

**LOGISTICS STRATEGIES AND PRACTICES
IN VENEZUELA**

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Abstract

This paper presents an empirical and statistical analysis identifies the key characteristics and opportunities of logistics in Venezuela. Among the key findings are conservative approaches to logistics in a protected market whose environment is changing faster than preferred by the responsible actors, limiting the application of modern logistics practices. This and other considerations, such as geographical location, production of commodities and the identification in the strategy of the firms of the need for better logistics practices indicate important opportunities for the application of modern logistics practices.

Keywords

Logistics in Venezuela, conservative approaches, modern logistics practices

Introduction

Logistics management has become a strategic tool in the success of business plans, due to its impact on cash flow generation and service quality. The processes of transformation and delivery demand a strategic vision of the links among manufacturing, purchasing and marketing, including organizational and environmental considerations.

Venezuela, with a promising geographical location, but with operational inefficiencies (e.g., high inventory costs –Esqueda, Díaz and Sánchez, 1996) and other market and state inefficiencies is particularly sensitive to advances in logistics. This situation is examined in this paper.

Logistics in Venezuela

Venezuela, an important emerging market (Bowman, 1998) constitutes a test bed for advanced logistic practices, due to extensive commodities production, its geographical location and a relatively low level of logistics performance.

Commodities produced in the country include petroleum and derivatives, natural gas, steel, aluminum and electricity. These are lead by *Petróleos de Venezuela (PDVSA)* –an state owned firm responsible for the petroleum and natural gas exploration, production and delivery- which is developing outsourcing as a focus strategy, ceding non-core activities to specialized firms.

The geographical location of Venezuela –near the continent’s center of gravity, Figure 1- constitutes a comparative advantage, as the country could become a commerce hub between the north and south of the Americas. This could be facilitated by strong improvements in the efficiency of the main port of the country, Puerto Cabello (Diaz and Dresner, 1997; Gooley, 1998), and by the consolidation of the road to Manaus, Brazil (Acosta and Canakis, 1996). Other regional hubs are under development. Such are the cases of Panama, where a Pacific-Atlantic rail link will move 500,000 TEU by 2003 (Wilner, 2000) and Mexico where a similar link is also being built (Logistic Management and Distribution Report, 2001).

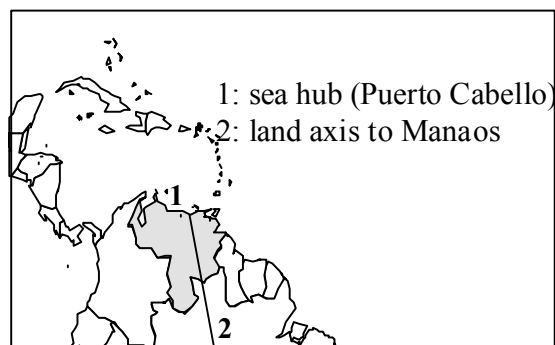


Figure 1. Logistic potential of Venezuela

These comparative advantages are marred by the backward state of competitiveness in the country. Venezuela has been ranked next-to-last in the world competitiveness report (IMD, 2000) for the last seven years, and this could be partially related to very small production scales and inefficient distribution channels (Esqueda et. al., 1996).

Logistics techniques and practices such as cross-docking, outsourcing in transportation and warehousing, process orientation (driven by ERP implementations), and considerable investments in information technology could help to improve this situation, even when other advanced practices like

benchmarking, network design and cooperative schemes are still lacking. This profile is similar to the one described for Latin America as a whole by Zinn (1996).

With this motivation a survey of key logistics players in Venezuela was conducted, resulting in a map of current practices, strategies and logistics opportunities

The Logistic Survey

The instrument was designed in mid-1998 as part of an academic collaboration between a consulting firm (AT Kearney) and a business school (IESA). This was the first logistic poll documented in Venezuela.

The respondents fulfilled Likert-type scales and numerical questions. The questions were designed to obtain descriptive information on logistic practices, while avoiding the disclosure of sensible financial information.

The sample and profile of the firms

A total of 384 logistics providers and users were initially contacted, with 31 responses received by February 1999. The low proportion of responses (8 per cent) is about average for Venezuela, where many companies do not have formal information services, or are suspicious of disclosing information.

Respondents are representative of the industrial and service sectors, employ 820 persons in average with annual sales close to US \$ 35 million, and exports of about 15 % of total sales. They tend to have large organizational structures for their sizes, averaging six hierarchical levels.

This article continues the exploratory study previously performed by Díaz and Pérez (2000). The raw data obtained was processed with standard statistical methods (including correlation and factor analysis), to study the relationship patterns among the variables in the survey¹.

Logistics Strategy

Among key results it was found that logistics strategy is mainly concerned with the integration of the supply chain: Long-term relationships with customers and suppliers, on-site services and delivery dependability, as shown in Figure 1. This is in line with the Mega-trends reported by Bowersox, Closs and Stank (2000).

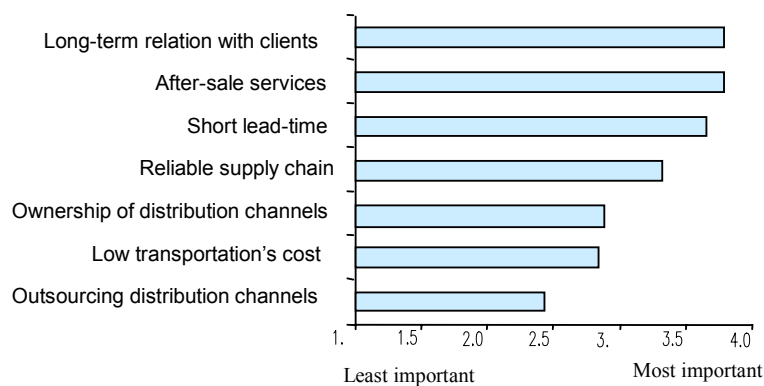


Figure 1. Key strategic considerations in Venezuelan' logistics

¹ Details of the survey in Díaz and Pérez (2000)

Response speed was described as more valuable than transportation costs, suggesting that efficacy is preferred to efficiency, a usual trend in protected markets.

The development of proprietary distribution channels is thought of as safer than outsourcing -implying the absence of reliable third-party providers.

The main perceived threats to logistics in Venezuela are economic uncertainty (due to short-term economic policies), infrastructure limitations and human resources scarcity.

Suppliers' selection policies reveal the behavior of Venezuelan managers: quality, price and dependability were reported as the key influential characteristics. This looks again as a consequence of the use of hierarchies –instead of markets- and conglomerates (subcontracting with firms owned by the same economic group).

Key factors in the logistic strategy

The respondents' opinions about key elements in logistics were processed using factor analysis. Table 1 shows the association among low transportation costs (COSTS), reliable providers network (NET) and ownership of the distribution channel: outsourcing is viewed as positive (3PCHANN) and total ownership as negative (OWNCHANN). This factor could be named "Costs view".

Another interesting relationship showed is among after sales services (AFTSALES), reliable network suppliers and long-term relationship with clients (CLIENTS). This shows long-term downstream commitments.

	Component		
	1	2	3
3PCHANN	.876		
OWNCHANN	-.853		
COSTS	.569		.448
DELIVERY			.933
AFTSALES		.727	.538
NET	.500	.400	
CLIENTS		.900	

Extraction Method: Principal Component Analysis.

^a. Rotation Method: Varimax with Kaiser normalization (converged in 4 iterations)

Table 1. Factor Analysis results for key elements in logistics (Rotated Component Matrix)

The association among low transportation costs, short lead-times (DELIVERY) and after sales services suggest a commitment to customer satisfaction. Most of the variance is collected by the three factors described above, as shown in appendix 2 (table A1, explained variance of key logistic strategy factors).

A clearly marked relationship between long-term relationship with clients and after sales service was expected. This is empirically proved in Table 2 where results of a linear regression became significant at standard confidence levels.

Model		Unstandardized Coefficients		Standardized Coefficients	t	. Sig
		B	Std. Error	Beta		
1	(Constant)	2.937	.342	.445	8.585	.000
	AFTSALES	.253	.098		2.580	.016

^a. Dependent Variable: CLIENTS

Table 2. Linear Regression between CLIENTS and AFTSALES

Threats to logistics development in Venezuela

Conducting a similar analysis, the perceptions of actual and future threats to the development of logistic practices in Venezuela were obtained. The resulting factors can be described as external and internal.

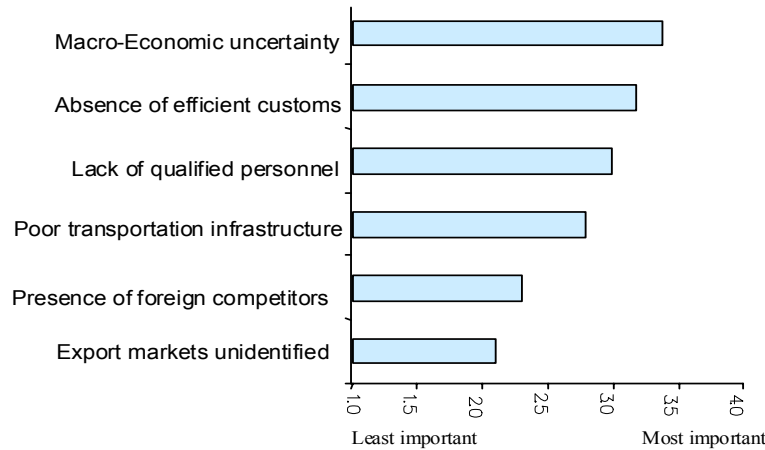


Figure 2. Threats to the development of logistics in Venezuela

Factor analysis results are included in Table 3. The respondents related the lack of transport infrastructure (INFRAEST), foreign competition (COMPETIT), and difficulties identifying foreign markets to export (UNKNOWN). This factor was called external environment, as firms have little control on it.

The other relevant factor includes macro-economic uncertainty (ENVIRON), lack of adequate custom services (SERVICE), and absence of qualified personnel (PERSON). This factor was called internal, or national, environment.

Rotated Component Matrix^a

	Component	
	1	2
ENVIRON	.819	-.258
COMPETIT	-.274	.691
INFRAS	.249	.682
SERVICE	.722	.271
UNKNOWN	.478	.598
PERSON	.630	

Extraction Method: Principal Component Analysis
 Rotation Method: Varimax with Kaiser Normalization
 a. Rotation converged in 3 iterations

Table 3 Factor Analysis for threats to logistics development

The total explained variance, showed in appendix 2 (Table A2) is approximately 57% suggesting some limitations in the explanatory power of the factor analysis. Successive tests were done but each new factor only contains one variable.

The relations obtained in internal environment suggested additional studies, as the variable qualified personnel does not contain an identifiable pattern. This lead to calculate the correlation between those variables, presented in Table 6.

Correlations

		ENVIRON	SERVICE	PERSON
Pearson Correlation	ENVIRON	1.000	.379 *	.452 *
	SERVICE	.379*	1.000	.094
	PERSON	.452*	.094	1.000

(*) Correlation is significant at the 0:05 level (2-tailed).

Table 4. Correlation between variables (internal environment factors)

There appears to be a significant correlation between ENVIRON and each of the other two variables, but no relation between SERVICE and PERSON. It looks like a case of structural dependency linking the latter pair with macro-economic uncertainty. Structural equation models could help to confirm this hypothesis.

Criteria to select suppliers

The most important criteria to select suppliers -from the highest to the lowest degree of importance- are: quality, delivery reliability, price, response flexibility, and geographic location, Figure 3.

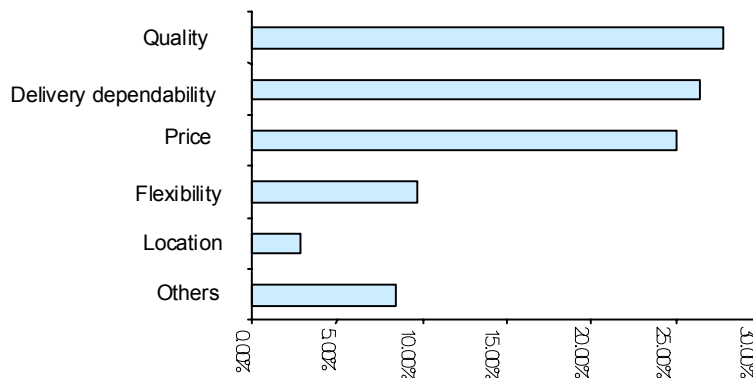


Figure 3. Importance of criteria to select suppliers

Due to the slight differences among the first three a correlation study was conducted (Table 5). The high values of correlation and significance explain the absence of dominant criteria, which explains the difficulties suffered by Venezuelan firms trying to establish strategic ventures for long-term supply chain partnerships.

Correlations

		FIRSTCRI	SECONCRI	THIRDCRI	FOURTCRI	FIFTHCRI
Pearson Correlation	FIRSTCRI	1.000	.822 **	.645 **	.339	.484
	SECONCRI	.822 **	1.000	.819 **	.748 *	.873
	THIRDCRI	.645 **	.819 **	1.000	.742 *	.981 **
	FOURTCRI	.339	.748 *	.742 *	1.000	.981 **
	FIFTHCRI	.484	.873	.981 **	.981 **	1.000

(**) Correlation is significant at the 0.01 level (2-tailed), and (*) at the 0.05 level (2-tailed)..

Table 5. Correlation among criteria for choosing suppliers

Determination of customers' logistics needs

Method used to understand customers' needs were ranked. The four main methods are classic marketing tools: market research, customer surveys, analysis of services provided by competitors and focus groups with clients.

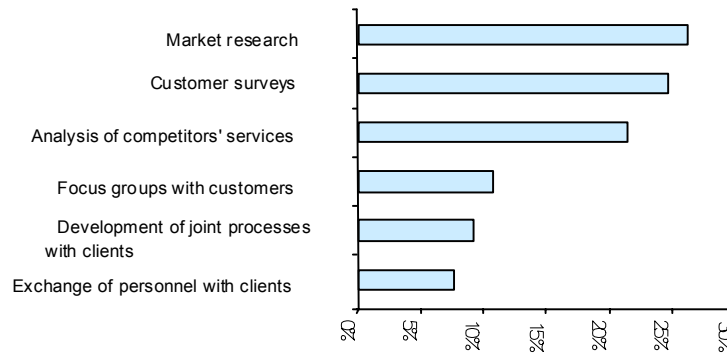


Figure 4. Methods used to determine customers' logistics needs

Again, Venezuelan companies do not perceive long-term commitment as an important strategy. Table 6 shows strong correlation among the first three techniques.

		Correlations			
		NEED1	NEED2	NEED3	NEED4
Pearson	NEED1	1.000	.770 **	.434 *	.311
Correlation	NEED2	.770 **	1.000	.483	.311
	NEED3	.434	.483 *	1.000	.311
	NEED4	.311	.311	.311	1.000

(**) Correlation significant at the 0.01 level (2-tailed) and (*) at the 0.05 level (2-tailed).

Table 6. Correlation among logistic requirements

Logistic Practices And Techniques

Respondents' firms value more integration with suppliers and customers (coincident with the confessed strategy), performance evaluation and benchmarking than more recent practices like ECR. But the use of these practices is in contradiction with the perceived importance (Figure 5), and so a correlation test was performed as presented in Table 9.

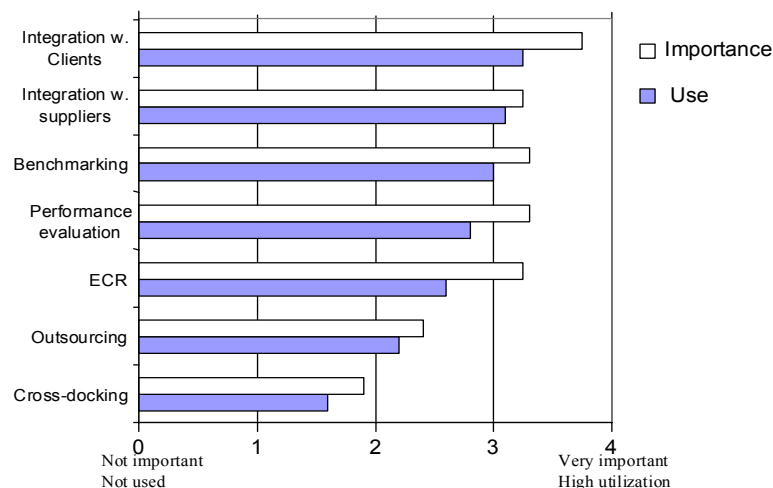


Figure 5. Perceived importance and utilization of key logistics practices and techniques

These results show the low perceived importance –prefixed IMP– of recent practices like ECR and their relation with their usage –prefixed USE.

Attention is caught by the importance assigned to integration along the supply chain (IMPSUPPL and IMPCLIEN) compared to its actual application –specially with suppliers-, and the relationship among performance (PERFO), outsourcing (OUTSO) and integration with customers (CLIEN). Logistics integration is desired, rather than implemented, according to these results.

		Correlations						
		IMPSUPPL	IMPCLIEN	IMPECR	IMPCROSS	IMPOUTSO	IMPERFO	IMPBENCH
Pearson	IMPSUPPL	1.000	.481**	-.256	-.409	-.338	-.021	-.080
Correlation	IMPCLIEN	.481**	1.000	.163	-.283	-.404*	.438*	.133
	IMPECR	-.256	.163	1.000	.349	.073	.423*	.191
	IMPCROSS	-.409	-.283	.349	1.000	.067	.030	.189
	IMPOUTSO	-.338	-.404*	.073	.067	1.000	-.236	-.064
	IMPPERFO	-.021	.438*	.423*	.030	-.236	1.000	.479**
	IMPBENCH	-.080	.133	.191	.189	-.064	.479**	1.000
	USESUPPL	.306	.184	-.095	-.291	-.252	.216	.270
	USECLIEN	.272	.595**	-.237	-.061	-.116	.392*	.103
	USEECR	-.087	-.082	.247	-.094	-.031	.169	-.334
	USECROSS	.047	.162	.296	.575	-.285	.169	.267
	USEOUTSO	-.229	-.195	-.186	.000	.485**	-.017	.071
	USEEVALU	-.117	-.125	.000	-.262	-.202	.632**	-.002
	USEBENCH	.171	.175					

(**) Correlation is significant at the 0.01 level (2-tailed) and (*) at the 0.05 level (2-tailed)

Table 7. Correlation among logistic elements

A factor analysis was performed to further study existing relations. Table 8 shows results for factors and Table a3 (appendix 2) the total variance explained.

Rotated Component Matrix ^a					
	Component				
	1	2	3	4	5
IMPSUPPLI	-.451	-.342	-.456	.628	.212
IMPCLIEN		-.519	-.273	.594	.481
IMPECR	.926				
IMPCROSS	.674			-.355	.585
IMPOUTSO			.287	-.913	
IMPPERFO	.347	.899			
IMPBENCH	.884	.253			
USESUPPL		.505	-.760	.274	
USECLIEN	-.285		-.436		.755
USEECR			.937		
USECROSS	.285	.299		.208	.863
USEOUTSO	-.324	.315	.716	-.513	
USEPERFO	-.255	.939			
USEBENCH				.568	-.215

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 16 iterations.

Table 8. Factor Analysis of logistic practices and techniques

The firms link outsourcing with more recent techniques (ECR, cross-docking), from the point of view of importance. This implies a particular cultural perception: outsourcing is a novelty in an environment that favors vertical integration.

Performance is linked with evaluations (EVALU), indicating an adequate correspondence between firm’s policies and practices. ECR is related directly to outsourcing, but in the opposite direction to the usage of integration with suppliers. This constitutes a logistic opportunity.

The use of benchmarking appears related to the variables just mentioned, as a tendency to perform better than competitors.

Cross-docking is linked to integration in the direction of the supplier, reflecting exigencies from the latter, more than initiatives from the supplier.

The importance of developing a network with suppliers and customers contrasts with the (opposite) relation assigned to outsourcing. The perception of the outsourcer as an intruder to the network is significant and suggests cultural misalignments. This topic is further explored in the next section.

Outsourcing

Only outsourcing of transportation is both perceived as important and widely used (Figure 6). Other activities show important gaps between perceived importance and use, denoting the implicit conflict between control and efficiency.

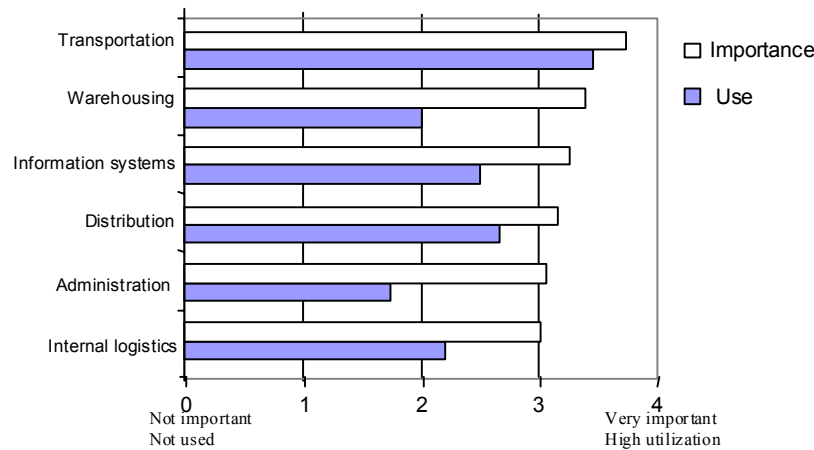


Figure 6. Perceived importance and utilization of outsourcing

The ranked reasons to outsource were focus on core competencies, improvement in service quality, better use of resources and cost reduction. The relative perception of reasons to outsource points out to a tight relation between cost reduction and efficient use of resources, besides the association with service quality improvement. This suggests an implicit direct relation between quality and cost, which may be caused by cultural factors. Table 9, a correlation study, shows the relation among these variables

		Correlations			
		REACORE	REQUAL	REARESO	REACOST
Pearson Correlation	REACORE	1.000	.544*	.667**	.210
	REQUAL	.544*	1.000	.584**	.347
	REARESO	.667**	.584**	1.000	.422*
	REACOST	.210	.347	.422*	1.000

Correlation is significant at the 0.01 level (2-tailed) and (*) at the 0.05 level (2-tailed).

Table 9. Correlation among reasons to outsource

Therefore the quality of the provided service and efficiency are perceived as the firms’ core objectives, and not cost reduction. This view could be caused by the relatively small size of the market in Venezuela.

When asked to report why not to outsource, the responses show a particular pattern: every variable analyzed (non-available services, costlier, confidentiality, and control and legal restrictions) becomes

independent. This is shown as a correlation analysis in Table 10, which shows quite differentiated perceptions about each one of the surveyed variables.

Correlations

		NOUTCONT	NOUTUNAV	NOUTCOST	NOUTPROT	NOUTLEGA
Pearson Correlation	NOUTCONT	1.000	-.283	-.105		
	NOUTUNAV	-.283	1.000	.161	.121	-.311
	NOUTCOST	-.105	.161	1.000	.097	.093
	NOUTPROT	.108	.121	.097	1.000	.023
	NOUTLEGA	.217	-.311	.093	.023	1.000

Table 10. Correlation among reasons to avoid outsourcing

Information Technology

To study relations between technology availability (AVA prefix) and its use- (USE prefix) seven types of technological resources were proposed to the surveyed managers: integrated systems, bar coding, tracking facilities, GIS, GPS, EDI, and Internet/Web (same order of appearance in the respective table). The reported usage was concentrated in integrated systems and bar coding technology. More than 60% of the respondents reported the other resources as unknown or not used in their firm (shown in the right axis of Figure 7 as % of companies reporting availability of IT).

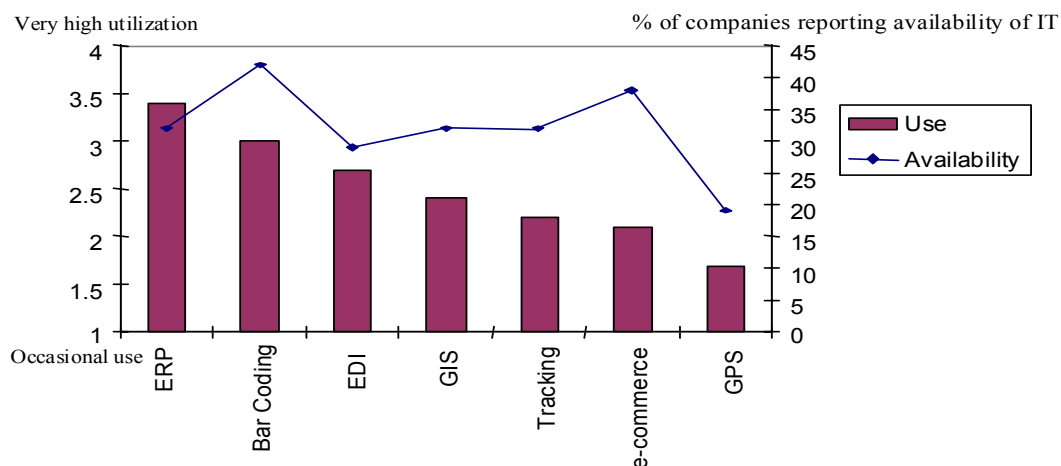


Figure 7. Availability and use of logistics-related IT

Table 11 introduces the results of a correlation study among these variables.

Correlations

		AVAERP	AVABAR	AVATRACK	AVAGIS	AVAGPS	AVAEDI	AWAWEB
Pearson Correlation	AVAERP	1.000	.827**	.510	.510	.498*	.681*	.302
	AVABAR	.827**	1.000	.177	-.229	-.234	.735*	-.081
	AVATRACK	.510	.177	1.000	1.000**	.575*	.586*	.664*
	AVAGIS	.510	-.229	1.000**	1.000	.866**	.559	.704*
	AVAGPS	.498*	-.234	.575*	.866**	1.000	.501	.592*
	AVAEDI	.681*	.735*	.586*	.559	.501	1.000	.630*
	AWAWEB	.302	-.081	.664*	.704*	.592*	.630*	1.000
	USEERP						.000	-1.000**
USEBAR	.a	.a	-.701	.091	.000	-.686	-.686	
USETRACK	.500	-.756	-1.000**	1.000**	.a	.a	-.866	
USEGIS	1.000**	.962*	.a	.a	.a	.a	.500	
USEGPS	.a	.a	.a	.a	.a	.a	.a	
USEEDI	.866	.a	.a	.a	.000	.a	.a	
USEWEB	-.560	.a	.000	-.079	-.065	.a	.a	

		USEERP	USEBAR	USETRACK	USEGIS	USEGPS	USEEDI	USEWEB
Pearson Correlation	AVAERP	.a	.a	.500	1.000**	.a	.866	-.560
	AVABAR	.302	.a	-.756	.962*	.a	.a	.a
	AVATRACK	.500	-.701	-1.000**	.a	.a	.a	.000
	AVAGIS	.a	.091	1.000**	.a	.a	.a	-.079
	AVAGPS	.a	.000	.a	.a	.a	.000	-.065
	AVAEDI	.000	-.686	.a	.a	.a	.a	.a
	AVAWEB	-1.000**	-.686	-.866	.500	.a	.a	.a
	USEERP	1.000	.206	.213	.041	.218	.000	.162
	USEBAR	.206	1.000	-.069	.427	.486	.448	.297
	USETRACK	.213	-.069	1.000	-.379	.925**	.539	.261
	USEGIS	.041	.427	-.379	1.000	.088	.340	.637
	USEGPS	.218	.486	.925**	.088	1.000	.899**	.971**
	USEEDI	.000	.448	.539	.340	.899**	1.000	.102
	USEWEB	.162	.297	.261	.637	.971**	.102	1.000

(**) Correlation is significant at the 0.01 level (2-tailed) and (*) at the 0.05 level (2-tailed)
 (a) Cannot be computed because at least one of the variables is constant.

Table 11. Correlation among availability and use of technology

From both tables, integrated systems are perceived as in tight relation with bar coding, EDI and satellite positioning, but only linked to geographical databases. It could be a bias caused by the selling strategies of such equipment providers.

Tracking is associated with geographical databases, in contrast with the opposite relationship assigned to shared applications with suppliers and customers. This points out power conflicts derived from information control. In Venezuela, it is common to relate power to information access.

It is important to mention the quite perfectly opposite relationship between tracking availability and usage, as a different behavior than the observed with geographical databases where the relation is direct.

The use of Internet is perceived as associated to all the recent tendencies (tracking, GIS, GPS, EDI, etc.) with opposite relation to the use of integrated systems. It looks like Internet is viewed as the way to avoid direct integration efforts.

Satellite technology is linked to EDI, Internet and tracking. This coincides with the systems operated by some foreign package carriers.

A total of eight explanatory variables for the adoption of IT were considered: precision, information comprehension, speed, accessibility along the supply chain, facilities to develop internal communications, professional appearance, transparency, and attraction and retention effect (in this order of appearance in the correlation table). The main reasons argued by the firms to use information technology are speed and precision, correlated, as is speed and internal communications (results of the study of correlation are showed in Table 12).

		Correlations							
		PRECIS	COMPREH	SPEED	ACCESS	INTCOMM	APPEAR	TRANSPAR	RETENT
Pearson Correlation	PRECIS	1.000	.318	.432*	.073	.225	.282	-.035	-.300
	COMPREH	.318	1.000	.360	.106	.426*	.228	-.012	-.065
	SPEED	.432*	.360	1.000	-.054	.402*	-.069	.291	.020
	ACCESS	.073	.106	-.054	1.000	.313	.375	.357	.442*
	INTCOMM	.225	.426*	.402*	.313	1.000	.105	.285	.316
	APPEAR	.282	.228	-.069	.375	.105	1.000	.277	.236
	TRANSPAR	-.035	-.012	.291	.357	.285	.277	1.000	.495*
	RETENT	-.300	-.065	.020	.442*	.316	.236	.495*	1.000

(*) Correlation is significant at the 0.05 level (2-tailed).

Table 12. Relations among reasons for using IT in logistics

Transparency and accessibility are related to the market (attraction and retention effect), while the comprehension of information is linked to internal communications. This points out to providing information to internal clients but only data to external ones.

Future tendencies in IT use

When asked to identify which technologies are more likely to impact logistics, respondents ranked first product tracking, advanced planning capabilities (APS-type) and automated/intelligent infrastructure. This indicates links between flexible/dynamic resource planning and flexibility to respond to product innovations, indicating a tendency to improve the information available to the client.

Reported Performance In Logistic Activities

Although logistic performance is comparable to the reported by the Council of Logistics Management (CLM), in terms of lead-time, order filling and precision, there are important gaps between the customer’s needs and suppliers’ performance.

Anyway, in all the reported cases, the performance required (and obtained) by the customer is better than that required and obtained by the suppliers.

This shows an important opportunity for a third party to manage the whole supply chain.

Average performance is shown in Table 17.

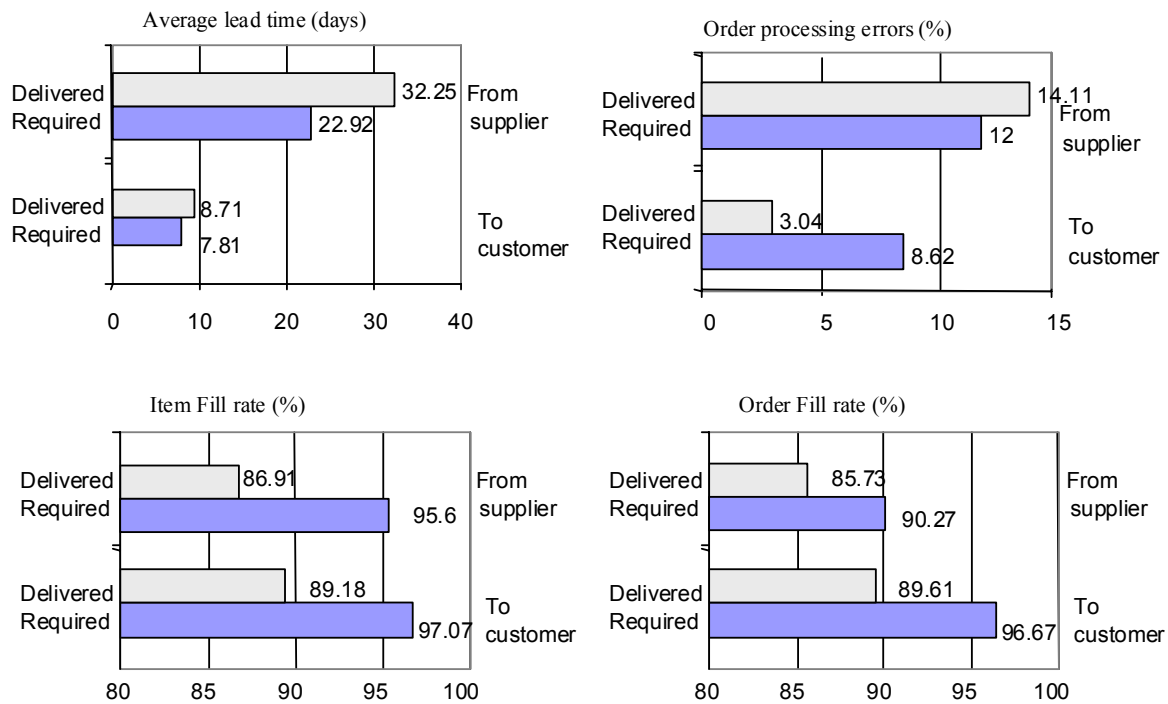


Table 17. Reported performance for performance in logistic activities

Concluding Remarks

Logistic practices adopted in Venezuela follow conservative strategies. The market characteristics – small size, lack of service providers- conspire against the development of outsourcing practices. This, in one hand, and the negative perception of outsourcing, on the other, creates opportunities for third party logistics activities focused on delivering appropriate services with cost efficiency in strategic alliances. As predicted by the analysis these activities have slowly developed in Venezuela since the survey took place.

Information technology tools have been slow to adapt by leading companies that disregard recent trends and favor the use of mature technologies has been chosen as the safest strategy, even when there are important gaps between the customers' needs and the services delivered by the suppliers.

The transactional focus of the relevant actors limits the long-term vision of the business, favoring vertical integration and excluding any possible loss of power that could result from the use of best practices in logistics.

Integration of the supply chain is the key pending issue in order to develop the logistic potential of Venezuela. Although some qualifiers are present (geographic positioning and human resources availability), the lack of infrastructure and technology slows down the implementation of logistic practices focused on improving the services delivered by means of cost reduction and quality improvement.

Appendix 1

The following table (A.1) presents the definitions of the reported variables, alphabetically ordered.

NAME	DEFINITION
3PCHANN	Degree of importance assigned to the outsourcing of distribution channels as a success factor
ACCESS	Reason perceived to use information technology: Information accessible by consumers and suppliers
AFTSALES	Degree of importance assigned to after sales service as a success factor in developing logistics
APPEAR	Reason perceived to use information technology in the firm: Professional appearance
AVABAR	Degree of technology availability in the firm: Bar Coding
AVAEDI	Degree of technology availability in the firm: Electronic Data Interchange(EDI)
AVAERP	Degree of technology availability in the firm: Integrated systems (ERP)
AVAGIS	Degree of technology availability in the firm: Geographic Databases (GIS)
AVAGPS	Degree of technology availability in the firm: Satellite Positioning Systems (GPS)
AVATRACK	Degree of technology availability in the firm: Electronic Tracking
AVAWEB	Degree of technology availability in the firm: E-Commerce via WEB
CLIENTS	Importance of long-term relationship with clients as a key factor in logistics development
COMPETIT	Perceived importance of foreigner competition impact as a threat to logistics development
COMPREH	Reason perceived to use information technology in the firm: Information's degree of comprehension
COSTS	Importance perceived of low transportation costs to measure success in developing logistics
DELIVER	Degree of importance assigned to lead-time as a success factor in developing logistics
ENVIRON	Uncertainty about economic environment as a threat to logistic activities' development
FIFTHCRI	Fifth criterion to select providers and be selected as provider: geographic location
FIRSTCRI	Most important criterion to select providers and be selected as provider: quality
FOURTCRI	Fourth criterion to select providers and be selected as provider: response flexibility
IMPADM	Degree of importance assigned to the outsourcing of logistic-related administrative tasks
IMPBENCH	Degree of importance assigned to benchmarking as a successful logistics practice
IMPCLIEN	Degree of importance assigned to integration with clients as a good practice
IMPCROSS	Degree of importance assigned to Cross-Docking
IMPDISTR	Degree of importance assigned to the outsourcing of distribution activity
IMPECR	Degree of importance perceived of Efficient Consumer Response (ECR) as a successful practice
IMPINFSY	Degree of importance assigned to the outsourcing of information systems
NAME	DEFINITION
IMPINLOG	Degree of importance assigned to the outsourcing of internal logistics activities
IMPOUTS	Importance assigned to outsourcing as a successful logistics practice

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IMPPERFO	Importance assigned to formal performance evaluation as a good business practice in logistics
IMPSUPPL	Degree of importance assigned to integration with suppliers as a successful practice
IMPTRANS	Degree of importance assigned to transportation activity in the firm
IMPWAREH	Degree of importance assigned to the outsourcing of warehousing activity
INFRAST	Importance assigned to the lack of adequate transport infrastructure as a threat to logistics
INTCOMM	Reason perceived to use information technology in the firm: Internal communication
NEEDS1	Leading practice used to identify clients' logistics requirements: market research
NEEDS2	Second practice to identify clients' logistics requirements: surveys to clients
NEEDS3	Third practice to identify clients' logistics requirements: analysis of services provided by competitors
NEEDS4	Fourth practice to identify clients' logistics requirements: focus groups with clients
NET	Importance of a reliable supplier's network to measure success in developing logistics
NOUTCONT	Reason argued to avoid outsourcing of logistics activities: Loss of control (power)
NOUTCOST	Reason argued for not outsourcing: Outsourcing is more costly than doing internally
NOUTLEGAL	Reason argued to avoid outsourcing of logistics activities: Legal obligations/labor relations
NOUTPROT	Reason argued to avoid outsourcing of logistics activities: Protection of reliability/intellectual property
NOUTUNAV	Reason argued to avoid outsourcing: Service/Capacity is unavailable in the market
OWNCHANNEL	Degree of importance assigned to directly-owning distribution channels as a success factor
PERSON	Lack of qualified personnel as a threat to logistic activities' development
PRECIS	Reason perceived to use information technology in the firm: Information's degree of precision
REACORE	Reason argued to outsource logistics activities: Focus on core activities
REACOST	Reason argued to outsource logistics activities: Cost-Reduction
REAQUAL	Reason argued to outsource logistics activities: Improvement of service quality
REARESOURCE	Reason argued to outsource logistics activities: Better resource's usage
RETENT	Reason perceived to use information technology in the firm: Attract and retain clients
SECONCRI	Second criterion to select providers and be selected as provider: delivery reliability
SERVICE	Perceived impact from lack of efficient custom services as a threat to logistics development
SPEED	Reason perceived to use information technology in the firm: Speed
THIRDCRI	Third criterion to select providers and be selected as provider: price
TRANSPAR	Reason perceived to use information technology in the firm: Transparency to clients and suppliers
UNKNOW	Importance assigned to absence of knowledge about exportation markets as a

N	logistics threat
USEADM	Utilization of outsourcing in billing and collect
USEAPLIC	Degree of usage in your firm: Shared-applications with suppliers and clients
USEBAR	Degree of usage in your firm: Bar coding
USEBENCH	Practice's degree of usage: Benchmarking
USECLIEN	Practice's degree of usage: integration with clients
USECROSS	Practice's degree of usage: Cross-Docking (CD)
USEDISTR	Utilization of outsourcing in external distribution
USEECR	Practice's degree of usage: Efficient Consumer Response (ECR)
USEEDI	Degree of usage in your firm: Electronic Data Interchange(EDI)
USEERP	Degree of usage in your firm: Integrated systems (ERP)
USEEVALU	Practice's degree of usage: Formal performance evaluation
USEGIS	Degree of usage in your firm: Geographic databases (GIS)
USEGPS	Degree of usage in your firm: Satellite Positioning Systems (GPS)
USEINFSY	Utilization of outsourcing in information systems support
USEINLOG	Utilization of outsourcing in internal distribution
USEOUTSO	Practice's degree of usage: Outsourcing
USESUPPL	Practice's degree of usage: integration with suppliers
USETRACK	Degree of usage in your firm: Electronic tracking
USETRANSPORT	Utilization of outsourcing in transportation
USEWAREHOUSE	Utilization of outsourcing in warehousing
USEWEB	Degree of usage in your firm: E-commerce via WEB

Table A.1 Definitions of the reported variables

Appendix 2. Variance analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.103	30.044	30.044	2.103	30.044	30.044	2.086	29.803	29.803
2	1.782	25.459	55.503	1.782	25.459	55.503	1.542	22.022	51.825
3	1.122	16.029	71.532	1.122	16.029	71.532	1.380	19.707	71.532
4	.949	13.560	85.092						
5	.570	8.143	93.235						
6	.268	3.833	97.067						
7	.205	2.933	100.000						

Extraction Method: Principal Component Analysis.

Table a1. Total explained variance for key elements in the logistic strategy

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.121	35.358	35.358	2.121	35.358	35.358	1.954	32.575	32.575
2	1.290	21.505	56.863	1.290	21.505	56.863	1.457	24.288	56.863
3	.917	15.277	72.140						
4	.799	13.312	85.453						
5	.690	11.505	96.958						
6	.183	3.042	100.000						

Extraction Method: Principal Component Analysis.

Table a2. Total explained variance for threats to logistics development

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.256	30.396	30.396	4.256	30.396	30.396	2.822	20.156	20.156
2	3.257	23.266	53.663	3.257	23.266	53.663	2.645	18.892	39.048
3	2.096	14.971	68.634	2.096	14.971	68.634	2.640	18.857	57.905
4	1.762	12.584	81.218	1.762	12.584	81.218	2.503	17.878	75.784
5	1.265	9.032	90.250	1.265	9.032	90.250	2.025	14.467	90.250
6	.996	7.112	97.362						
7	.369	2.638	100.000						
8	2.856E-16	2.040E-15	100.000						
9	2.203E-16	1.574E-15	100.000						
10	1.668E-16	1.191E-15	100.000						
11	-6.46E-17	-4.61E-16	100.000						
12	-1.05E-16	-7.51E-16	100.000						
13	-2.57E-16	-1.84E-15	100.000						
14	-5.08E-16	-3.63E-15	100.000						

Extraction Method: Principal Component Analysis.

Table a3. Total explained variance for logistic practices and techniques

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