary Service
When I travel by air, I would pay extra fees for …	Aisle Seat	On a past international flight, I have paid extra fees for…	Aisle Seat
	Extra Legroom		Extra Legroom
	Window Seat		Window Seat
	Seat Front of Airplane		Seat Front of Airplane
	Priority Boarding		Priority Boarding
	Priority Deplaning		Priority Deplaning
	Reserved Seat		Reserved Seat
	Reserved Overhead Space		Reserved Overhead Space
	Onboard Meals		Onboard Meals
	Onboard Movies		Onboard Movies
	Onboard TV		Onboard TV
	Onboard WiFi		Onboard WiFi
	Mobile Tablets Provided by Airline		Mobile Tablets Provided by Airline

Table A.2: Ancillary Service Behavior Model 1 Results

Dependent Variable	Independent Variable	Estimate	Std. Error	Wald Chi-square	Significance	Odds Ratio	Reciprocal of Odds Ratio
Aisle Seat	Intercept	-0.5248	0.3535	2.2041	0.1376		
	DF_1	-1.0591	0.3849	7.5719	0.0059	0.347	2.882
	DF_3	-0.8604	0.3899	4.8685	0.0274	0.423	2.364
	TP_B	1.0245	0.2867	12.7714	0.0004	2.786	
Extra Legroom	Intercept	0.1736	0.348	0.2488	0.6179		
	DF_1	-1.2659	0.3739	11.4645	0.0007	0.282	3.546
	DF_3	-0.8863	0.3819	5.3859	0.0203	0.412	2.427
	TP_B	0.7077	0.2705	6.8446	0.0089	2.029	
Window Seat	Intercept	0.2412	0.2326	1.0748	0.2999		
	IF_1	-1.2262	0.2782	19.4288	<.0001	0.293	3.413
Seat Front of Airplane	Intercept	-0.6058	0.2957	4.1986	0.0405		
	IF_1	-1.0984	0.3076	12.7546	0.0004	0.333	3.003
	TP_B	0.8923	0.2946	9.1757	0.0025	2.441	
Priority Boarding	Intercept	1.0669	0.3366	10.0458	0.0015		
	DF_1	-1.2662	0.3862	10.7479	0.001	0.282	3.546
	DF_3	-0.8351	0.3822	4.7746	0.0289	0.434	2.304
	IF_1	-1.0811	0.3031	12.7205	0.0004	0.339	2.950
Priority Deplaning	Intercept	-0.3769	0.6297	0.3582	0.5495		
	INC_0	0.8607	0.6591	1.7055	0.1916	2.365	
	INC_1	0.253	0.6293	0.1617	0.6876	1.288	
	INC_2	-0.6922	0.6292	1.2103	0.2713	0.5	2.000

	INC_3	0.504	0.6303	0.6395	0.4239	1.655	
	DF_1	-1.5057	0.4846	9.6527	0.0019	0.222	4.505
	DF_3	-0.4324	0.4265	1.0282	0.3106	0.649	1.541
	IF_0	-0.9069	0.3613	6.3021	0.0121	0.404	2.475
	TP_B	0.7557	0.3337	5.1269	0.0236	2.129	
Reserved Seat	Intercept	0.0398	0.2693	0.0218	0.8827		
	IF_1	-0.66	0.2781	5.634	0.0176	0.517	1.934
	TP_B	0.5348	0.2607	4.2103	0.0402	1.707	
Reserved Overhead Space	Intercept	-0.3571	0.6714	0.2829	0.5948		
	INC_0	1.1555	0.6899	2.8053	0.094	3.176	
	INC_1	1.3657	0.6754	4.0888	0.0432	3.918	
	INC_2	0.3284	0.6541	0.252	0.6156	1.389	
	INC_3	0.1545	0.7006	0.0486	0.8254	1.167	
	DF_1	-1.3675	0.4713	8.4193	0.0037	0.255	3.922
	DF_3	-1.1692	0.4421	6.9929	0.0082	0.311	3.215
	IF_1	-0.7722	0.3566	4.6887	0.0304	0.462	2.165
	TP_B	0.824	0.3126	6.9471	0.0084	2.28	
Onboard Meals	Intercept	0.5108	0.2981	2.9355	0.0867		
	DF_1	-0.9058	0.3392	7.1322	0.0076	0.404	2.475
	DF_3	-0.3596	0.3561	1.0194	0.3127	0.698	1.433
Onboard Movies	Intercept	-0.18	0.3311	0.2957	0.5866		
	AGE_A	0.5347	0.2627	4.1442	0.0418	1.707	
	DF_1	-1.1407	0.3385	11.3557	0.0008	0.32	3.125
	DF_3	-0.3956	0.3471	1.2991	0.2544	0.673	1.486
Onboard TV	Intercept	-0.3691	0.317	1.3553	0.2444		
	AGE_A	0.6235	0.2965	4.4203	0.0355	1.865	
	IF_1	-1.2643	0.2818	20.1285	<.0001	0.282	3.546
Onboard WiFi	Intercept	0.3715	0.2907	1.6338	0.2012		
	DF1	-1.1872	0.3403	12.1672	0.0005	0.305	3.279
	DF3	-0.5502	0.3527	2.4335	0.1188	0.577	1.733
Mobile Tablets Provided by Airline	Intercept	-0.6311	0.4537	1.9351	0.1642		
	AGE_A	1.0588	0.3968	7.121	0.0076	2.883	
	DF_1	-1.317	0.4211	9.7835	0.0018	0.268	3.731
	DF_3	-1.0385	0.4369	5.6498	0.0175	0.354	2.825

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MANUSCRIPT SAMPLE

A FRAMEWORK FOR EVALUATING SUPPLY CHAIN PERFORMANCE

Terrance L. Pohlen, University of North Texas

ABSTRACT

Managers require measures spanning multiple enterprises to increase supply chain competitiveness and to increase the value delivered to the end-customer. Despite the need for supply chain metrics, there is little evidence that any firms are successfully measuring and evaluating inter-firm performance. Existing measures continue to capture intrafirm performance and focus on traditional measures. The lack of a framework to simultaneously measure and translate inter-firm performance into value creation has largely contributed to this situation. This article presents a framework that overcomes these shortcomings by measuring performance across multiple firms and translating supply chain performance into shareholder value.

INTRODUCTION

The ability to measure supply chain performance remains an elusive goal for managers in most companies. Few have implemented supply chain management or have visibility of performance across multiple companies (Supply Chain Solutions, 1998; Keeler et al., 1999; Simatupang and Sridharan, 2002). Supply chain management itself lacks a widely accepted definition (Akkermans, 1999), and many managers substitute the term for logistics or supplier management (Lambert and Pohlen, 2001). As a result, performance measurement tends to be functionally or internally focused and does not capture supply chain performance (Gilmour, 1999; *Supply Chain Management,* 200 I) . At best, existing measures only capture how immediate upstream suppliers and downstream customers drive performance within a single firm.

Table 1 about here

Developing and Costing Performance Measures

ABC is a technique for assigning the direct and indirect resources of a firm to the activities consuming the resources and subsequently tracing the cost of performing these activities to the products, customers, or supply chains consuming the activities (La Londe and Pohlen, 1996). An activity-based approach increases costing accuracy by using multiple drivers to assign costs whereas traditional cost accounting frequently relies on a very limited number of allocation bases.

$$y = a^2 - 2ax + x^2$$

REFERENCES

Manrodt, Karl (2003), "Drivers of Logistics Excellence: Implications for Carriers," In 1. W. Wilson (Ed.), *Logistics and Transportation Yearbook 2003* (pp. 126-154) Englewood Cliffs, NJ: Prentice-Hall, Inc.

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