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Knowledge Management for Logistics Service Providers: The Role of Learning Culture

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Abstract

Purpose – Knowledge management capabilities have proven to be key success factors for organizations within our increasingly information-based economy. Although knowledge management literature has a rich history, less is known about how an organization's learning culture affects outcomes realized via knowledge management initiatives. Moreover, there is a dearth of understanding regarding how to successfully operationalize knowledge management activities in order to achieve performance in the dynamic logistics and supply chain management environment. Rooted in competence-based theory, the purpose of this paper is to examine the role that learning culture plays with regard to knowledge management capabilities, human capital, and organizational performance at logistics service providers.

Design/methodology/approach – This study uses survey data from 448 managers and covariance based structural equation modeling to assess how knowledge management, learning culture, and human capital influence organizational performance.

Findings – The results of this study indicate that knowledge management has a significant positive relationship with learning culture and human capital. There was also an indirect effect of knowledge management through learning culture on human capital and organizational performance. Interestingly, human capital did not have a significant relationship with organizational performance as hypothesized.

Practical implications – The results support the vital role that leaders and managers have in creating a culture that is conducive to the success of knowledge management initiatives.

Originality/value – This study goes beyond the simple direct relationship between knowledge management and personal and organizational outcomes that is usually examined by testing learning culture as an important mediator.

Keywords Human capital, Knowledge management, Structural equation modelling, Learning culture

Paper type Research paper

1. Introduction

An organization's collective knowledge and competences have become critical assets in improving organizational performance, increasing profitability, and ultimately creating and maintaining a competitive advantage; however, the process by which knowledge management affects organizational performance is not clear (Moustaghfir and Schiuma, 2013). This uncertainty fuels the struggle of top managers in the public and private sector when deciding how to best allocate limited resources. For continued support and investment, knowledge management initiatives must demonstrate value to stakeholders (Wong, 2005). To this end, research has shown that organizational learning culture, a specific type of organizational culture that integrates organizational

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learning, is a critical success factor in knowledge management success (Bates and Khasawneh, 2005; Ho *et al.*, 2014; Pantouvakis and Bouranta, 2013; Zheng *et al.*, 2010). However, there is a dearth of research regarding how learning culture can aid knowledge management efforts in obtaining organizational outcomes.

There is also a scant understanding regarding how knowledge management activities support outcomes in the military logistics and supply chain management environment. As noted by Ariely (2011), military knowledge management is a major resource at all levels and, accordingly, must be effectively implemented and managed as a critical war fighting skill that could very well mean the difference between victory and defeat. Military logisticians require knowledge management practices that aid them in their learning and synthesis of information so as to make sound decisions, all the while understanding the ramifications of those decisions on the entire enterprise (Cherry, 2014).

Top military leaders understand the complexities of military logistics with regard to knowledge management and human capital development. In 2008, the Department of Defense Logistics Human Capital Strategy was released. This strategy recognizes the need for logistics human capital to be aligned across the entire enterprise to include new business rules, emerging enterprise management systems, and strategic goals (Office of the Secretary of Defense, 2008).

However, there is a need to better understand how to successfully operationalize knowledge management activities in order to achieve this objective. Therefore, this research effort is focussed on the effect that learning culture, as indicated by top military leader involvement, plays when logistics service providers seek to realize increased performance and develop human capital via knowledge management efforts.

Prior research has often focussed on the main effect of knowledge management on organizational performance, leaving little room for the larger understanding of how other constructs may affect that relationship (Mills and Smith, 2011). This study addresses this gap by developing and testing an integrated model that considers learning culture as an important mediator of knowledge management outcomes. In order to more fully understand the proposed model and underlying relationships, a multi-theoretical approach is employed. The competence-based view of the firm is adopted as the overarching theoretical lens, because it informs our understanding of how a combination of assets, competences, and skills may represent a competitive advantage for an organization. Additionally, in an effort to fully explore individual relationships between the constructs, we also incorporate the knowledge-based view of the firm and dynamic capability theory. In the following section, we provide a deeper background on competence-based theory, and follow with the development of specific hypotheses in Section 3.

2. Theory background

Competence-based theory suggests that an organization's resources and capabilities are what differentiate it from its rivals (Freiling, 2004; Freiling *et al.*, 2008). Further, organizations with resources and capabilities that are shown to be valuable, scarce, superior, and complementarity may gain a marketplace advantage (Amit and Schoemaker, 1993; Barney, 1991; Collis and Montgomery, 2008; Hoopes *et al.*, 2003; Newbert, 2008). Therefore, the competence-based view of the firm focusses on the ability of an organization to sustain the coordinated deployment of assets, capabilities, and skills in ways to help it achieve a competitive advantage. This suggests that organizations seeking improved performance must recognize and capture the dynamic,

systemic, cognitive, and holistic nature of organizational competences (Sanchez, 2004). To do so, Lado and Wilson (1994) suggest that organizations need to focus on managerial competencies (the unique capabilities of the organization's leaders), input-based competencies (the organization's resources), transformational competencies (the organization's ability to convert inputs into outputs and include innovation and entrepreneurship), and output-based competencies (the organization's knowledge-based assets). Thus, organizational competencies include all assets, knowledge, skills, and capabilities embedded in the organization's structure, technology, processes, and interpersonal relationships. These organizational competencies have the potential to yield sustained competitive advantage.

As described by Freiling *et al.* (2008), the competence-based view's epistemological aim is found in its explanation of current and future organizational competitiveness in markets due to inhomogeneous availability of competences. Furthermore, Freiling *et al.* (2008) describes an organization's competencies to provide a repeatable, non-random ability to render competitive output. This ability is based on knowledge, channeled by rules and patterns established within an organization. In sum, the competence-based view embodies not only the resource-base of an organization, but also its competencies. Improving organizational competence does not depend simply on achieving excellence in one or two key success factors, but rather on developing an interrelated and balanced set of success factors that in turn depend on achieving proper balance and alignment among an organization's competence areas and managerial processes. Given these theoretical tenets, it follows that knowledge management capabilities should enable positive organizational-level outcomes, to include performance. It also follows that a learning culture is a capability that will play an intervening role, aiding these positive outcomes. These specific relationships and resulting hypothesized model will be described in the following section.

3. Hypotheses and conceptual model

3.1 Knowledge management outcomes

As seen in the extant research, establishing sound knowledge management practices, fostering a learning culture, and investment in human capital, may yield significant returns on investment, increased organizational performance, and a competitive advantage in the marketplace (Moustaghfir and Schiuma, 2013; Pantouvakis and Bouranta, 2013). Here, we begin by developing the role of knowledge management. Knowledge management is concerned with creating, organizing, sharing, and using knowledge within an organization. In the business context, organizational knowledge is independent of specific members in the organization (i.e. knowledge in knowledge repositories, and knowledge embedded in policies and routines) (Aggestam, 2006). Learning and innovation in organizations requires personal knowledge to transform into information that other members of the organization can use (Jensen, 2005; Lin *et al.*, 2012). In the context of knowledge management literature, it is the process organizations use to assess information contained within the organization and the translation of organizational learning into usable knowledge. According to Aggestam (2006) organizations learn and build knowledge through different purposes and methods over time and knowledge is captured in one or a combination of three ways:

(1) in people: train and educate people in order to transfer skills and know-how as well as improve ways of performing tasks;

(2) in repositories outside people: document knowledge and build databases in order to distribute knowledge; and

(3) by embedding: embed knowledge in standards, technology, and operating practices in order to improve technology and the way it is used.

According to Nonaka (1991), there are two types of knowledge: explicit knowledge and tacit knowledge. Explicit knowledge is formal, systematic, easily communicated, and shared within an organization. This type of knowledge can be expressed in words and numbers and shared in the form of data, manuals, and other tangible methods. The second type of knowledge, tacit knowledge, is not as easily expressed and is highly personal, hard to formalize and, therefore, difficult to communicate to others. Tacit knowledge is also deeply rooted in action and the technical skills developed through years of experience.

The knowledge-based view of the firm suggests knowledge-based resources are competencies that are difficult to imitate among organizations and can be determinates of sustained competitive advantage (Barney, 1991; Grant, 1991, 1996, 1997; Kiessling *et al.*, 2009). The knowledge-based view suggests processes through which organizations integrate specialized knowledge as being fundamental to their ability to create and sustain competitive advantage (Grant, 1996). This knowledge is embedded within an organization and carried through its culture, identity, policies, routines, and employees. At a more complex level, organizational routines are regular patterns of coordinated activity involving multiple individuals, and the efficiency of integration, scope of integration, and flexibility of integration all dictate the ability of knowledge to be a source of competitive advantage (Grant, 1997). Indeed, an organization's knowledge is an overwhelmingly important productive resource in terms of its contribution and ability to add value to processes and strategic-level initiatives across the organization (Grant, 1997). Based on these arguments that better knowledge management can induce positive outcomes across an organization, we propose the following hypotheses:

H1a. Knowledge management is positively related to human capital.

H1b. Knowledge management is positively related to learning culture.

H1c. Knowledge management is positively related to organizational performance.

3.2 The role of learning culture

Organizational culture is critical to the success of knowledge management; however, developing a specific type of culture that encourages knowledge creation, knowledge sharing, and knowledge application is one of the biggest challenges to any knowledge management effort (Rebelo and Duarte Gomes, 2011; Wong, 2005). Marsick and Watkins (2003, pp. 140-41) argue that the learning culture is in the "hearts and minds" of the employees and, that while necessary, the dimensions of "the learning organization (continuous learning, team learning, empowerment, and promoting dialogue and inquiry)" are not sufficient. Literature supports the notion that the mere management of knowledge alone is not enough to garner sustained organizational performance. Instead, senior leaders and managers must be engaged in the knowledge management process and create a culture of learning within the organization (Marsick and Watkins, 2003).

The view that learning increases competitive advantage has stimulated interest in developing organizations that foster and promote learning (Kontoghiorghes *et al.*, 2005; Pantouvakis and Bouranta, 2013). Additionally, as noted by Marsick and Watkins (2003), leaders who learn from their experience and influence the learning of others,

build an organization's climate and culture. Furthermore, organizations with an organizational learning culture are skilled at creating, acquiring, and transferring knowledge, as well as modifying its behavior to reflect new knowledge and insights (Garvin, 1985). Learning and knowledge are then seen as direct outcomes of activities performed commensurate with the organization's central mission and core competencies (McInerney and Koenig, 2011). The link between learning organizational characteristics and organizational performance has been seen in several studies including Ellinger *et al.* (2002), Jashapara (2003), Kontoghiorghes *et al.* (2005), and Pantouvakis and Bouranta (2013).

Not only does literature support a direct relationship between learning culture and organizational outcomes, but the arguments above also support the suggestion that a learning culture can mediate the effect that knowledge management has on organizational outcomes. Therefore, we propose the following direct and indirect hypotheses.

H2a. Learning culture is positively related to human capital.

H2b. Learning culture mediates the relationship between knowledge management and human capital.

H3a. Learning culture is positively related to organizational performance.

H3b. Learning culture mediates the relationship between knowledge management and organizational performance.

3.3 Human capital

There are two main forces affecting the increased emphasis on logistics workforce development and training. First, both the public and private sectors have recognized that prudent management of the supply chain function is essential to the overall success of the larger organization. Second, increasing fiscal constraints and worldwide economic instability necessitate the careful evaluation of how best to invest in human capital. An employee's skills and competencies need to be continuously developed through appropriate professional development to enhance organizational performance (Wong, 2005). There is broad agreement that a strategic approach to human resource management involves designing and implementing a set of internally consistent policies and practices that ensure an organization's human capital (employee's collective knowledge, skills, and abilities) contributes to the achievement of its business objectives (Baird and Meshoulam, 1988; Huselid *et al.*, 1997; Jackson and Schuler, 1999; Schuler and Jackson, 1987).

This significant relationship between strategic human resource management effectiveness and employee productivity is found to be consistent with both institutional theory and the resource-based view of the firm (Huselid *et al.*, 1997). Human resources, as recognized by Caldas *et al.* (2015) and Griffith (2006), are one of an organization's most common means to build and maintain dynamic capabilities. Furthermore, Griffith argues the perspective of the organization's personnel is leveraged by the specific human capital that the individual possesses, which determines the strategic path of the organization. Additionally, in order for an organization's personnel to be able to effectively operate, the embodied human capital of these individuals needs to appropriately match the tasks embedded within the job (Griffith, 2006). It is widely acknowledged that human capital is the foundation for business success in the modern marketplace (Barnes and Liao, 2012; Griffith, 2006; Huselid *et al.*, 1997; Lengnick-Hall *et al.*, 2013).

Human resource management system design should be managed strategically to fit the characteristics of the organization and its environment as well as facilitate the organization's ability to achieve its intended outcomes (Lengnick-Hall *et al.*, 2013). Clearly, strategic human resource management practices aimed at leveraging human capital contribute to creating and capitalizing on strategic benefits for the organization. From this strategic perspective, the idea has expanded at the organization level to include core competencies as the unique intellectual, process, or product competencies that give an organization a competitive advantage, and where the collective learning and performance capabilities of the organization contribute to its overall success (Barnes and Liao, 2012). These intellectual competencies include both the tacit and explicit knowledge of individuals. Successful organizations, then, must view their information as a strategic asset and a source of competitive advantage and that the knowledge and skills an organization accumulates over time are the most fundamental strategic resource possessed (Barnes and Liao, 2012).

An organization's competitiveness is tied to enhancing its human capital through the development of the competencies of its employees and by creating unique, distinctive and difficult to imitate core competencies (Barnes and Liao, 2012). Organizations should consider employees as strategic assets and a critical investment in organizational performance, and create an atmosphere in which these competencies can thrive. Investments in human capital, chiefly in the education and training of the employees, can yield substantial benefits to organizations that recognize the power of sound human capital management practice (Cherry, 2014). The relationship between human capital and organizational performance has long been established in extant literature (e.g. Hatch and Dyer, 2004; Hitt *et al.*, 2001; Hsu, 2008). Notably in the work of Hitt *et al.* (2001) and Hsu (2008), the relationship between human capital and its positive association with organizational performance has been explored. We posit that these positive relationships will hold in our logistics service setting:

H4. Human capital is positively related to organizational performance.

Based upon the aforementioned arguments, the following conceptual model is proposed (see Figure 1). The model presents learning culture as an important mediator in the relationship between knowledge management and organizational outcomes.

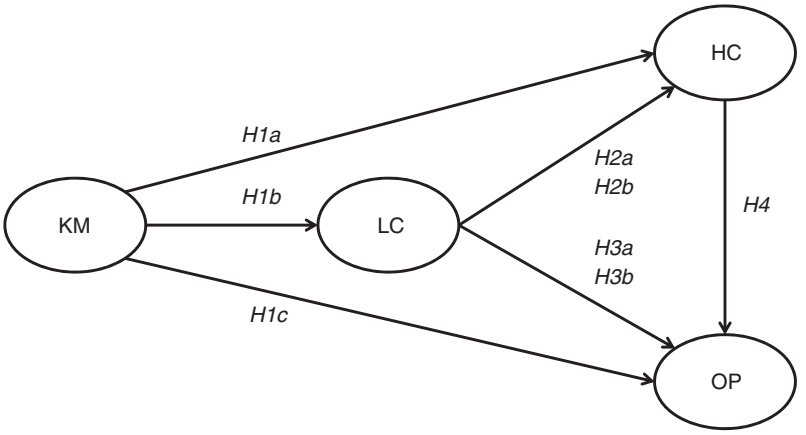


Figure 1. The conceptual framework with hypotheses

4. Methodology

4.1 Sample and data collection

In this study, the unit of analysis is logistics service providers. As a sample frame, we obtained a listing of logistics service providers affiliated with the Department of Defense from the Air Force Personnel Center. An online survey tool was used to administer the survey to 1,337 logisticians. When respondents clicked on the link to open the survey they were greeted with a page explaining the purpose of the survey, a confidentiality statement, a survey participation statement, instructions for completing the survey, and contact information for the researchers. The second section of the survey housed the study measures and the final section of the survey contained demographic questions. Participants were allowed to stop the survey and resume at a later time without the survey resetting. Additionally, no participant was allowed to complete the survey more than once.

Of the 574 attempted surveys 475 were complete with no missing information yielding an abandonment rate of 17.4 percent and an overall response rate of 35.5 percent. Additional data analysis revealed that 27 of the responses had little to no variance and were deleted. The final sample size was 448. Table I contains the demographic information for the participants.

4.2 Measures

Previously validated scales were minimally adapted for context and used in this research. All items were measured on a seven point Likert scale and can be found in Table AI. A scale developed by Gold *et al.* (2001) and further refined by Kiessling *et al.* (2009) was used to assess knowledge management practices. Beliefs about learning culture were measured using a scale created by Yang (2003). Human capital was measured using a scale adapted from Subramaniam and Youndt (2005). The work of Delaney and Huselid (1996) was adapted to measure organizational performance.

5. Analysis and results

5.1 Assessment of measures

The large sample size and the confirmatory nature of this study comport with the use of maximum likelihood estimation in covariance based structural equation modeling (CBSEM). Therefore, we began by examining the data for adherence to CBSEM assumptions. Normality was assessed by examining skewness and kurtosis of the data for the measurement items. The highest Standardized Skewness Index has an absolute

	Mean	Median	SD	Characteristic	Count	%
Rank				Junior (up to 4 years)	87	19.4
				Mid-level (4-15 years)	237	52.9
				Senior (more than 15 years)	124	27.7
Education				Bachelor	129	28.8
				Master	317	70.8
				PhD	2	0.5
Maintenance experience (months)	26	16	11.5	< 25	231	51.7
				25-36	138	30.9
				37-48	62	13.9
				> 48	16	3.6

Note: $n = 448$

Table I. Participant demographics

value smaller than 2.00 (−1.644), and the highest Standardized Kurtosis Index is well below 10.00 (3.877), providing evidence that there are no significant departures from normality (Kline, 2011). Supportive analysis in SPSS 18 was performed to obtain the variance inflation factors (VIF) and the Durbin-Watson statistic. Organizational performance was regressed on the other three constructs. The highest VIF is well below the threshold of 10.0 (2.095) indicating that multicollinearity is not an issue. The Durbin-Watson statistic was also below the threshold of 2.0 (1.778) indicating that autocorrelation is not an issue (Gefen *et al.*, 2011). Further, there were no discernible outliers or missing data points.

Exploratory factor analysis (EFA) was conducted on the 25 items that made up the scales for the four constructs. We used primary axis factoring for the extraction method and normalized Varimax for the rotation method. Four factors had eigenvalues greater that 1.0 and were retained, which accounted for nearly 72 percent of the variance. After discarding the four items that loaded poorly, the Kaiser-Meyer-Olkin measure for sampling adequacy was 0.917 and the Bartlett's test for sphericity was significant ($p < 0.001$) indicating that the data were suitable for further analysis (Hair *et al.*, 2010). Table AII displays the results of the EFA.

5.2 Reliability and validity

As shown in Table AII, item loadings for knowledge management, learning culture, human capital, and organizational performance were all significant ($p < 0.001$). Further, the measurement model was examined for evidence of reliability and validity. In Table II, reliability was demonstrated by each Cronbach's α being 0.865 or greater and each measure of composite reliability being 0.870 or greater (Chin and Newsted, 1999). The average variance extracted (AVE) for each construct exceeded the suggested 0.500 threshold recommended by Fornell and Larker (Fornell and Larcker, 1981). Path coefficients had standardized loadings greater than 0.500 and were statistically significant providing evidence of convergent validity (Gefen and Straub, 2005). Discriminant validity was evidenced by items loading highest on the intended construct and by the square root of the AVE being greater than the correlation between each pair of constructs (Fornell and Larcker, 1981; Gefen and Straub, 2005).

5.3 Bias and power analyses

To help prevent common method bias, we followed several steps prescribed in survey methods literature during the early stages of our study. A pre-test of the survey instrument was conducted with several career logisticians, both in academia and in operational logistics. This helped to ensure item clarity and readability, as well as reduce item complexity and limit the use of jargon (Hinkin, 2005; Peterson, 2000; Spector, 1992).

	Mean	SD	CA	CR	KM	LC	HC	OP
Knowledge management (KM)	4.765	1.241	0.927	0.927	*0.847*			
Learning culture (LC)	5.287	1.211	0.865	0.870	0.677	*0.791*		
Human capital (HC)	5.408	1.074	0.901	0.910	0.523	0.571	*0.818*	
Organizational performance (OP)	4.611	1.082	0.910	0.901	0.468	0.551	0.398	*0.753*

Notes: The mean, standard deviation (SD), Cronbach's α (CA) and composite reliability (CR) are shown. The square-root of average variance extracted (AVE) is on the diagonal in italics. Correlations are in the off-diagonal. All correlations are significant at $p < 0.01$

Table II. Correlation matrix

Additionally, we provided clear instructions for survey completion, separated independent and dependent variables, avoided negatively worded items, and protected the participant's anonymity (Harrison and McLaughlin, 1991; Schmitt, 1994). The highest correlation between constructs was 0.677 (knowledge management and learning culture), which is below the threshold of 0.90 recommended by Podsakoff *et al.* (2003) indicating that common method variance does not significantly bias our results. Additionally, non-response bias was assessed using two methods suggested by Rogelberg and Stanton (2007). First, after sending the initial survey e-mail to the identified sample frame, follow-up e-mails were sent to increase overall survey participation and reduce concerns of non-response bias. Second, a comparison between each wave of survey responses was conducted by calculating the difference between the mean values for each construct using two-way *t*-tests. Analysis revealed no significant difference in the means between the initial and subsequent waves of responses.

Finally, we used the Preacher and Coffman (2006) online power analysis tool to obtain the sample size and power estimates for the final model. The minimum sample size recommended for an 80 percent power level was 97. Given $n = 448$, $\mathrm{df} = 161$, and assuming $\alpha = 0.05$, $\varepsilon 0 \leqslant 0.05$, and $\varepsilon 1 = 0.08$ resulted in a close fit test power of > 0.999. Changing $\varepsilon 0 \geqslant 0.05$ and $\varepsilon 1 = 0.01$ to test not-close fit resulted in a power estimate of > 0.999. Thus, the probability of correctly rejecting a false model or correctly accepting a valid model for this study is essentially 100 percent (Kline, 2011).

5.4 Hypothesis testing

After finding an acceptable fit for the measurement model and evidence of reliability, validity, and statistical power, the structural model was assessed and the hypothesized relationships were examined. The structural model failed the exact fit test ($\chi^2_{(161)}$ 273.962, $p < 0.001$), which is considered by many researchers to be overly stringent and often indicates significant results with only minor model departures, particularly when the sample size is large (Chen *et al.*, 2008; Hu and Bentler, 1999; Pruitt *et al.*, 2010). However, Kline (2011) argues that in spite of its limitations the χ^2 statistic provides valuable insight into model-data discrepancies, which should be further analyzed. We evaluated the covariance residuals for values exceeding 0.10, which indicate that the model does not adequately explain the corresponding sample covariance. Less than 10 percent exceeded this value and no discernible pattern emerged. Overall, given that there is no guidance specifying a threshold for the number of items that may violate the 0.10 threshold and the satisfactory performance of the model in terms of the approximate fit indices as shown below, there was no reason found to reject the model and it is concluded that the model provides adequate fit to the sample data.

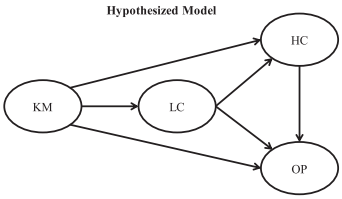
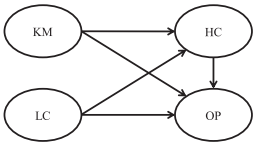
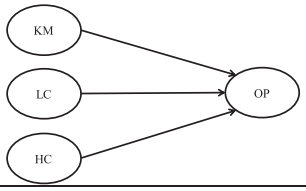
The goodness of fit index (GFI), which is a measure of fit between the hypothesized model and the observed covariance matrix, was well above the 0.90 threshold ($\mathrm{GFI} = 0.946$). The comparative fit index (CFI), which adjusts for sample size while examining the discrepancy between the data and the hypothesized model, was above the 0.90 threshold ($\mathrm{CFI} = 0.984$). The root mean square error of the approximation (RMSEA), which analyzes the discrepancy between the hypothesized model and the population covariance matrix, and the standardized root mean square residual (SRMR), which is the standardized square root of the discrepancy between the sample covariance matrix and the model covariance matrix, are both badness of fit measures and values closer to zero are desired with 0.10 usually being the upper threshold for both. For this model the RMSEA with a 90 percent confidence interval is 0.040 (0.031, 0.048) and the SRMR is 0.036. Therefore, our model has acceptable approximate fit indices (Hair *et al.*, 2010).

It is possible that an alternate model could produce the same or better results (Kline, 2011). Because the hypothesized model was deeply rooted in theory, only minor alterations were tested. Alternate Model 1 (see Table III) modeled knowledge management and learning culture as independent variables (i.e. no mediation). The exact fit test for Alternate Model 1 indicates a statistically significant poorer fit to the data ($\Delta\chi^2 = 282.976$). Alternate Model 2 regressed organizational performance on the other three constructs. Again, the alternate model had a statistically significant poorer fit to the data ($\Delta\chi^2 = 481.783$). These results provide further evidence that our model is suitable for making inferences regarding the stated hypotheses.

The unstandardized path coefficients provide evidence (i.e. *z*-values and *p*-values) to draw conclusions regarding our direct hypotheses (see Table IV). Significant paths are represented in Figure 2 as solid lines and non-significant paths are represented by dashed lines. The squared multiple correlation is a measure of the model's capability to explain the variance of the dependent variables. As shown in Figure 2, our model explains 57.2 percent of the variance in learning culture, 41.5 percent of the variance in human capital, and 40.9 percent of the variance in organizational performance. For the indirect effects, path coefficients were estimated using 5,000 samples with 448 cases as recommended by Hair *et al.* (2010). The significant indirect effects shown in Figure 2 demonstrate mediation (Zhao *et al.*, 2010).

6. Discussion and implications

The importance of knowledge management has been equated to the importance of natural resources in previous generations wherein strategies that companies once devoted to optimizing capital and labor are now being applied to maximize the

Hypothesized Model 	χ^2	273.962
	df	161
	χ^2/df	1.702
	GFI	0.946
	CFI	0.984
	SRMR	0.036
	RMSEA (0.90CI)	0.040 (0.031, 0.048)
Alternate Model 1 	χ^2	556.938
	df	162
	χ^2/df	3.438
	GFI	0.911
	CFI	0.944
	SRMR	0.189
	RMSEA (0.90CI)	0.074 (0.067, 0.081)
Alternate Model 2 	χ^2	755.745
	df	164
	χ^2/df	4.608
	GFI	0.867
	CFI	0.917
	SRMR	0.264
	RMSEA (0.90CI)	0.090 (0.083, 0.096)

Note: Evaluating Alternate Models 1 and 2 revealed that the hypothesized model better fit the data ($p < 0.001$)

Table III. Alternate models

Table IV.
Results

Hypothesis	Structural path	Loading	SE	*z*-value	*p*	LCL[a]	UCL[a]	Supported
H1a	KM→HC	0.156	0.058	2.702	0.007	–	–	Yes
H1b	KM→LC	0.811	0.059	13.796	0.001	–	–	Yes
H1c	KM→OP	0.081	0.065	1.250	0.211	–	–	No
H2a	LC→HC	0.370	0.059	6.257	0.001	–	–	Yes
H2b	KM → LC→HC	0.300	0.071	4.225	0.001	0.199	0.431	Yes
H3a	LC → OP	0.442	0.075	5.890	0.001	–	–	Yes
H3b	KM→LC→OP	0.378	0.068	5.559	0.001	0.534	1.041	Yes
H4a	HC→OP	0.043	0.064	0.675	0.500	–	–	No

Note: [a]Bootstrap upper and lower 0.90 confidence intervals for the indirect effects

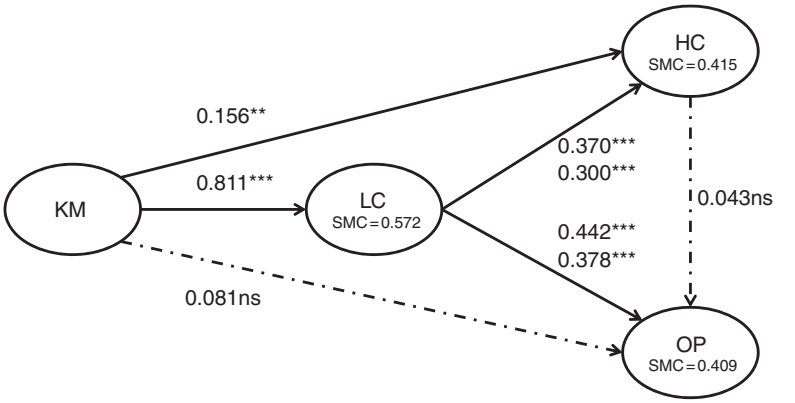


Figure 2.
Structural model

Notes: Unstandardized path coefficients shown. $^{**}p<0.01$; $^{***}p<0.001$; ns, not significant

productivity of knowledge resources (Silver, 2001). Knowledge is also a critical component of logistics operations, and the military (to include their logistics functions) has been an early adopter of knowledge management technologies (Maule, 2011). Common to both the public and private sector is research into mechanisms to consolidate data and information into knowledge, and once integrated, to understand strategic options and cause-effect relationships (Maule, 2011). This present research contributes to this discourse be investigating outcomes of knowledge management practices, and examining the important role that learning culture plays in affecting these outcomes. Indeed, a key implication of this study is that investment in "softer" aspects of logistics can enable gains in performance.

The results provide evidence that organizations can enhance performance when they foster and promote learning. This finding yields important implications for the developing literature on behavioral operations and supply chain management in that it elucidates the connection between human-based components of the organization and performance (Bendoly *et al.*, 2015). As noted by Marsick and Watkins (2003), leaders who learn from their experience and influence the learning of others build an organization's climate and culture. Furthermore, learning organizations are skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to

reflect new knowledge and insights (Garvin, 1985). This research showed that knowledge management and learning culture are capabilities that can evoke organizational performance and play a positive role in the development of human capital. Indeed, in addition to the direct positive relationship between learning culture and the outcome variables, support was found for a partially mediated relationship between knowledge management and human capital through learning culture as well as a fully mediated relationship between knowledge management and organizational performance through learning culture. In addition to showing the mediating effect of learning culture, the effect size (f^2) can be calculated as $(R^2_{\text{full}}-R^2_{\text{excluded}})/(1-R^2_{\text{full}})$. Effect size has been called the most important outcome of empirical research as it provides the magnitude of the reported relationship and allows future researchers the opportunity to conduct meta-analysis and a priori power analysis (Lakens, 2013). Cohen (1988) defined small, medium, and large effect sizes as 0.02, 0.15, and 0.35, respectively. The effect of learning culture on human capital was (0.415−0.311)/(1−0.415) or $f^2 = 0.178$ and the effect on organizational performance was (0.409 −0.298)/(1−0.409) or $f^2 = 0.188$. These effect sizes indicate that learning culture has a moderate effect on human capital and organizational performance.

Interestingly, the findings suggest that human capital does not have a direct relationship with organizational performance. There is broad agreement that a strategic approach to human capital investment involves designing and implementing a set of internally consistent policies and practices that ensure an organization's human capital (employee's collective knowledge, skills, and abilities) contributes to the achievement of its business objectives (Baird and Meshoulam, 1988; Jackson and Schuler, 1999; Schuler and Jackson, 1987). Huselid *et al.* (1997) note a fundamental assumption of strategic human capital development is that organizational performance is influenced by the development practices that organizations have in place. An organization's strategic human capital development practices ensure that competitors can neither easily copy these practices nor readily replicate the unique pool of human capital that such practices help to create (Huselid *et al.*, 1997). However, the results of this research show that this development does not enhance performance in a model that already considers knowledge management and learning culture constructs. Given the similarities captured in both the learning culture and human capital constructs, we suspect that learning culture serves to confound the relationship between human capital and performance. Indeed, when removing learning culture from the model, the relationship between human capital and organizational performance is significant at $p < 0.001$, which may indicate a more complex relationship than tested in this model. Therefore, we propose more research regarding the relationship between logistics human capital, learning culture, and performance is warranted in order to uncover the true nature of the relationships between these constructs. Such research will likely include the addition of additional mediators or moderators, as well as demographic-based control variables.

As described earlier, both the public and private sectors have recognized the importance of knowledge management in achieving logistics and supply chain performance (Cherry, 2014). In the national defense sector, increasing fiscal constraints, and economic instability across the globe necessitate the careful evaluation of how best to spend government dollars. The results of this study indicate that enhancing the learning culture within the firm might be one cost-effective and robust means to drive performance via leveraging logistician talent. For instance, a report outlining an examination within the US Department of

Defense aimed at the training and education needs of the logistics forces stressed the following:

> As the world changes rapidly, profoundly, and in every dimension – social, economic, and political – the logistics workforce needs to continuously evolve and operate in a way that optimizes the human capital of the entire enterprise rather than individual parts. It is imperative that the logistics workforce align its human capital with transformed warfighting, modernized weapons systems, business rules, emerging enterprise management systems, and executive-level strategic goal (Office of the Secretary of Defense, 2008).

The findings of this research imply that investing in knowledge management and instilling a learning culture are means through which to attain performance, even in the face of an ever-changing world landscape.

7. Limitations and concluding remarks

While every effort was made to ensure this research was reliable and valid there are nonetheless some limitations. Although the web-based survey presented several advantages, it has the potential to introduce sources of bias. Possible biases include common method bias, non-response bias, and coverage error (Dillman, 2007). Every attempt was made to mitigate the effects of these biases; however, to ensure the reliability and validity of this research, appropriate statistical tests were conducted and provided sufficient evidence that the results of this survey were not significantly affected. Also, the cross-sectional nature of this study prevented further exploration into the relationships between the latent constructs. Additional longitudinal analyses using longitudinal data collection might be especially useful in future research aimed toward examining the effects of knowledge management on sustained performance. Finally, the conclusions drawn from this study are specific to logistics service providers; thus caution should be taken when generalizing to other populations. Future research that examines the model presented herein using data from other logistics and supply chain functions would be fruitful. In addition to learning culture, investigations including other possible mediators are certainly warranted as less than 50 percent of the variance in human capital and organizational performance was accounted for with this model.

This study makes a significant contribution by elucidating the relationship between knowledge management, learning culture, human capital, and organizational performance. Learning culture was shown to have an important role in mediating the effect of knowledge management on human capital and organizational performance. This research adds to the burgeoning discourse on the competence-based view of the firm by substantiating how investments in knowledge management practices and the development of a learning culture can elicit organizational performance (Cherry, 2014; Ellinger *et al.*, 2002; Hsu, 2008).

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Appendix

Item	Statement	Mean	SD	Loadings	*t*-value
Knowledge management					
On a scale from 1 (strongly disagree) to 7 (strongly agree), please indicate your level of agreement with the following statements					
KM1	My organization has processes for integrating different sources and types of knowledge	4.875	1.377	1.000	
KM2	My organization has processes for converting competitive intelligence into plans of action	4.623	1.429	1.102	19.529
KM3	My organization has processes for taking advantage of new knowledge	4.783	1.433	1.169	21.438
KM4	My organization has processes for acquiring knowledge about organizational partners	4.708	1.396	1.007	18.854
KM5	My organization has processes for exchanging knowledge with organizational partners	4.837	1.420	1.092	16.829
Learning culture					
On a scale from 1 (strongly disagree) to 7 (strongly agree), please indicate your level of agreement with the following statements					
LC2	In my organization, people spend time building trust with each other	5.033	1.520	1.000	
LC3	In my organization, teams/groups revise their thinking as a result of group discussions or information collected	5.174	1.395	0.931	19.029
LC5	My organization recognizes people for taking initiative	5.346	1.415	0.956	16.862
LC7	In my organization, leaders ensure that the organization's actions are consistent with its values	5.594	1.410	0.919	14.946
Human capital					
On a scale from 1 (strongly disagree) to 7 (strongly agree), please indicate your level of agreement with the following statements					
HC1	Logisticians in my organization are very intelligent	5.795	1.073	1.000	
HC2	Logisticians in my organization are very creative	5.279	1.359	1.239	18.737
HC3	Logisticians in my organization are very talented	5.679	1.143	1.105	28.532
HC5	Logisticians in my organization are producing new ideas and knowledge	4.938	1.399	1.225	14.590
HC6	Logisticians in my organization are the best performers	5.353	1.343	1.097	16.810
Organizational performance					
On a scale from 1 (much worse) to 7 (much better), in relation to the factors below, how would you compare your organization's performance over the past 3 years to that of other organizations that do the same kind of work?					
OP1	Quality of products, services, or programs	5.009	1.294	1.000	
OP2	Development of new products, services, or programs	4.672	1.282	0.933	18.300
OP3	Ability to attract essential employees	4.190	1.318	0.974	14.289
OP4	Ability to retain essential employees	3.942	1.435	1.042	13.588
OP5	Satisfaction of customers or clients	4.815	1.319	1.1073	19.128
OP6	Relations between management (leadership) and other employees	4.788	1.445	1.147	15.331
OP7	Relations among employees in general	4.864	1.303	1.063	15.447

Notes: $n = 448$. All unstandardized loadings are significant at $p < 0.001$

Table AI. Survey questions with descriptive statistics

Item	Factor 1	Factor 2	Factor 3	Factor 4
OP1	*0.894*			
OP2	*0.768*			
OP3	*0.745*			
OP4	*0.702*			
OP5	*0.791*			
OP6	*0.618*			0.388
OP7	*0.657*			0.388
KM1		*0.728*		
KM2		*0.727*		
KM3		*0.779*		
KM4		*0.935*		
KM5		*0.821*		
HC1			*0.833*	
HC2			*0.839*	
HC3			*0.942*	
HC5			*0.635*	
HC6			*0.721*	
LC2				*0.683*
LC3				*0.730*
LC5				*0.693*
LC7				*0.652*
Eigenvalue	9.562	2.632	1.836	1.088
% of variance	45.534	12.534	8.745	5.180

Table AII. Pattern matrix

Notes: Factor loadings less than 2 are not shown. Items HC4, LC1, LC4, and LC6 did not perform well and were removed from the analysis

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