THE DYNAMICS OF STRATEGIC ELECTRICITY-TRADING

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ABSTRACT

As electricity markets are turning competitive, uncertainty becomes a major threat to trading companies. In this environment a single strategic intent seems inappropriate as important endogenous and exogenous variables are not predictable and may have important negative impact on the company's performance.

In this paper, we undertake Markides' idea of a portfolio of strategies (2000, 2001) and apply it to the electricity trading industry. We explore the viability of this approach, that embeds feedback thinking, by using a system dynamics model for a hypothetical electricity market. We use Porter's competitive advantage framework and apply it to three generic strategies in order to examine the idea of a portfolio of strategies. We describe the SD model that was developed for this purpose and present simulation results.

Key words: The dynamics of strategy, electricity trading, system dynamics.

1. INTRODUCTION

As energy markets around the world are being liberalised since the early 1990s, intense competition is emerging, bringing important benefits to customers, with effects on price reductions and the introduction of new types of products and services.

Under the dynamics and uncertainty of energy markets, companies may find appropriate to remain flexible by developing a portfolio of strategies that can be swiftly substituted to respond to the rapid evolving markets (Williamson, 2001). While companies focus on the implementation of a particular strategy, they may develop alternative options for the future (Beinhocker, 2001, Hamel, 2001).

As Hamel (2001) notes, successful companies, such as Home Depot, Amgen, Nike, Intel, Compaq and Gap, grew because they radically change the base of competition in their industries - they either invented new industries or reinvented dramatically the old ones.

Dynamics and Uncertainty

According to Elsenhardt (2001), and Hax and Wilde (2001), the dynamics and uncertainty which are immersed in deregulated energy markets, represent a challenge for strategic planning. Traditional approaches, which used to define strategy intents by responding to the questions of where to go, and how to get there, overestimated managers abilities to analyse and predict which industries and which competencies or strategic positions would be successful and for how long. These approaches also underestimated the construction of effective strategies (Dyner and Larsen, 2001).

The businesses world is less predictable today than what it used to be, and the human mind has proven not to be an appropriate forecasting aid. However, the greatest problem, according to Beinhocker (2001) and Williamson (2001) is people's tendency to identify patterns and interpret situations, associating them

with previously facts, even when there is no connection between them - No one can predict accurately the evolutions of markets in the long-term.

Modern energy markets are growing fast. They are immersed in an uncertain world due to price volatility, rivalry intensity, demand fluctuation and regulatory risk. In this complex world, companies have to deal with imperfect information and a large number of interrelated variables that exceed the capacity of the human mind, making management a difficult task.

Strategy and risk management

During the last twenty years, competency has been the centre of strategic thinking (Kim and Mauborgne, 2001). Managers have been focused on being competitive, improving operational efficiency trough the implementation of different strategic intents such as Total Quality Management, Reengineering, Cost Reduction, Outsourcing, Size Reduction and Focus. However, as Porter stated in 1996, companies have to find a way of growing by creating competitive advantages instead of just eliminating disadvantages.

To perform a plan and to achieve a strategic position that allows a company to reduce risks and benefit from industry's opportunities, it is necessary to understand markets and prepare for its evolution. Although strategy would like to have accurate prediction-tools, most things in the world seemed naturally unpredictable. This is why businesses might consider not to develop a single strategy but a number of strategies that evolve through time. In this sense firms may consider a robust strategic framework that may provide them with satisfactory, rather than optimal, results under different scenarios.

De Gues (1988) and Hamel (2001), both stated that companies must invest in experiments that help them understand new markets and motivate the creation of new strategies, showing new perspectives that allow them to rethink the industry, their services and the company itself. They should invest more time

trying to understand the preconditions that contribute to emergent strategies, as company's survival depends on the management ability to perceive environmental changes and its prompt reaction.

Moving from one strategy to another one

Flexibility is turning important for companies' long-term survival. While companies define and implement one positioning strategy they need to develop a stock of resources and capabilities that allow them to change fast, which may help them redefine strategy according to environmental changes.

According to Markides (2000, 2001), traditional strategic thinking fails to understand strategy from a dynamic point of view; it fails to place the company into its historical context and to consider its evolution as well as the industry's.

Thus, on the development of strategy, companies should be prepared to go along the following thinking loop, presented by Markides (2000) on his book "All the Right Moves" (See Figure 1):

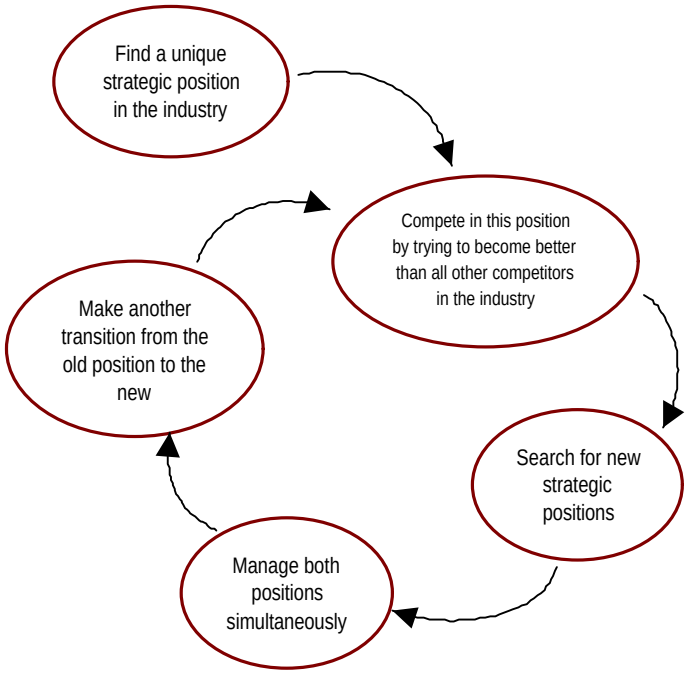

Figure 1.Strategy as a Dynamic, Lifelong Process (Markides, 2000, 2001)

No company can perfectly forecast strategic innovation. Most companies fail when new technology innovations appear on its market, even when they have adopted them, because they do not have the core competencies needed to take advantage of the innovation or because they mishandle the transition between old and new technology.

In the following section, we explore on some likely strategic approaches that might be undertaken in electricity markets. In section 3 we show the main components of the model that was built for the evaluation of Markide's approach. Section 4 exhibit simulation results for a hypothetical case in order to show the consistency of the proposed approach. We finish with some conclusion of our findings.

2. SOME LIKELY STRATEGIC APPROACHES

Porter's Competitive Advantage (1982) seems an adequate approach for companies to attain a sustainable position in their respective industries.

According to Porter (1982) and Hill and Jones (1995), companies can achieve competitive advantages by striving for efficiency, Total Quality Management, innovation and customer satisfaction.

Three Generic Competitive Strategies

According to Porter (1982) and Aaker (1998), the best strategy for a firm is a unique construct that reflects its particular circumstances; it should be based on resources and capabilities of the organization and on its abilities for value creation.

In this sense, Michael Porter suggested three generic competitive strategies to attain a sustainable long-term position. These three strategies, which could be used by energy companies as well as by companies in other industries, allow the firm to stand-out of its competitors.

First Generic Strategy - Cost Leadership: Overcome competency doing everything possible to produce or serve clients at a lower cost than competitors (Hill and Jones, 1995).

The cost-leadership firm gains flexibility because it can stand-out facing price reductions due to rivalry increase; or cost rising as a result of legal restrictions or offer reduction, among others.

Cost leadership is certainly a valuable position, although it is hard to sustain in the long term due to energy prices volatility. However, risk management and information systems could protect the firm against price uncertainty. Once a company becomes cost leader, it gains recognition and customer's loyalty, incrementing its market share, and making possible for the firm to take advantage of economies of scale.

Second Generic Strategy – Differentiation: To do something the market perceives as unique in a way that is valuable to customers (Porter, 1982).

Differentiated companies create their own market niche through innovation and deep understanding of clients' necessities. This position allows companies to charge higher prices for its products and services.

Differentiation lowers the effects that higher production costs might have over companies, because lowering costs is not as important as increasing customers' perception and loyalty.

Third Generic Strategy – Focus or High Segmentation: This strategy is about focusing on a specific group of customers – segment - with particular needs.

The best way to attain segmentation, a company seeks for a market niche that matches the company's conditions to exploit resources and capabilities; a niche with almost no rivalry.

Segmentation strategy, as well as differentiation, need a profound customer understanding and high levels of innovation in order to create new market segments. This strategy is natural among energy markets, where geographical zones, demand or types of contracts could segment clients.

Because focused companies have fewer customers than other companies, they could effectively serve their clients, achieving either differentiation or cost leadership between their selected segment of the market.

In this context of dynamic and unpredictable energy markets, where strategy evolution might be indicated, we turn to assess the viability of this strategic approach with the help of modelling and simulation.

3. SYSTEM DYNAMIC MODELLING

In this section we show a System Dynamics model that represents the pursue of competitive advantage by trading companies in energy industries through capital management and investment policies (Figure 2). Competitive advantage

improves the company's position, in the long term, in comparison to its competitors' position, by increasing profits and allowing the company to improve investment levels to sustain improvement.

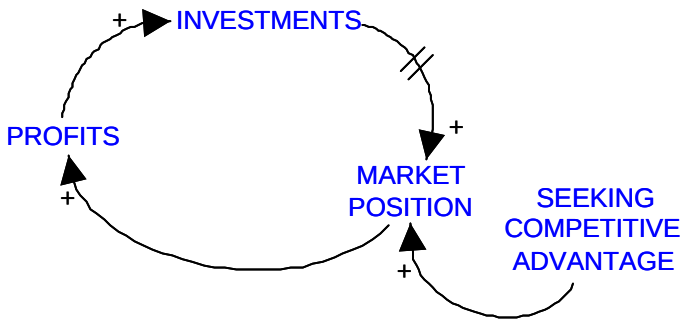

Figure 2.Strategic Position through competitive advantage causal loop.

Investment is required for developing resources and capabilities and to improve the company's performance. The SD model evaluates three main types of investment:

Investment on Process Improvement & Information Technology (PI & IT): Includes research on contracting alternatives, billing, development of new complementary services, information systems and communication tools, among others. This type of investment focuses on research for the improvement of the company's processes, with consequences on total quality management, which increase efficiency (Figure 3) and operational profits, allowing more investment.

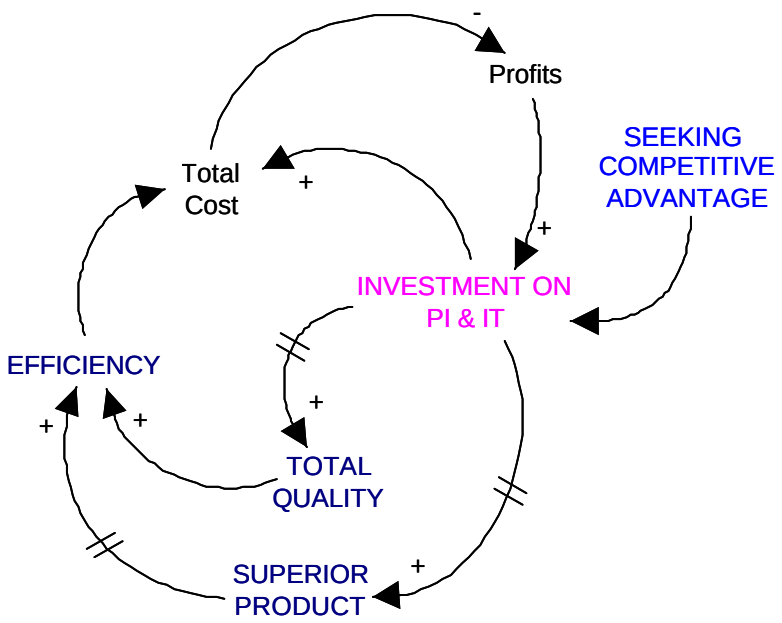

Figure 3. Investment on Process Improvement & Information Technology (PI & IT) causal loop.

Human Development Investment (HD): Company invests on personnel by hiring high quality employees, or when invests on market research, training on system information, risk management and valuation, or people motivation.

Human Development investment impact is similar to the PI & IT one, because they both reduce operational errors while increase efficiency (Figure 4).

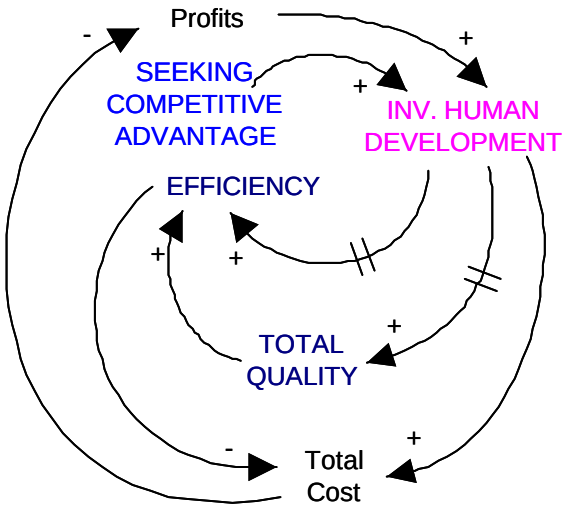

Figure 4.Human Development Investment impact causal loop

Marketing and Services Investment (MS): Focuses on customer satisfaction through high quality complimentary-services, consulting, advertising and corporate image management, improving market product position and lowering customer price perception (Figure 5) allowing the company to increase its market share and its profits due to sales rise.

The balance between different investment alternatives is very important in order to gain sustainable advantages and reach company's goals on profitability, market share and strategic position. Over-investment in one of the three main areas could lead to under-performance.

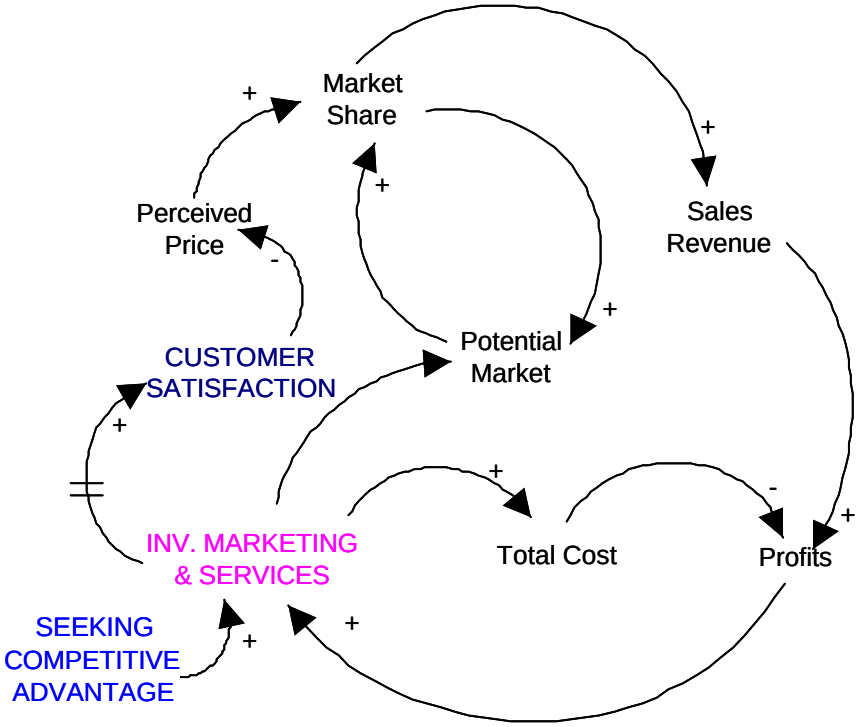

Figure 5. Investment in marketing and services impact causal loop.

An adequate combination of investment alternatives leads the company to gain competitive advantage and strategic position, as represented in Figure 6.

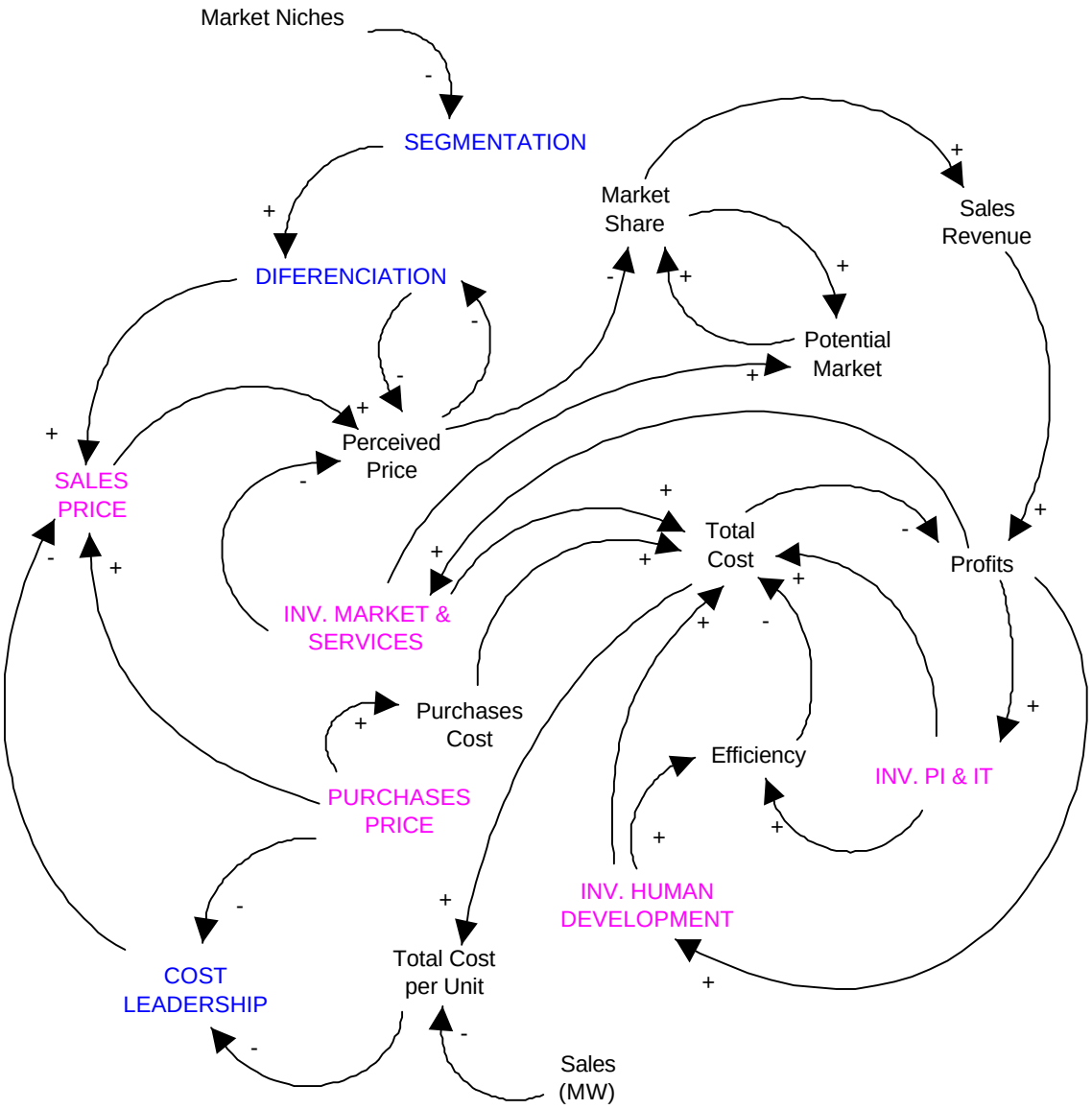

Figure 6. Investment impact on strategic positioning causal loop.

Cost leadership is a consequence of an appropriate purchase policy that allows the company to discover lower prices than its competitors, and of cost reduction due to efficiency improvement because of investment on human development and PI & IT.

Marketing and services investment leads to differentiation improving customers' perception of company's product, which allows price rising. Differentiation is

also influenced by segmentation because segmented companies usually offer particular products for particular clients.

In our SD model, strategic positioning depends on investments: Marketing and Services, Process Improvement & Information Technology, and Human Development, which influence the cost structure of the company and customer's perception. This has an effect on the company's market share and operational profits.

Customer perception is modelled through *perceived price*: This variable expresses customers' valuation of the benefit they would attain when acquiring a product. This perceived price is represented by a function of real price and investments on marketing and services as follows:

$$Perceived\ Price = f(Real\ Price, MS)$$

In the following section, we present results for a hypothetical electricity market, for the purpose of evaluating the viability and consistency of the proposed approach.

4. SIMULATION RESULTS

Figure 7 shows how the difference between Real and Perceived price is changing according to Marketing and Services Investment. During the initial periods there is little investment, thus perceived price is higher than real price, which means that customers prefer the competitors' products over ours. During the following periods, one can observed how perceived and real price are identical, so there is no difference of perception between the product offered by competing companies; but by the tenth period, our increasing investment is reflected on the increasing difference between real and perceived price. Our product is now positioned and customers perceive it better. However, we

cannot keep on increasing our investment level for ever and start slowly reducing it by the end of the planning exercise.

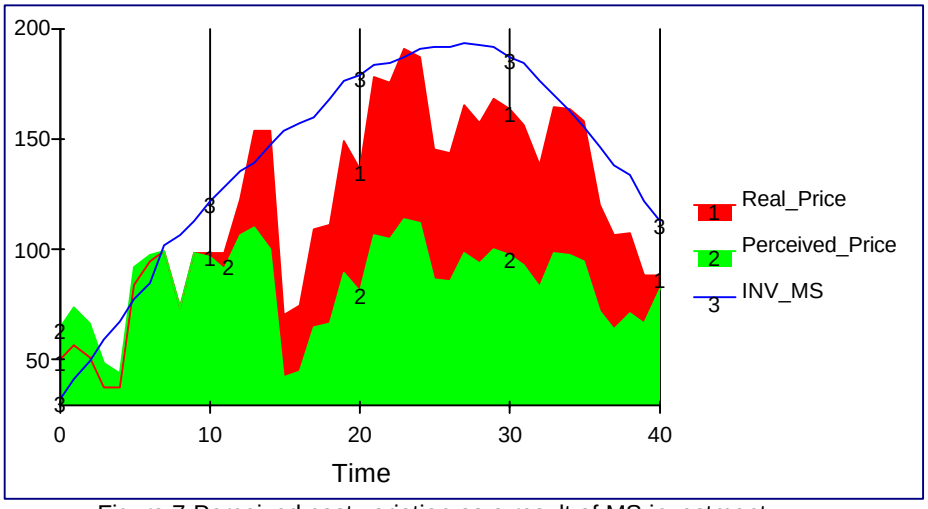

Figure 7.Perceived cost variation as a result of MS investment.

Figure 8 presents Market Share and Profits evolution for the former case. At the beginning, market share and profits are decreasing. This is because the company is just starting to develop its image and brand position - investment levels are increasing but company does not have enough clients to cover its cost. Once its clients recognize company, its profits start to increase and so does market share.

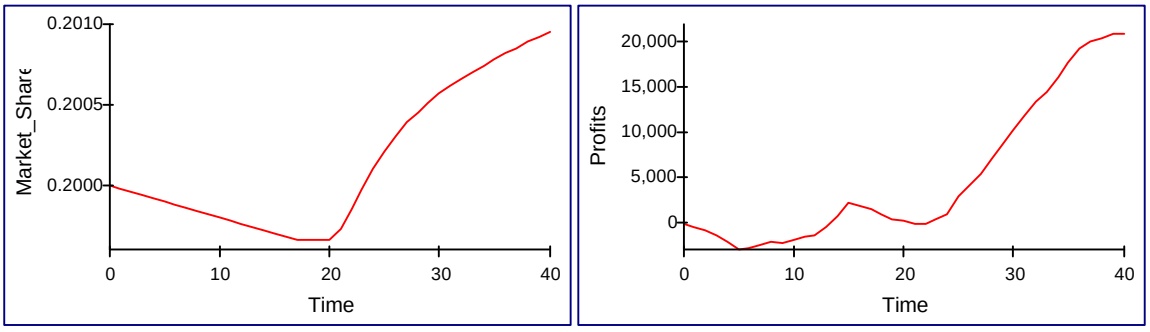

Figure 8. Market Share and Profits evolution

PI & IT and HD investments influence cost structure because of those investments make company more efficient, reducing errors' cost. Figure 9

shows the impact of different PI & IT, and HD investment levels on fixed operational costs. This figure shows how, between the 15-20 period, simultaneous investment on PI & IT and HD could lead to better benefits than isolated investments.

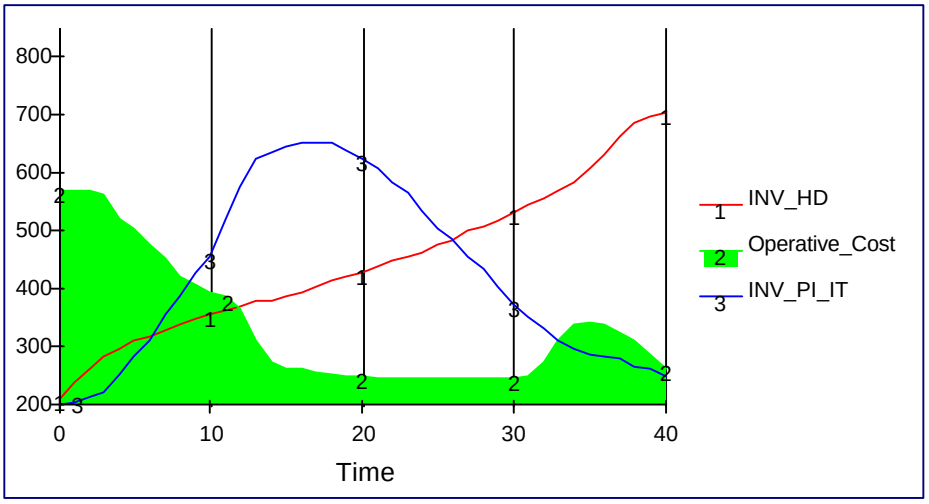

Figure 9. Operational cost variation as consequence of PI & IT and HD investments.

If our company's goal is, for instance, attain cost leadership, then we may invest on HD, on PI & IT, or both. Company's operative cost would reduce and company might achieve its goal. Although, if company's investment level raises above certain point, then the firm might be over-investing and increasing cost rather than reducing it, as can be appreciated on the last ten periods in Figure 9.

Cost leadership is the result of reducing fixed costs and purchases costs. Fixed costs could be reduced by PI & IT and HD investments, while purchases costs are more difficult to control because of its dependence on uncertain market prices. Thus, to attain cost leadership is the consequence of good investment policy on PI & IT and HD, modified by purchase efficiency. The probability of being cost leader increases as operative cost decreases (Figure 10).

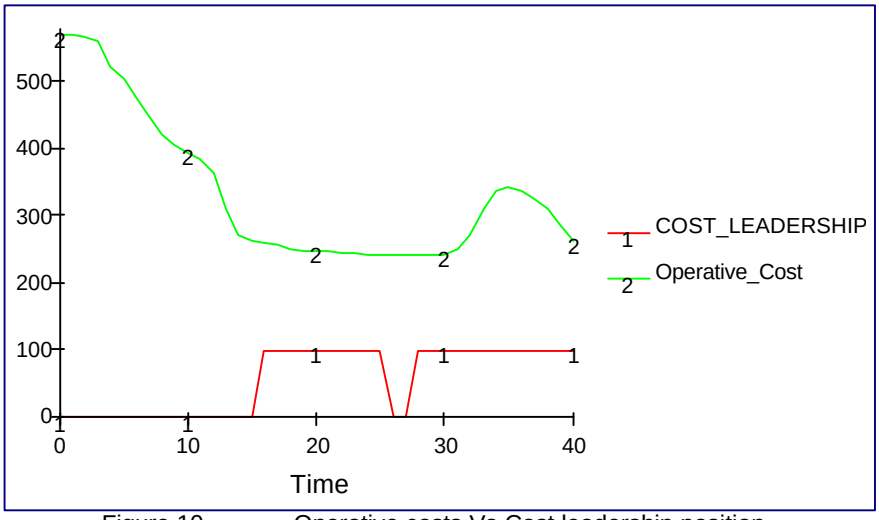

Figure 10. Operative costs Vs Cost leadership position.

Segmentation is an indicator of sales concentration in different market niches[1]. The segmentation indicator is calculated according to the Herfindahl index (Littlechild, 2001), which has been used as a measure of industry concentration – adding the square of market shares of all the companies within an industry:

$$\mathbf{H} = \sum_{\mathbf{1}}^{\mathbf{n}} (\mathbf{Share}_{\mathbf{i}})^{\mathbf{2}}$$

In this case, we used Herfindahl index as a measure of company's sales concentration among consumers' type, adding the square of sales percentage on each segment. Thus, segmentation level relies on sales concentration on different niches, as shown in Figure 11. When our company sales most of its products to just one market niche the company is segmented, and the segmentation indicator will equal one; when company's sales are equally divided between two markets, then it is partially segmented and the indicator will equal

[1] Market niches for Colombian electricity market model: Traders – Residential Consumers – Industrial Consumers

0.5; as the indicator approaches zero, then company is not segmented, which means that it is serving every available niche on the market.

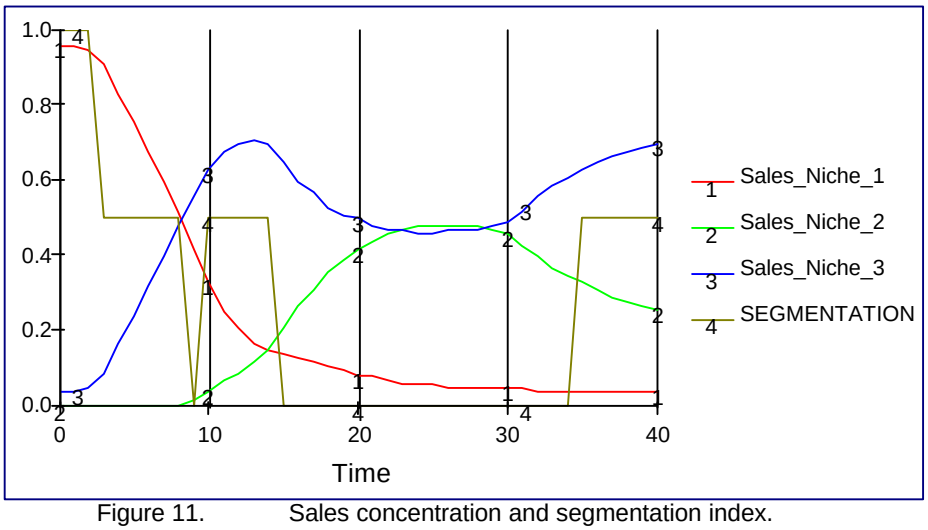

Figure 11. Sales concentration and segmentation index.

Differentiation position is gained when customers perceive firm's product as unique in the market. That is, company attains differentiation when perceived price is lower than real price of energy, because of MS investment, which influence could be seen on Figure 12.

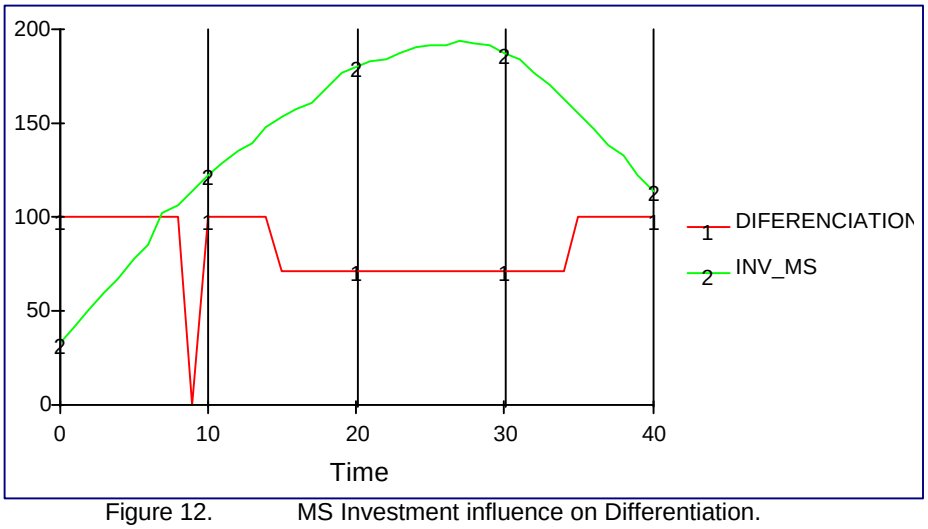

Figure 12. MS Investment influence on Differentiation.

Segmentation also influences differentiation levels, because competing in just one segment of the market gives companies the ability to better understand customer's necessities and differences (Figure 13).

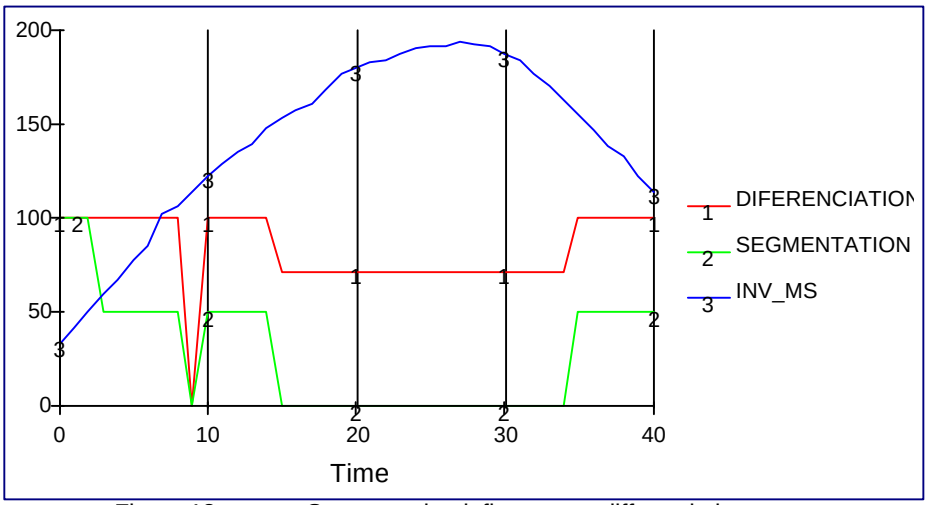

Figure 13. Segmentation influence on differentiation.

Differentiated companies do not pursue cost leadership or segmentation strategies. A differentiated company may sale its products at a higher price and still keep its market share and profits. Likewise, once a company becomes cost-leader, it may reduce its investments. Cost leaders do not need to differentiate its products, they need to produce as much as possible for the average consumer so they could maintain its leadership.

However, no position lasts forever. Thus, companies might be able to switch strategies when required. It is not difficult for a differentiated company to move into a segment, nor for a segmented company to differentiate. The cost leader should, however, keep on investing in R&D as it need to be alerted about market changes.

For a start up company it is difficult to gain a strategic position in a particular industry. The company might gain competitive advantages and, by properly managing investments and efficiency, attain cost leadership. This position may not be sustainable as the introduction of new technologies may result on cost

reduction, making the company lose competitive advantage. Thus, the formerly efficient company may find a niche to focus on. The strategy could be switched towards segmentation, achieving a new competitive position; in this case, as shown in Figure 14, chances are high that the company lose its cost leadership, because they need to increase the level of investment in PI & IT to develop special products and services for the segment they choose.

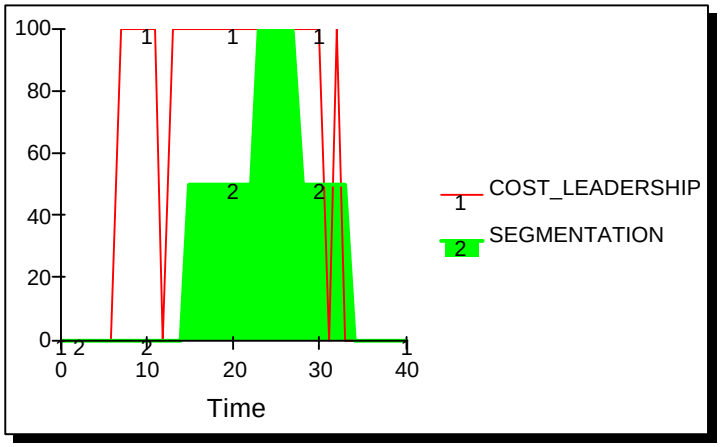

Figure 14. Switching between strategies

5. CONCLUSIONS

We draw some conclusions from the progress made in our research:

- The development of Competitive Advantage schemes might result beneficiary to trading electricity companies.
- Markides' approach to Strategy Dynamics seems appropriate to energy markets.
- System Dynamics is an appropriate approach for the evaluation of alternative strategies and evolutionary strategies.
- Core Competences may also be approached by an investment scheme although we did not evaluate it on this paper.

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