The Impact of Environmental Factors on Internal Integration in Support of Supply Chain Management

THESIS

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THESIS

Presented to the Faculty

Department of Operational Science

Graduate School of Engineering and Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics and Supply Chain Management

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March 2011

AFIT/LSCM/ENS/11-01

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Abstract

Despite the recognized importance of cross-functional integration in support of supply chain management by scholars and practitioners, integration remains an elusive goal in today's competitive market. Specifically, numerous scholars have identified three environmental factors as potential barriers to interdepartmental integration and cooperation. A review of the literature indicates that limited research has examined potential environmental barriers to the integration between logistics and other functions. This paper is an exploratory study that seeks to fill this gap by using secondary data collected from over 1,500 mid-level managers and a structural equations model to test which environmental factors could be potential barriers. The study indicates that supporting cooperation by senior management has high direct and indirect impact on the overall performance.

Key words: Integration, collaboration, physical distance, senior management, formalization.

Dedication

To Allah the Almighty (All Praise be for Him) for granting me the health and ability to finish this humble effort in a time critical environment.

To my caring mother who dedicated her life for all her children and was the biggest motivation in all the struggles during my life.

To my father who taught me how to walk and then distinguish between the right and the wrong path when I learnt to walk.

To my wife who stood by me during the countless hours I spent working at the AFIT, she braved everything in an alien land with a smile and ensured that I totally concentrated on my mission.

To my children for re-energizing me with their smiles when I was tired and the constant joy they bring to my family with their existence.

To Major General Suliman S Alkhalifah for his guidance and support I enjoyed during my military career.

To all the superior officers that I worked with who showed and taught me exemplary leadership and management and made me capable of representing the Kingdom of Saudi Arabia at an international academic institution.

To all my subordinates whom I worked with, they helped me achieve the given objectives with their dedicated efforts and commitment.

Acknowledgments

In addition, sincere thanks to:

Dr. A. Michael Knemeyer

Dr. Christine Schubert Kabban

DR. Carl Marcus Wallenburg

Dr. Doral Sandlin

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INTRODUCTION

Why has so much focus been placed on the topic of cross functional integration, both within firms as well as across the supply chain? The answer is that the business world is recognizing the importance of integration as a means of achieving success in today's highly competitive environment. Short product life cycles, the implementation of supply chain processes and the increasingly global nature of competition require coordinated actions involving several business functions. Practitioners and academics alike are recognizing the benefits of integration both internal such as management of inventory levels, higher forecast accuracy and greater employee satisfaction and external integration such as better customer service and greater customer satisfaction to the firm (Kahn and Mentzer 1996). In addition, cross-functional management strategies have been a critical aspect of achieving the promise of supply chain process implementations (Lambert 2006).

While much has been written in the popular press about external integration between firms, the importance of internal cross-functional collaboration within the firm has received less attention. Why is internal cross-functional integration so important? Volvo, the famous Swedish car maker provides an excellent example. In the mid-1990s, the Swedish car manufacturer found itself with an excessive inventory of green cars. To move them into the market, the sales and marketing departments began offering attractive deals, so green cars started to sell. But nobody had told the manufacturing department

about the sale promotions. It noted the increase in sales, read it as a sign that consumers had started to like green, and ramped up production of the same cars Volvo had intended to remove from inventory (Siegele 2002). This type of issue as well as several others is common in firms that lack collaboration across functions.

Research on cross-functional interaction and collaboration has found that there are several barriers that inhibit integration within a company. These barriers can be grouped into three primary categories: individual factors (Gupta, et al. 1986; Song and Parry, 1997); organizational factors (Dougherty, 1992; Pinto, et al. 1993; Menon, Jaworksi, and Kohli, 1997); and environmental factors (Ruekert and Walker, 1987; Cohen and Bailey, 1997; Gupta, et al. 1986; Song and Parry, 1997). Individual factors refer to the functional personality differences between an organization's various functions or business units (Gupta, et al. 1986). Organizational factors are attributes of a company's structure or policies that may inhibit or encourage integration. Finally, environmental factors are attributes of the business environment in which the company operates and are typically dictated by the type of product sold. The focus of this study is on the barriers of cross-functional integration that are due to differences in environmental factors. The term environmental factors were used to define the environmental differences between functions.

The purpose of the research paper was to gain a better understanding of the impact of environmental factors that affect the integration between marketing and logistics. Two rich streams of research on the topic of integration are focused on cross-functional teams and new product development. Despite the extensive work in both of these areas, very little has been written about the environmental factors that impact

integration. This paper seeks to fill this literature gap by applying the conceptual framework utilized by Gupta, et al. (1986) and Song and Parry, (1997) to examine the integration of logistics and marketing. Specifically, a model that builds on the work of these two papers was conceptualized. We extended their work by using updated measures of integration to determine the impact of environmental differences and by examining other functions within the firm. In addition, a connection to firm performance was added, thereby extending their original work. The functions of logistics, and marketing were chosen because of their importance to the company and because of the regular interaction between personnel in these functions with personnel in logistics.

This paper began with a discussion of the theoretical underpinnings of the model. The major purpose was to develop a model of cross-functional integration for use in business firms. This was followed by a proposed measurement tool to test the model and some of the expected benefits to managers that could be derived from the completion of this study.

CONCEPTUAL FRAMEWORK

Environmental Factors

Differences in *physical distance* might create barriers for effective interaction and communication. Interaction and communication styles refer to the subjective process through which individuals perceive information, organize and change information during the decision making process (Hauptman and Hirji, 1999). While teams need to work together in a direct and interactive fashion on fundamental management tasks, many activities in the task process can be delegated to individual members working parallel on sub tasks. One important component of the quality of collaboration among teams is the

harmonization and synchronization of individual contributions (Hoegl, et al. 2003). Collocation cross functional product development teams correlates with increased market place success (Holland, et al. 2000).

Support by *senior management* is critical for the successful product development process. The ability of senior management to produce what they term subtle control is also important to both superior process performance and effective products (Brown, et al. 1995). Senior management who actively listens to team members and incorporate their ideas into a final recommendation significantly affect members' attachment to the team, their trust in the leader and enhances belief in the quality of decision made during the training session (Cho and Hahn, 2004). Senior level management is in a unique position to help organizations guide inter-unit behavior by influencing the extent to which logistics and marketing functions recognize their interdependence and by affecting their tasks, roles, and interpersonal climates (Ellinger, et al. 2000). There are certain variables that the senior management can support to create a climate where a greater degree of research and development of marketing integration would be achieved, (reward systems, balancing long and short objectives, encourage risk taking, providing research and development and marketing opportunities). Senior management can reduce the detrimental effects of socio-cultural differences among functions through a proper staffing and training system (Gupta, et al. 1986). Interdepartmental interactions can be improved by a host of actions including a management style that exhibits less risk aversion and greater empowerment of employees (i.e decentralization) and development of market based reward structure to create common incentives (Menon, et al. 1997). Top management has significant control over the culture of cooperation achieved through the

use of integrative policies, evaluation and reward procedures and managerial support (Song, et al. 1997).

Formalization is the emphasis placed within the organization on following rules and procedures in performing one's job. Formalization appears to be both a facilitator as well as a barrier to integration (Gupta, et al. 1986). Evidence suggests that the number of hierarchal levels in an organization structure affects inter-departmental interactions. The literature indicates that organization structures having many hierarchal levels are often associated with climates characterized by relatively uncooperative unfriendly work groups (Menon, et al. 1997). Rules and procedures refer to the degree to which activities or tasks on the project team were mandated or controlled. The project team's rules and procedures are important predictors of cross functional cooperation (Pinto, et al. 1993). Formalization refers to the degree to which rules or the standard operating procedures are used to govern the interaction between two individuals working in two different functional areas (Gupta et al. 1986). Since such interactions often cut across formal organizational lines of authority, the opportunity for informal influence over decisions is always present (Ruekert and Walker, 1987).

Integration

There is some confusion regarding the term integration, primarily due to the fact that there are multiple definitions available in the literature. Lawrence and Lorsch, (1969) define integration as achieving unity of effort. Mohr, Fisher, and Nevin, (1996) define integration in terms of a governance strategy with the most extreme example being ownership. Hauptman and Hirji, (1999) define integration from a relationship perspective

that can be achieved through joint goals, job rotation, and status parity. Menon, et al. (1997) use a slightly different term, interdepartmental connectedness, to describe the formal and informal contact between functions. Interdepartmental connectedness is used interchangeably with the term interdepartmental interactions. Several scholars take a similar position by offering that integration consists of interaction between departments (Griffin and Hauser, 1992; Dougherty, 1992; Ruekert and Walker Jr., 1987; Gimenez and Ventura, 2005), while others state that integration is a form of collaboration between the two departments (Pinto, et al 1993). While both of these characterizations of integration are applicable, this study uses a more holistic definition offered by Kahn and Menter, (1996) who define integration as a process of interaction and collaboration between business units to form a cohesive organization.

Internal cross-functional integration has been described as the crux of supply chain integration (Fawcett and Magnan, 2002). Despite the recognized importance of integration, achieving an integrated company is illusive. In fact, some companies attempt external integration before focusing on internal integration (Barratt, 2004). To better understand integration, a closer examination is needed of the two components that represent integration, namely, interaction and collaboration.

Interaction is a structural set of interdepartmental activities and formal process of communication for transactions that need to be managed (Kahn, 1996). Examples of a formal set of interactions include meetings, committees, telephone calls, e-mail, standard forms, memos and reports, and faxes (Holland, et al. 2000). Menon, Jaworski, and Kohli, (1997) found that interactions between departments led to better product quality. In addition, interaction between business functions can clarify new product requirements,

identify innovative solutions, and improve customer service (Stank, Daugherty, and Ellinger, 1999). However, companies must be careful not to go overboard on interaction between functions. Over-specifying interaction between functions can decrease work place efficiency, increase the level of conflict between functions, and have a negative impact on overall performance (Ruekert and Walker, 1987; Stank, et al 1999). The company must therefore strike a careful balance on the amount of interaction required between functions. This balance must be monitored and carefully managed to ensure that the level of interaction stays at an appropriate level based upon the demands of the internal and external environment.

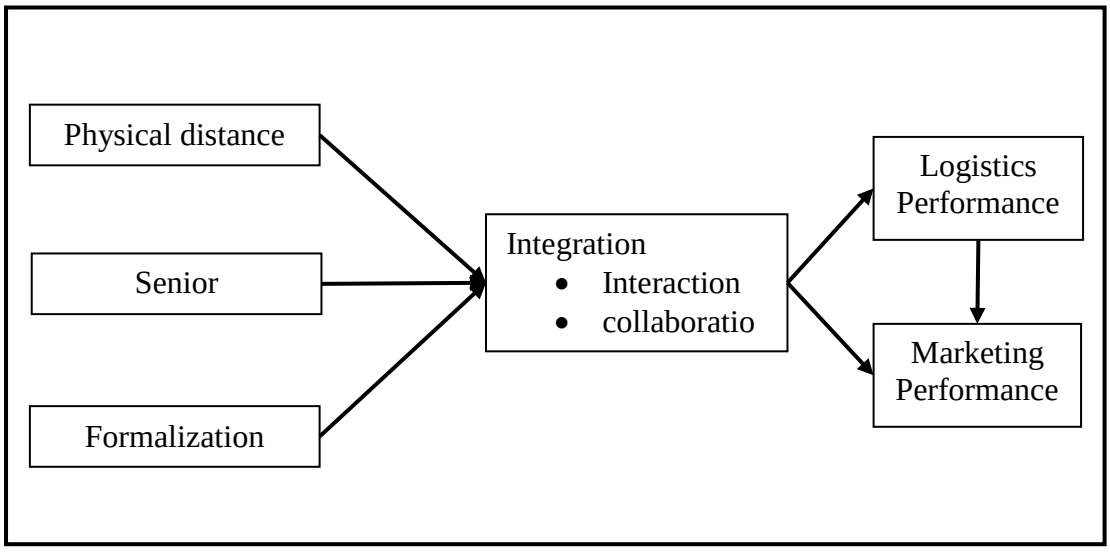
The second component to integration is *collaboration,* which is defined as unstructured relationships between departments that are volitional in nature, have collective goals, and require joint effort (Kahn, 1996). Collaboration capitalizes on informal relationships, the sharing of resources, a certain spirit de corps, and a shared common vision (Holland, Gaston, and Gomes, 2000). Because these relationships are somewhat intangible, they are difficult to measure (Kahn and Mentzer, 1996). The success of inter-functional collaboration is largely dependent on the success of the underlying relationships (Ellinger, 2000). Collaboration, like interaction, is also a factor in providing customer service (Ellinger, 2000); is essential to new product development (Brown and Eisenhardt, 1995; Song et al, 1997); and can enhance market orientation (Fisher et al. 1997). Conversely, a lack of collaboration can lead to duplication of effort and the misallocation of resources leading to delays in scheduling and budgeting concerns (Hoegl, Praveen, and Gemuenden, 2003).

In summary, this review of selected literature indicates a number of critical functions that senior management must install. What the literature failed to address is the need for integration between logistics and marketing functions. By measures of integration we can determine the impact that environmental have upon the integration between logistics and marketing and also performance.

PROPOSED MODEL OF CROSS-FUNCTION INTEGRATION FOR SUPPLY CHAIN MANAGEMENT

The proposed conceptual framework presented in Figure 1, models the influence of three environmental factor constructs of functional personality upon integration. The model expands the original research by Gupta et al. (1986) and Song and Parry (1997) in two important ways. First, it considers the key functions involved in supply chain management, namely: marketing and logistics. Second, it examines the impact that integration has upon firm performance.

Figure 1: Environmental Factors



Hypotheses

Physical distance is defined as distance between locations of subgroups influences the individual decision-making process. We anticipate that the greater the physical distances between a logistics member and personnel from marketing the lower the level of integration.

Hypotheses 1: less Physical distance between logistics and marketing is positively and directly associated with high a) integration between logistics and marketing functions and high b) direct logistics performance and c) direct marketing performance.

Senior management can facilitate or be a barrier to inter-functional collaboration behavior by influencing the extent to which logistics and marketing functions recognize their interdependence and by affecting their tasks, roles, and interpersonal climates. We anticipate that the greater the support of senior management between a logistics member and personnel from marketing the higher the level of integration.

Hypotheses 2: High support of senior management between logistics and marketing is positively and directly associated with high a) integration between logistics and marketing functions and high b) direct logistics performance and c) direct marketing performance.

Formalization is defined as the emphasis placed within the organization on following rules and procedures in performing one's job. We anticipate that the higher level of formalization between a logistics member and personnel from marketing the higher the level of integration.

Hypotheses 3: High similarity in formalization between logistics and marketing is positively and directly associated with high a) integration between logistics and

marketing functions and high b) direct logistics performance and c) direct marketing performance.

Integration is defined as a combination of interaction and collaboration. We propose that higher levels of integration will lead to a higher level of firm performance.

Hypotheses 4: A high level of integration between logistics and marketing is positively, directly associated with higher firm a) logistics performance and b) marketing performance.

It is important to recognize the goals of marketing performance are to establish production, sales goals and worker job satisfaction. We propose that higher levels of logistics performance will lead to a higher level of marketing performance.

Hypotheses 5: A high level of logistics performance is positively and directly associated with higher firm marketing performance.

RESEARCH METHODOLOGY

Sample

A secondary analysis was conducted using data collected by Wallenburg, (2010). The analysis was preceded by pretest interviews with six logistics/customer service managers, seven marketing managers, and six researchers. The interviews conducted were pivotal in authenticating the pertinence of the competence categories. They also ensured optimization of the survey instrument for its comprehensibility and assured content and face validity (Wallenburg, 2010).

For the analysis of the competences of the two different functions logistics and marketing performance, both logistics and marketing managers were included in the same

survey. The sample was derived from two available databases, and a total of 3,133 managers in German industrial and trade companies were selected (1,558 marketing and 1,575 logistics managers). Consistent with the guidelines set forth by Griffis, Goldsby, and Cooper (2003), a web-based survey method was employed; the sample members were contacted via email asking them to complete the online questionnaire. A total of 2,430 of the email contacts (1,226 logistics managers and 1,204 marketing managers) responded. In accordance with the recommendations of Larson and Poist, (2004), incentives and friendly reminder e-mails were used to increase the response rate. A total of 356 managers answered the survey, resulting in a response rate of 14.7 percent. The questionnaires were checked for incomplete data, leaving a total sample size of 347 data sets for further analysis. The demographic characteristics of the final data demonstrate that the sample is nicely balanced in terms of industry affiliation and company size (see Table 1 for respondent demographics). The unit of analysis for this type of study is the typical white collar employee in logistics and marketing-(Wallenburg, 2010).

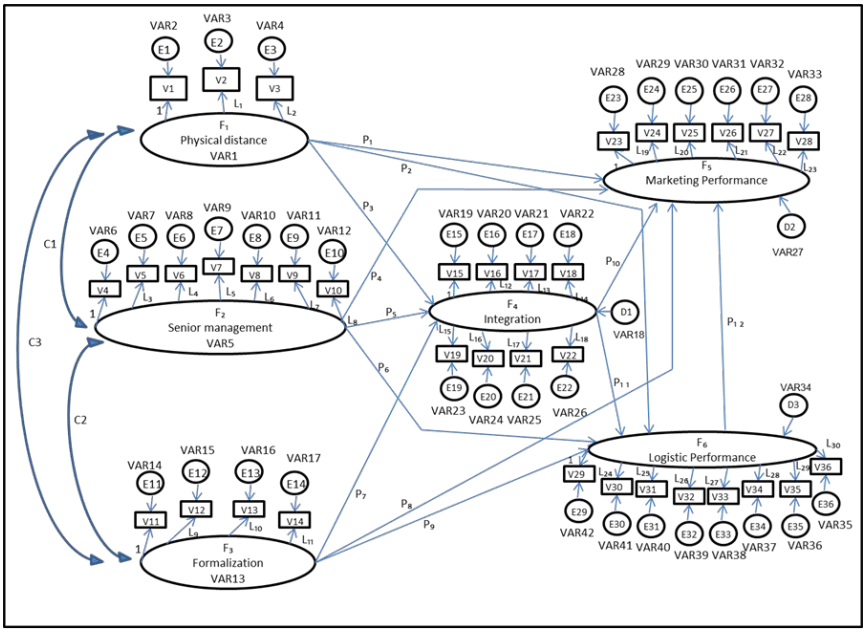
To assess the respondent competency, the survey focused on some areas of personal information. The answers to these questions revealed that on average the responding managers had 7.0 years of experience in their present (logistics or marketing) functional area. In addition, 51.7 percent of the managers also had direct experience in the other function, i.e. logistics managers in marketing and marketing managers in logistics.

Variables and measures

All analysis were conducted in SASv9.2. Cronbach's alpha values (Table 2) to assess reliability and validity were in general above the suggested 0.7 figure (Nunally,1978) indicating reasonable agreement on survey questions. The physical distance scale is a 3-item survey of functional physical distance. Each of the three Likert-type items used to assess physical distance were composed of-seven response-statement scores (1 = Do not agree at all; 7 = fully agree). Higher scores reflected closer physical distance. The internal consistency reliability of each item ranged from 0.67-0.87 and the total physical distance scale was 0.85.

The senior management scale is a 7-item survey. Each of the seven Likert-type items used to asses senior management were composed of seven response-statement scores (1 = Do not agree at all; 7 = fully agree). Higher scores reflected better senior management. The internal consistency reliability of each item ranged from 0.87-0.90 and the total senior management scale was 0.85.

Figure 2: initial model.



Formalization scale is a 4-item survey of four Likert-type items using seven response-statement scores (1 = Do not agree at all; 7 = fully agree). Higher scores reflected higher formalization. The internal consistency reliability of each item ranged from 0.77-0.86 and the total formalization scale was 0.85. Integration scale is an 8-item survey of eight Likert-type items using seven response-statement scores (1 = Do not agree at all; 7 = fully agree). Higher scores reflected better integration. The internal consistency reliability of each itme ranged from 0.94-0.95 and the total scale was 0.95. Marketing performance scale is a 6-item survey of six Likert-type items using seven response-statement scores (1 = Do not agree at all; 7 = fully agree). Higher scores reflected better marketing performance. The internal consistency reliability of each itme ranged from 0.80-0.87 and the total marketing performance scale was 0.85. the logistics performance scale is an 8-item survey of eight Likert-type items using seven response-statement scores (1 = Do not agree at all; 7 = fully agree). Higher scores reflected better logistics performance. The internal consistency reliability of each item ranged from 0.85-0.88 and the total logistics performance scale was 0.87. A summary of the mean responses and standard deviation for each item of the survey is given in Table 3.

The analytic method that allows estimation of both direct and indirect effects in order to investigate the processes underlying the relationship between an independent (exogenous) variable and a dependent (endogenous) variable was sought. Structural equation modeling (SEM) was used to test the fit of the initial hypothesized models and verify the influence of environmental factors and integration on the dependent variables (marketing performance and logistics performance).The initial model is given in Figure 2 Fit statistics were computed for each model. A consensus of fit among these statistics,

along with examination of the residual matrix, was used to determine adequate fit of the model.

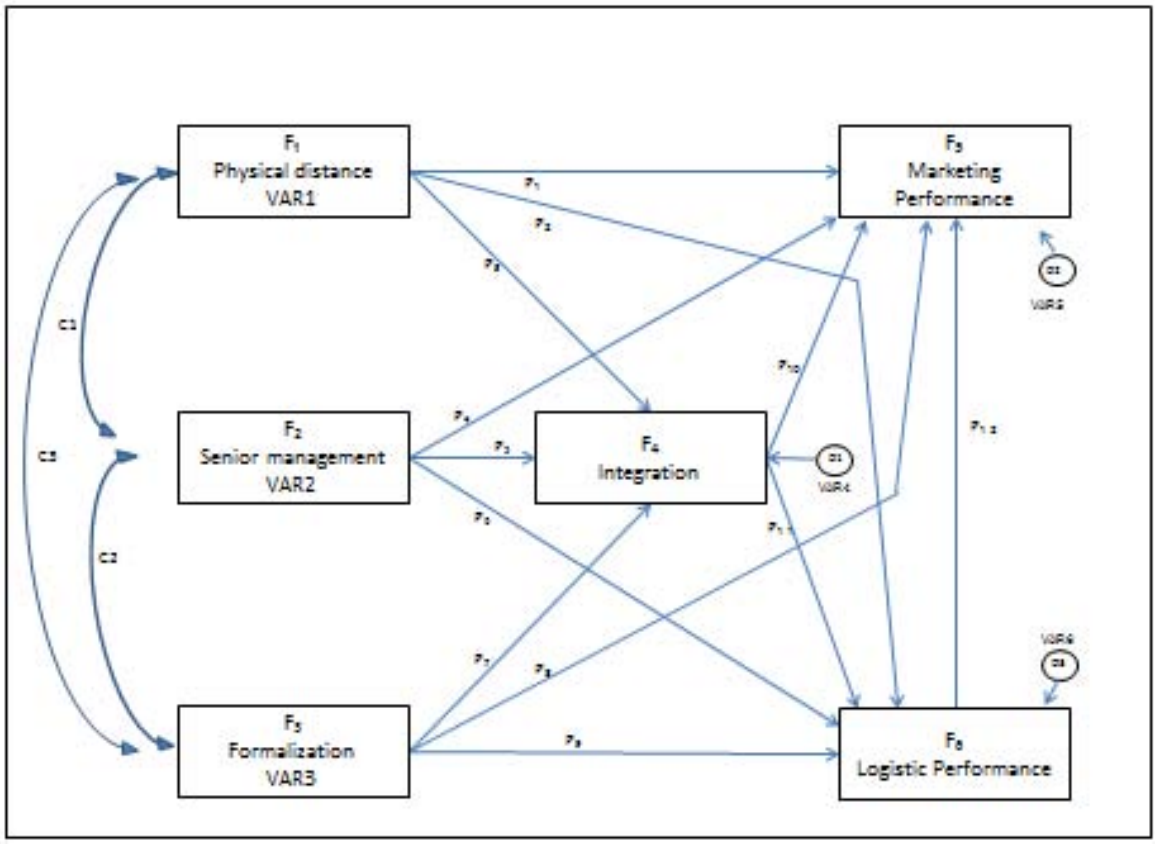
The initial model given in Figure 2 and Table 7 resulted in a comparative fit index (CFI) value of 0.81 (<0.90) indicating an inadequate model. In addition, the non-normed fit index (NNFI) value was 0.79 also indicating a poor model fit. Supporting this, a significant , p-value <0.0001 indicated that the model did not fit well. The root mean square error of approximation (RMSEA) value was (0.0892) indicating fair fit, as did the standardized Root Mean Square Residual (SRMR) value which was (0.1104).

The fit for initial model in Figure 2, was not acceptable. The $\chi 2$, p-value was highly significant (<0.0001), indicating poor fit, and two fit indices (NNFI, RMSEA) were not estimable. Therefore, an alternative (modified Figure 3) model was specified to better evaluate the hypothesized relationships. In this alternate model, factor analysis was used to create common constructs to measure physical distance, senior management, formalization, integration, and marketing and logistic performance. The results of the factor analysis (i.e. the factor loadings) are given in Table 4. As can be seen, factor analysis resulted in one common factor to describe physical distance, formalization, and marketing and logistic performance (Table 3, Figure 3). However, two factors were identified which describe separate aspects of senior management. One factor focused on decentralized decision and the other cooperation. These two aspects within the construct of senior management were considered as separate endogeneous variables as depicted in Figure 3. Once the fit of the model using the factors as identified through factor analysis was acceptable, the resulting model was further improved by removing non-significant

paths. This model and its paths including the standardized parameter estimates is the one given in Figure 3 and Table 5.

The modified model given in Figure 3 and Table 5 resulted in a comparative fit index (CFI) value of one indicating a good model, but the (NNFI) value was zero indicating a poor model fit. Supporting this, a significant , p-value indicated that the model did not fit well. The RMSEA value was zero indicating good fit, as did the (SRMR) value which was also zero.

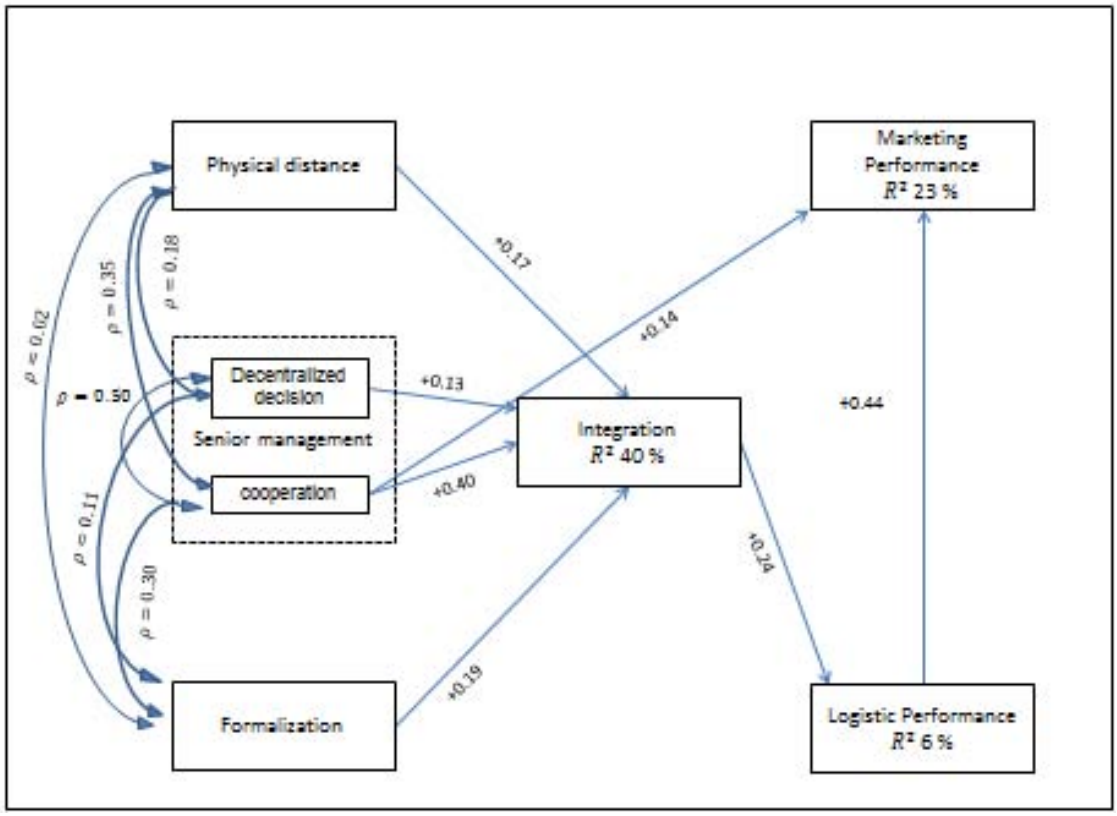
Figure 3: modified model



The modified model was further modified by removing non-significant paths and resulted in the final model as given in Figure 4. This final model resulted in a CFI and

NNFI value close to one indicating good model fit. In addition the non-significant , p-value >0 .05 indicated that the model does fit well. A small RMSEA = 0.0281 and SRMR = 0.0285 also demonstrated good model fit.

Figure 4: final model



Hypotheses Test Results

Hypotheses 1 posits a positive influence of less physical distance on integration, logistic performance and marketing performance. Each of these relationships is significant as closer physical distance has a direct positive affect on integration and positive indirect effect on both logistic and marketing performance (Table 6). Which

indicate the less physical distance have no direct influence on logistic and marketing performance but a positive direct influence on integration.

Hypotheses 2 posit a positive support of senior management on integration, logistic performance and marketing performance. Promoting decentralized decision-making by senior management has no direct impact on logistic and marketing performance but lead to positive integration through integration decentralized decision-making has a positive indirect effect on logistic and marketing performance. On the other hand promoting cooperation between logistics and marketing by senior management has direct positive impact on logistic and marketing performance and integration. (Table 6)

Hypotheses 3 posit a positive impact of high similarity in formalization on integration, logistic performance and marketing performance. Each of these relationships is significant. Proposition 3a is supported through a direct significant positive effect, which indicates that higher similarity in formalization has a positive direct influence on integration. With respect to proposition 3b and 3c higher formalization has a positive indirect effect on both logistic and marketing performance acting through integration.

Hypotheses 4 posit a positive impact of level of integration between logistics and marketing on logistics performance and marketing performance. Proposition 4a is supported through a significant direct positive effect which indicates that higher levels of integration logistics performance. With respect to proposition 4b, integration has a positive indirect effect on marketing performance, such that higher integration results in higher marketing performance.

Hypotheses 5 posit a positive impact of level of logistics performance on marketing performance. Proposition 5 is supported through a significant direct positive

effect which indicates that higher levels of logistics performance results in higher marketing performance.

Implications, Discussion and Conclusions

Implications:

A model for studying the impact that environmental factors has upon integration is proposed based upon previous research on organizational behavior, empirical research in logistics, marketing, and operations, and new product development. Previous research has focused on the differences between marketing and engineers with very little about the degree of integration between other functions. This study benefits managers in several ways.

First, the research seeks to fills a literature gap with respect to the environmental factors differences that may exist between functions. In this manner, the research serves to educate managers about these potential differences and provides a framework for understanding the impact these differences have upon the integration efforts of the firm and firm performance. A common theme in the literature speaks to the difficulty in achieving integration between functions.

In addition, the model may provide useful insights to managers when considering the impact of integration efforts upon business performance, the implications that physical distance, senior management support and formalization has upon integration. Armed with the information, managers should be in a better position to make smart decisions about where to focus their integration efforts.

Discussion

This study supports and confirms the findings of the previous research studies. It also covers the gap in the study of factors that hamper integration and advise senior management to support the concept of cooperation between the varied functions of the organization this support has a direct impact on performance in the final outcome. Also, this study identifies the role of supplies in raising performance and achieving marketing goals for the firm.

Although the study was on business environment, but we can find some results and links that can be drawn for military applications. As the results of the study that the physical distance convergence between military units and had a direct positive effect on integration work to reach the performance required, but not necessarily help directly on the final performance task. In other words, the physical distance convergence affects the integration as the integration is an important factor in raising the performance of the logistics performance that are considered sensitive and important factor in the performance of field units with its tasks.

The study confirmed that the decentralization of decision-making would help to overcome some obstacles to reach the integration, but in a fraction of what underscores importance of the chain of command and at the same time the importance of senior management supporting cooperation and flexibility between the military units and work as one unit, which has great impact on integration and the impact on the task of logistics since this trend has a positive impact on the performance of field units.

As indicated previously, the research data was taken from the culture and economic environment of the German industrial sector. The study results indicated the

important role of formalization to overcome obstacles and to raise the level of integration, especially in military organizations.

Conclusions

In this study, we explained the relationship between environmental factors and access to integration to reach logistics performance and marketing performance. Results indicate that senior management support and the level of formalization are key factors to raise the level of integration. We must not lose sight of the direct relationship of senior management on marketing performance and in boosting cooperation between marketing and logistics. In any case the study results indicated a positive relationship between environmental factors directly and integration. We believe that senior management support for cooperation between marketing and logistics is an important and influential factor on the performance of the firm. As well as the logistics performance has direct positive effects on marketing performance.

Study Limitations and directions for Future

In this study we have identified factors affecting the integration and performance of staff and to urge that these factors are not only the variables impacting performance, and is suggested that future studies examine the relationship between environmental factors individual factors, and organizational factors and how they interact to impede or enhance corporation success.

We live now in an era of globalization and transnational corporations and must consider level of formalization of management styles. Also, it is important to consider the role of varied cultures and how management functions are delineated.

There are statistical limitations to this paper. First the data sampling should be based on accurate measurements. When collecting data, the survey must be written clearly and concisely so there is no confusion for the respondent. The results of these questions will reflect the accuracy of the data gathered.

Second the size of the sample may not be large enough to be an accurate representation of the population. When we conduct a complex conceptual model that has a lot of variables there needs to be a big sample size to get a good fit model. To be sure we achieved a good fit model we used a factor analysis to reduce the number of variables in the conceptual model and not lose any information.

Third it is critical to build a good conceptual model with a clear relationship between the variables. The result we get depends on how sensitive the structural equation modeling method is to the relationship between the variables of the conceptual model which may lead to a bad fit.

Finally there has been little research about the relationship and the impact of the individual factors, organizational factors, and environmental factors by themselves on internal integration in supply chain management. The relationship of these factors with each other and their impact on internal integration in supply chain management must also be studied.

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Appendix A

Table 1: The demographic analysis

	Frequency	Percentage
Industry		
Construction industry	14	4
Chemicals and Plastics	37	10.7
Electrical Engineering, Precision Engineering, Optics	34	9.8
Energy and Raw Materials	8	2.3
Automotive industry	38	11
Health and Biotechnology	4	1.2
Trade	43	12.4
Consumer goods	34	9.8
Mechanical and Plant Engineering	53	15.3
Food, Beverages and Tobacco	32	9.2
Pharma and Healthcare	14	4
Telecommunications	4	1.2
Transportation, Traffic, and Logistics	12	3.5
Other services	18	5.2
Unspecified	2	0.6
Position of Respondent		
General Management	40	11.5
Marketing/ Customer Service	98	28.2
Logistics / Supply Chain Management	173	49.9
other area	29	8.4
Unspecified	7	2
Number of Employees		
≤ 250	136	39.2
251 – 500	63	18.2
501 – 1000	49	14.1
> 1000	79	22.8
Unspecified	20	5.7

Table 2: Cronbach's alpha values

	Alpha Standardized
Physical distance	0.85
Employees from logistics and marketing are located in close proximity.	0.82
Employees from logistics and marketing work in direct vicinity, so that they can meet each other without much effort.	0.67
Employees from logistics and marketing can easily get together in one place for spontaneous meetings (e.g., for discussions and decisions).	0.87
Senior management	0.85
Decentralized decision-making	0.91
Employees from both logistics and marketing can generally make decisions without needing (explicit) approval of their supervisor.	0.88
Employees from both logistics and marketing have great freedom in the choice of means to accomplish goals.	0.87
Employees from both logistics and marketing usually do not have to check with their supervisor before being able to act.	0.88
Employees from both logistics and marketing can decide for themselves how to get their work done.	0.88
To what extent do the following statements apply to the cooperation between logistics and marketing in your company unit?	0.92
Senior management communicates to marketing and logistics employees that working together is essential to meet customer needs.	0.88
Senior management encourages marketing and logistics employees to sort out any differences/problems that may exist between them.	0.88
Senior management emphasizes the importance of coordinating marketing and logistics activities.	0.90
Formalization	0.85
In order to coordinate tasks/ responsibilities, standard operating procedures have been established (e.g., rules, policies, forms, etc.).	0.84
In order to coordinate tasks/ responsibilities, formal communication channels are usually followed.	0.86
The terms of the relationship between logistics and marketing have been explicitly verbalized or discussed.	0.77
The terms of the relationship between logistics and marketing have been written down in detail.	0.77
Integration	0.95
Logistics and marketing try to achieve goals collectively.	0.95
Logistics and marketing understand each other well.	0.95
Logistics and marketing informally work together.	0.95
Logistics and marketing share ideas, information and/or resources.	0.95
Logistics and marketing work together closely.	0.94
Logistics and marketing coordinate their activities very well.	0.95
Logistics and marketing trust each other.	0.95
How do you evaluate the cooperation of logistics and marketing *in total*?	
Overall, the (level of) cooperation between logistics and marketing is very good.	0.94
Marketing Performance	0.85
How do you assess the following criteria concerning your company´s	

market performance compared to your competitors?	
Achieving customer satisfaction	0.84
Achieving the envisioned growth	0.81
Achieving value for the customers	0.81
Achieving or maintaining the envisioned market share	0.80
Gaining new customers or entering new markets	0.82
Fast reaction to opportunities and threats in the market	0.84
Logistics Performance	0.87
The ability to satisfy special customer requests	0.86
The ability to reduce the time between order receipt and customer delivery to as close to zero as possible	0.85
The ability to meet promised delivery dates and quantities on a consistent basis	0.85
The ability to respond to the needs and wants of key customers	0.85
The ability to provide desired quantities on a consistent basis	0.85
The ability to modify order volumes or compositions at short notice	0.86
The ability to accommodate delivery times for specific customers	0.85
The ability to achieve lower costs in logistics in relation to turnover	0.88

Table 3: Mean and standard deviations

	mean	SD
Physical distance		
Employees from logistics and marketing are located in close proximity.	3.5	2.0
Employees from logistics and marketing work in direct vicinity, so that they can meet each other without much effort.	4.2	2.0
Employees from logistics and marketing can easily get together in one place for spontaneous meetings (e.g., for discussions and decisions).	4.9	1.9
Senior management		
Decentralized decision-making		
Employees from both logistics and marketing can generally make decisions without needing (explicit) approval of their supervisor.	4.6	1.5
Employees from both logistics and marketing have great freedom in the choice of means to accomplish goals.	4.5	1.5
Employees from both logistics and marketing usually do not have to check with their supervisor before being able to act.	4.4	1.4
Employees from both logistics and marketing can decide for themselves how to get their work done.	4.5	1.4
To what extent do the following statements apply to the cooperation between logistics and marketing in your company unit?		
Top management communicates to marketing and logistics employees that working together is essential to meet customer needs.	5.0	1.6
Top management encourages marketing and logistics employees to sort out any differences/problems that may exist between them.	4.9	1.5
Top management emphasizes the importance of coordinating marketing and logistics activities.	5.0	1.5
Formalization		
In order to coordinate tasks/ responsibilities, standard operating procedures have been established (e.g., rules, policies, forms, etc.).	4.5	1.6
In order to coordinate tasks/ responsibilities, formal communication channels are usually followed.	4.0	1.3
The terms of the relationship between logistics and marketing have been explicitly verbalized or discussed.	4.2	1.5
The terms of the relationship between logistics and marketing have been written down in detail.	3.9	1.6
Integration		
Logistics and marketing try to achieve goals collectively.	5.0	1.4
Logistics and marketing understand each other well.	4.6	1.3
Logistics and marketing informally work together.	4.8	1.4
Logistics and marketing share ideas, information and/or resources.	4.3	1.4
Logistics and marketing work together closely.	4.7	1.4
Logistics and marketing coordinate their activities very well.	4.4	1.4
Logistics and marketing trust each other.	4.8	1.4
How do you evaluate the cooperation of logistics and marketing *in total*?		
Overall, the (level of) cooperation between logistics and marketing is very good.	4.9	1.3
Marketing Performance		
How do you assess the following criteria concerning your company´s market performance compared to your competitors?		
Achieving customer satisfaction	5.2	0.9

Achieving the envisioned growth	4.9	1.0
Achieving value for the customers	5.2	0.9
Achieving or maintaining the envisioned market share	5.1	1.0
Gaining new customers or entering new markets	4.8	1.1
Fast reaction to opportunities and threats in the market	4.8	1.3
Logistics Performance		
The ability to satisfy special customer requests	5.2	1.1
The ability to reduce the time between order receipt and customer delivery to as close to zero as possible	4.8	1.1
The ability to meet promised delivery dates and quantities on a consistent basis	5.0	1.2
The ability to respond to the needs and wants of key customers	5.4	1.0
The ability to provide desired quantities on a consistent basis	5.2	1.1
The ability to modify order volumes or compositions at short notice	5.1	1.1
The ability to accommodate delivery times for specific customers	5.1	1.1
The ability to achieve lower costs in logistics in relation to turnover	4.5	1.1

Table 4: loading for Factor Analysis

	Factor 1	Factor 2
Physical distance		
Employees from logistics and marketing are located in close proximity.	0.86	
Employees from logistics and marketing work in direct vicinity, so that they can meet each other without much effort.	0.94	
Employees from logistics and marketing can easily get together in one place for spontaneous meetings (e.g., for discussions and decisions).	0.83	
senior management		
Decentralized decision-making		
Employees from both logistics and marketing can generally make decisions without needing (explicit) approval of their supervisor.	0.78	-0.42
Employees from both logistics and marketing have great freedom in the choice of means to accomplish goals.	0.80	-0.41
Employees from both logistics and marketing usually do not have to check with their supervisor before being able to act.	0.76	-0.44
Employees from both logistics and marketing can decide for themselves how to get their work done.	0.78	0.40
To what extent do the following statements apply to the cooperation between logistics and marketing in your company unit?		
Top management communicates to marketing and logistics employees that working together is essential to meet customer needs.	0.66	0.66
Top management encourages marketing and logistics employees to sort out any differences/problems that may exist between them.	0.65	0.67
Top management emphasizes the importance of coordinating marketing and logistics activities.	0.61	0.70
Formalization		
In order to coordinate tasks/ responsibilities, standard operating procedures have been established (e.g., rules, policies, forms, etc.).	0.80	
In order to coordinate tasks/ responsibilities, formal communication channels are usually followed.	0.74	
The terms of the relationship between logistics and marketing have been explicitly verbalized or discussed.	0.90	
The terms of the relationship between logistics and marketing have been written down in detail.	0.90	
Integration		
Logistics and marketing try to achieve goals collectively.	0.85	
Logistics and marketing understand each other well.	0.87	
Logistics and marketing informally work together.	0.80	
Logistics and marketing share ideas, information and/or resources.	0.87	
Logistics and marketing work together closely.	0.90	
Logistics and marketing coordinate their activities very well.	0.90	
Logistics and marketing trust each other.	0.84	
How do you evaluate the cooperation of logistics and marketing *in total*?		

Overall, the (level of) cooperation between logistics and marketing is very good.	0.92	
Marketing Performance		
How do you assess the following criteria concerning your company´s market performance compared to your competitors?		
Achieving customer satisfaction	0.66	
Achieving the envisioned growth	0.80	
Achieving value for the customers	0.80	
Achieving or maintaining the envisioned market share	0.83	
Gaining new customers or entering new markets	0.74	
Fast reaction to opportunities and threats in the market	0.70	
Logistics Performance		
The ability to satisfy special customer requests	0.70	
The ability to reduce the time between order receipt and customer delivery to as close to zero as possible	0.80	
The ability to meet promised delivery dates and quantities on a consistent basis	0.80	
The ability to respond to the needs and wants of key customers	0.80	
The ability to provide desired quantities on a consistent basis	0.80	
The ability to modify order volumes or compositions at short notice	0.71	
The ability to accommodate delivery times for specific customers	0.74	
The ability to achieve lower costs in logistics in relation to turnover	0.50	

Table 5: Standardized Parameter estimates (standard errors)
Of the modified model and Final models and associated fit statistics

	modified model			Final model		
	Marketing performance	Logistics performance	Integration	Marketing performance	Logistics performance	Integration
Marketing performance	-	-	-	-	-	-
Logistics performance	0.43 (0.04)	-	-	0.44(0.04)	-	-
Integration	0.07(0.03)	0.18(0.03)		-	0.24(0.03)	0.17(0.08)
Physical distance	0.02(0.04)	-0.01(0.05)	0.17(0.08)	-	-	0.13(0.09)
senior management Factor 1	-0.05(0.04)	0.06(0.05)	0.13(0.08)	-	-	-
senior management Factor 2	0.10(0.06)	0.11(0.07)	0.40(0.11)	0.14(0.04)	-	0.40(0.11)
Formalization	0.07(0.06)	-0.05(0.07)	0.20(0.12)	-	-	0.19(0.12)
Error	0.90	0.96	0.80	0.88	0.97	0.80
	0.25	0.07	0.40	0.23	0.06	0.40
GFI	1.00			0.9917		
SRMR	0.0000			0.0285		
	0.0000			10.1908		
df	0			8		
RMSEA	0.0000 (0,0)			0.0281 (0.0 , 0.0727)		
CFI	1.000			0.9952		
NNFI	0			0.9875		

Table 6: the direct and indirect effect.

	direct (Hypotheses)	indirect	Total
On marketing performance:			
Logistic performance	0.44(H5)	-	0.44
Integration	-		0.12
Physical distance	-	0.02	0.02
(Senior Management) Decentralized decision	-	0.01	0.01
(Senior Management) Cooperation	0.14(H2c)	0.04	0.18
Formalization	-	0.02	0.02
On logistic performance:			
Integration	0.24(H4a)	-	0.24
Physical distance	-	0.04	0.04
(Senior Management) Decentralized decision	-	0.03	0.03
(Senior Management) Cooperation	-	0.10	0.10
Formalization	-	0.05	0.05
On Integration:			
Physical distance	0.17(H1a)	-	0.17
(Senior Management) Decentralized decision	0.13(H2a)	-	0.13
(Senior Management) Cooperation	0.40(H2a)	-	0.40
Formalization	0.19(H3a)	-	0.19

Table 7: fit statistics of the Initial, modified and Final models

	Initial model	modified model	Final model
GFI	0.7333	1.00	0.9917
SRMR	0.1104	0.0000	0.0285
	2174.0640	0.0000	10.1908
df	579	0	8
RMSEA	0.0892 (0.09 , 0.09)	0.0000 (0,0)	0.0281 (0.0 , 0.0727)
CFI	0.8075	1.000	0.9952
NNFI	0.7906	0	0.9875

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From – To)*
24-03-2011	**Master's Thesis**	July 2010 - March 2011

4. TITLE AND SUBTITLE
The Impact of Environmental Factors on Internal Integration in Support of Supply Chain Management

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Mohammed Ibrahim Alzaben, Major, Royal Saudi Air Force

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S)
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2950 Hobson Street, Building 642
WPAFB OH 45433-7765

8. PERFORMING ORGANIZATION REPORT NUMBER

AFIT/LSCM/ENS/11-01

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Major General Suliman S. Alkhalifah
Ministry of Defence and Aviation
P.O.Box 28613 Riyadh 11447
Kingdom of Saudi Arabia

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Despite the recognized importance of cross-functional integration in support of supply chain management by scholars and practitioners, integration remains an elusive goal in today's competitive market. Specifically, scholars have identified three environmental factors as potential barriers to interdepartmental integration. A review of the literature indicates that very little research has examined potential environmental barriers to the integration between logistics and other functions. This paper is an exploratory study that seeks to fill this gap by using secondary data collected from over 1,500 mid level managers and a structural equations model to test which environmental factors could be potential barriers.

15. SUBJECT TERMS
Integration, collaboration, physical distance, senior management, formalization.

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Doral Sandlin , PhD, Lt Col, USAF (ENS)
U	U	U	UU	45	19b. TELEPHONE NUMBER *(Include area code)* (937) 255-3636 x4533 doral.Sandlin@afit.edu