

Selection and Use of Energy Efficient Opportunities in Logistics vs. Customer Purchasing Behavior: case studies on Argentinean and Colombian organizations using Dynamic Alignment models.



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ABSTRACT

The selection and use of appropriate energy efficient technologies, systems or devices present a challenge for organizations across diverse supply chains. The list of activities currently being trialed and promoted is extensive, with new technologies and methods constantly emerging. However, the degree to which even proven energy efficiency measures are adopted by logistics practitioners varies dramatically. Such adoption variations are present despite the support of company or governmental policies.

This paper aims to explain operational decisions in the adoption of energy efficiency measures, specifically in those activities surrounding transportation, through the use of “customers’ purchasing behaviors”, as defined by the Dynamic Alignment framework. Two studies are presented. The first one, conducted in Argentina with national and international companies across a range of industrial sectors, provide rich insights into why study participants (hands on operational) may deviate from stated organizational sustainability goals. The second study is currently being performed in Colombia, and illustrates how the Dynamic Alignment framework can be used to understand how policies in support of energy efficiency may be received by market participants, and potential strategies that could encourage or enhance adoption could be devised.

Keywords: Dynamic Alignment, energy efficiency, transport, logistics, heavy vehicles, behaviour

Introduction

Sustainability and energy efficiency are increasingly important issues for both public and private organisations in Latin America. The potential benefits of energy efficiency, both in environmental and monetary terms have been well established by organizations such as the United Nations Industrial Development Authority (UNIDO)ⁱ. Companies participating in global supply chains are under ever more scrutiny, with their environmental strategies and performance being monitored by programs such as the Global Reporting Initiative and CDP.

When it comes to the operational arena, however, there can be significant gaps between stated organizational goals and practice, and the operational managers' decisions. Operations managers often face contradictory demands in regards to transport and warehousing. Identifying which resource efficient technologies, systems or devices will provide requisite customer service without compromising operational and financial viability is an ever evolving question.

Some sustainable actions, e.g. aerodynamics, are long proven to reduce fuel consumption. The transport or logistics decision maker's perception of these technologies' potential, however, quite often differ from academic or industry proof and not be used or even offered to their customer, raising comments as contradictory as these ones from three respondents from the study:

- 1- *'We pay by ton transported, so anything that increases tare weight is taken away. Therefore, our transport suppliers rip off their vehicles of cab extenders, fairing, trailer skirts, etc. They buy good, powerful prime movers because of the type of road, but the best brands bring all this extra weight which has to be taken off''*
- 2- *'Our transport suppliers buy the cheapest truck, and we pay for all the aerodynamics fitting because we checked and they reduce fuel consumption, which ultimately impacts on the negotiation'.*
- 3- *'We have a few customers who want everything that is new and relates to safety; no matter how much it costs, they want it. However, most customers just want the cheapest we can do, and find that aerodynamics are a 'fashionable cost' they are not willing to pay. And there is no explaining of the benefits to these customers, so we just built as per requested'*

This investigation examines the use, lack of use and awareness of resource efficient technologies in the transport and logistics sector in Argentina and Colombia. By interviewing decision makers from this sector, and utilizing the innovative Dynamic Alignmentⁱⁱ, a form of segmented supply chain response, the study attempts to understand the use of technologies by the logistics sector from the point of view of their market, taking into account organizations' business strategies, organizational culture and leadership.

Dynamic Alignment has been demonstrated to improve the financial and productivity performance of supply chains such as Dellⁱⁱⁱ, and DHL^{iv}. The successful incorporation of energy and climate into its frameworks would present supply chain managers with a comprehensive model to incorporate efficiency measures in sympathy with their clients' purchasing behaviors and operational

needs. The insights could help understand how policies in support of energy efficiency may be received by market participants, and devise potential strategies that could encourage or enhance adoption.

Dynamic Alignment Framework

The Dynamic Alignment methodology is based on the premise that people drive supply chains, in the form of customers, suppliers, and staff. Everything else (technology; infrastructure; assets) are simply enablers (or inhibitors). The dynamic alignment model links marketplace and strategy, with internal cultural capability and leadership styles in the workplace. These four elements can be measured and described via a behavioral metric, or ‘logics’, as Dr.Gattorna and Dr.Chorn, the methodology developers, call them. The model is based on Carl Jung’s work on personality types^v, and Adizes and Faust coding system^{vi}, which resolved and simplified Jung’s original framework and identified four key behavioral types (P-A-E-I).

The behavioral coding system developed by Drs. Gattorna and Chorn re-labels Adizes and Faust’s four behavioral forces to P-A-D-I, which stands for Producer, Administrator, Developer and Integrator respectively. The four elements of the P-A-D-I logic produce 16 possible combinations, each with a different “center of gravity” which can be defined as the ‘dominant logic’ and coded by its primary and secondary parameters. For example, an Ia logic would imply that there is a strong preference for cohesion with emphasis on trust and quality of relationships (I logic as primary), with lesser preference for reliability and price (A logic being secondary). While there could be some preference for flexibility and innovation (D logic), as for speed and results (P logic), these last two are not as strong as the first ones. Figure 1 shows the general characteristics of the dominant behavioral logics.

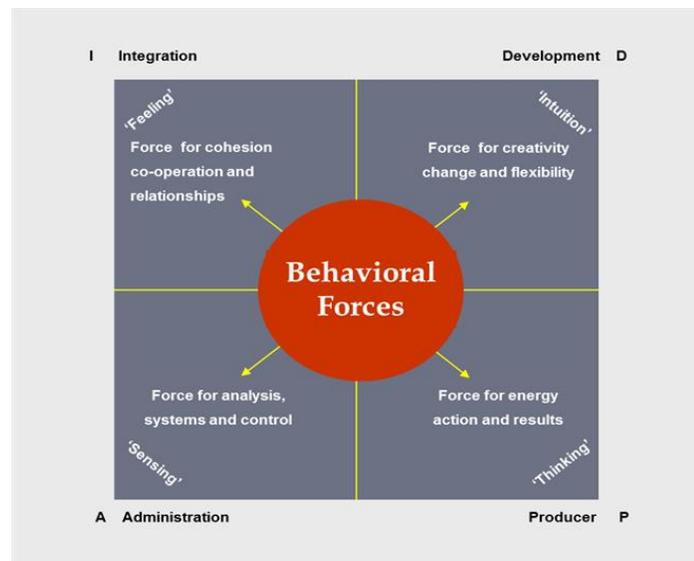


Figure 1. General Characteristics of the Four Dominant behavioral forces

The four elements of dynamic alignment (marketplace, strategy, corporate culture and leadership) are then coded according to the four dominant behavioral forces, in order to determine, for example, marketplace buying behavior of a particular product or service in a specific context.

Rapid Diagnostic

One way to assess rapidly the overall degree of alignment (or misalignment) of the respondent's organization is to use a tool called 'quick dynamic alignment diagnostic'. For the purpose of this proof of concept study, the quick diagnostic was considered adequate by the researchers. This diagnostic gives 32 questions, eight per each element of the dynamic alignment framework, and then two groups of four questions each. Each question is phrased so that the respondent rates his/her agreement/disagreement, in a five point Likert scale. The rates provide a score, which is later graphed to show the 'alignment' or 'misalignment' the respondent perceives there is between the organization and the marketplace. This word 'perception' is extremely important since, as it will be shown later in the empirical framework, respondents from the same organization have a different alignment perception, possibly as a result of their position in the company, or other proprietorial behavioral parameters that are not in the scope of this study.

The first eight questions of the diagnostic refer to the first element of the framework, Marketplace. Respondents are requested to think about their industry or market in its broadest sense. The first four questions deal with the 'Competitive Intensity', which actions the concentration of commercially aggressive behavior between competing enterprises. The next four questions deal with 'Uncertainty', which actions the degree of discontinuous change in a marketplace.

The next eight questions refer to the second element of the framework, the organization's Business Strategies. Two factors describe this element, 'Risk and Reward' (defined as the trade –offs between risks taken and the potential rewards sought) and 'Strategic Posture'. Business strategies link the organization's capabilities to the marketplace. The third element, Organizational Culture, questions respondents on 'Focus' (defined as the effort the organization exerts to improve its on-going viability and well-being) and 'Control' (how it achieves integration and coordination to implement its efforts). It is key to have the appropriate internal capabilities to deliver the strategies. Last, questions about Leadership, the fourth element of the framework, focus on 'Orientation', which actions the extent to which a manager is sensitive to teams or individuals, and 'Preference', which actions the manager's preference for thought or action. Plotting the scores allows the researcher to assess the four primary dominant behaviors for each element. These primary behaviors are described in Table 1.

Table 1. Four primary dominant behaviors for each element of the dynamic alignment framework

	P	A	D	I
<i>Marketplace</i>	Competitive	Stable	Turbulent	Forgiving
<i>Business Strategy</i>	Operational	Evolutionary	Pathfinder	Protective
<i>Org. Culture</i>	Rational	Hierarchical	Entrepreneurial	Group
<i>Leadership</i>	Company Baron	Traditionalist	Visionary	Coach

Table 1 illustrates the sixteen combinations that are available from these four dominant primary behaviors. The names of these behaviors are not written on stone, and their interpretation vary to make sense within the market studied. For example, a study made in Brazil^{viii} on cattle ranchers named their typical behaviors from ‘talkative’ to ‘e-ranchers’, so that the person to visit them would know that with the first ones extra time to talk in person should be allowed before doing business, while the latter preferred to deal mostly through the internet.

The empirical study

The aim of the study was to see if there is a correlation between the buying behaviors exhibited by the study participants and their awareness and use of energy efficiency actions. Demonstrating that the framework is able to accommodate sustainability issues is the first step in a broader research effort to establish how the Dynamic Alignment framework might be used to address energy efficiency issues in harmony with broader organizational goals.

Study structure

The study was divided into two parts. Firstly, the participants responded to an online ‘dynamic alignment rapid diagnostic’ as described in the previous section. The diagnostic would categorize the participants, their markets and strategies with respect to the PADI framework.

Secondly, participants were interviewed (face to face or over the phone), with respect to their awareness and use of a list of efficiency actions within the logistics operation of their organization. The list was presented to the participants via a spreadsheet containing descriptions of each activity, with pictures to aid understanding where appropriate, as shown in Figure 2.

Action	Description	Response	Impact			Sector Application				Supply Chain Type
			Social	Economic	Environmental	Metro		Long Haul		
elements	weight of vehicle		quality.	Increased cargo capacity	Reduced particulates	Cold Chain	Standard	Cold Chain	Standard	Innovative
	Figure 7. Two floor semitrailer with lift, 40 cm ground clearance and 4m box height, length 16.50 m, single wheel suspension on semitrailer for volume transports.									
Increased trailer volume						✓	✓	✓	✓	Innovative
Tyre selection										
Low rolling resistance tyres						✓	✓	✓	✓	Collaborative
										Reduced particulates

Figure 2. Screenshot of efficiency actions list

The list contained thirty one efficiency actions for the transport and logistics sector. The majority of the actions are applicable to all sectors, but some sector specific opportunities were also included. The researcher edited the list for each participant to ensure only appropriate actions were presented to participants.

The actions range from the well proven in the field to the theoretically or academically proven, with many questions still surrounding their use. Based on the actions level of maturity, they were categorized by buying behavior, in line with Table 2. These categorization however we not shared with the study's participants.

Table 2. Efficiency action categorization

Efficiency Action Classification	Description	Efficiency action
Efficient (A)	Appropriate for lean, efficient types of buying behaviour, where the focus is on economies of scale, synergies and lowering the costs. The cost benefits of the action are well established in the field, and represent good value for money in addition to their positive sustainable impacts. No sharing of costs to finance the actions would be expected on the side of the customer/supplier.	<ul style="list-style-type: none"> • Tire Pressure • Air curtains • Vehicle speed • Cab extender • Cab fairing • Bumper dam • Aerodynamically shaped side mirrors
Collaborative (Ia)	The benefits of these actions are known and usually proven, however their successful implementation would require the collaboration of both service provider and client. The focus is on developing relationships with trust and reliable service, therefore, a willingness to engage in trials to demonstrate the effectiveness of the actions, even to share the investment costs for mutual benefit	<ul style="list-style-type: none"> • Eco drive techniques • High Capacity Vehicles B-double type • Low rolling resistance tires • Super wide tires • Auto-inflation • Trailer skirts • Auxiliary Power Units
Innovative (Dp)	These actions are for those who require innovative solutions to improve responsiveness. Customers/suppliers with this type of behaviour are willing to engage in new practices and trial new equipment, even willing to pay a premium to be able to demonstrate they are at the leading edge.	<ul style="list-style-type: none"> • Light weight structural elements • Increased trailer volume • Trailer tail • Liquefied Natural Gas • Hybrids • Ethanol • Biodiesel • Shore Power • Liquid Nitrogen refrigerated containers • Coopetition

Participants could select from five possible answers to each action available:

- I am aware of the action and consider it to be appropriate for my business
- I am aware of the action but consider it to be inappropriate for my business
- I am unaware of the action, but consider it inappropriate for my business
- I am unaware of the action, but consider it appropriate for my business
- I am unaware of the action

The interviewees also provided comments on the use or lack of use of the actions too, and all of them showed interest and engagement in the interview. A few of these comments will be provided in the results

Participant profile

This paper addresses the responses from two distinct groups, one in Argentina and one in Colombia.

Argentine Study

In this study, conducted between June and September 2013, the Dynamic Alignment framework is applied to the transport and logistics elements of thirteen major companies in Argentina, in the food processing, logistics, cement, forestry and vehicle manufacturing sectors. Eleven of the participating companies were multinationals with a presence in Europe and North America.

Transport and logistics was selected as it is an energy intensive sector with energy accounting for over 20% of operating costs. Efficiency actions would have significant economic benefits and should be readily embraced by operators. Non-adoption would be more readily associated with organizational or behavioral issues. In addition, one of the researchers has extensive relationships with the respondents which allowed for a degree of openness from the participants and understanding of individual circumstances which aided the validation of the framework, particularly important at this proof of concept phase.

The interviewees were, at the time of writing, in decision making positions within the logistics and commercial areas of their companies, or are CEOs/owners. From the fifteen respondents, eleven belong to large multinational groups, and four to medium domestic organizations. In two of the organizations, two respondents were interviewed, one being more “hands on operational” while the second dealt with clients on a commercial level. Since the method is based on the ‘individual’ decision making process, the researchers wanted to check if their position in the company and other personal characteristics influenced their answers regarding the four elements of the dynamic alignment framework.

Colombia Study

The Colombian study was initiated in February 2014 in Popayán, Cauca, Colombia and, at the time of writing, was still ongoing. The project aims to use the Dynamic Alignment framework to provide a qualitative evaluation of the potential sustainable policies their potential impact on the business community of the city of Popayán.

The questions the study tries to answer are:

1. How to select appropriate sustainable policies for the diverse industrial or business sectors in Popayan?
2. What is the likelihood of the participating sectors to react positively to the policies, i.e. adopt the behavior intended?
3. How might the identified policies impact on the competitiveness of the participating industrial sectors?

The study engages over 50 different organisations across 10 different industry sectors in Popayán. The list of efficiency opportunities was changed to reflect the local policies of Popayán, the regional policies of Cauca and the national policies of Colombia.

Study Results

The overarching aim of this discussion of the results of the studies is to illustrate the utility of the Dynamic Alignment framework in understanding individuals’ decisions regarding the adoption, or not, of energy efficiency opportunities. Selected responses are presented and discussed. The complete set of responses is available from the authors on request. As the participant profile and focus of each of the studies addressed in this paper are quite distinct, the results of each study will be discussed separately.

Argentine Results

Figures 3 presents the results of two companies operating in the logistics industrial sector. These companies work with each other, with L1 supplying logistics services to F1. Given this arrangement it might be expected that both organisations would hold a similar view of market place conditions and correspondingly match their culture, strategy and leadership.

However F1’s perceptions of their market place (**M**) and leadership (**L**) are markedly different to strategies (**S**) they employ. L1 has tried to align it strategies and leadership with what is effectively its market place, i.e. F1. Similar cultures (**C**) ensures a long lasting relationship, which is at the heart of their strategic approach, is maintained.

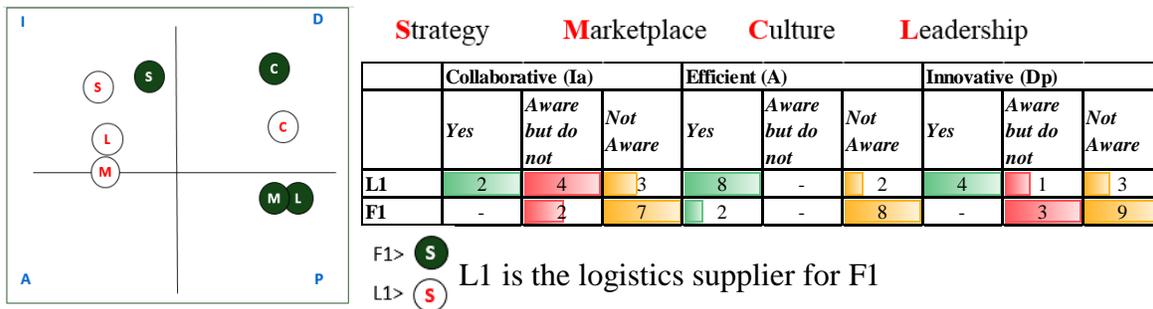


Figure 3. PADI coding & responses to energy efficiency opportunity list for logistics companies

With respect to selecting energy efficiency measures, L1 is the prime decision maker and is significantly more proactive in this area than F1, who displays a low degree of awareness of even well proven, economically viable opportunities. In regard to Innovative opportunities, L1 had considered (and deemed some inappropriate, hence the difference in scores) a much greater number of efficiency opportunities than F1. These results would suggest that the nature of the relationship between L1 and F1 (Collaborative) has dominated the selection of energy efficiency opportunities.

Figures 4 presents the results of two companies operating in two distinct industries, Dairy and cement manufacturing. Both organisation’s leadership operate by consensus and by procedures, which can be slow to react to the marketplace. Dairy’s marketplace is forgiving of such an approach, which

C1's is not. As a result C1's strategies and culture are more closely aligned with market place demands, which require responsiveness both in terms of price and speed.

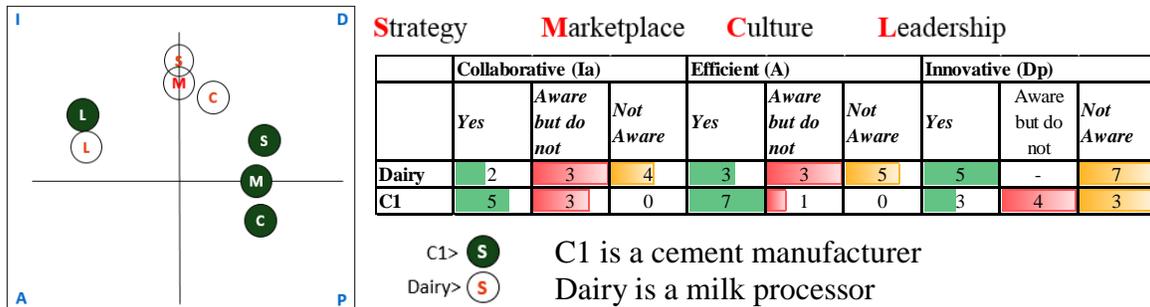


Figure 4. PADI coding & responses to energy efficiency opportunity list for cement and dairy companies

As a result C1 was significantly more proactive with respect to proven cost effective efficiency measures. C1 described using an interventionist approach, trying to help their logistics suppliers to identify savings that would help minimize costs.

Dairy admitted to a hands off and quite often adversarial approach to their logistics providers, with a consequential lower use and awareness of efficiency measures, as it was the contractor's problem. This goes against how they perceive their market, which would suggest that a more collaborative approach would yield better results, similar to L1's relationship to F1 in the previous example.

Colombian Results

The Colombian study is ongoing and, unfortunately, results were no available in time for the publication of this paper. Please contact the authors if you wish to learn more about the outcomes of the Colombian study.

Conclusions and further research

The results provide rich insights into why study participants deviate from organizational strategy and what they perceive their market wants or would be willing to bear. This study is an initial first step in assessing the potential of Dynamic Alignment to develop and manage policies to enhance the adoption of efficiency actions by large organizations.

Significant additional study needs to be undertaken to establish the framework's limitations and when and where its use is most appropriate. For example regulators may wish to develop a comprehensive understanding of market behaviors and how any policies deployed may compliment or clash with existing market imperatives. The completion of the Colombia study will hopefully provide demonstrate the Dynamic Alignment frameworks validity with respect to policy measures.

Internal to a large organization there may be a greater focus on establishing whether market imperatives and organizational strategies and goals are being reflected in the day to day operations. This would necessitate a more comprehensive assessment beyond the rapid diagnostic used in this study.

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