

# Identification and analysis of the decisive factors of local development for the use of natural gas in the ceramist industries of Mato Grosso do Sul (Brazil)

Identificação e análise dos fatores determinantes de desenvolvimento local para o uso do gás natural nas empresas ceramistas Mato Grosso do Sul (Brasil)

*Identification et des de l'analyse facteurs décisifs de développement local pour l'usage du gaz naturel dans le ceramists de la compagnie Mato Grosso do Sul (Brésil)*

*La identificación y análisis del los factores firmes de desarrollo local para el uso del gas natural de la compañía en los ceramistas Mato Grosso do Sul (Brasil)*

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**Abstract:** The present article is part of research in development, together with the USP/IEE, UFMS and UCDB universities, the aim of which is to identify and to analyze qualitatively and quantitatively the decisive factors for the use of natural gas from local development in the ceramist industries of Mato Grosso do Sul. Natural gas is not used yet as an alternative source of energy on a large scale in the State. It can be considered as one of the results of the valorization of socioeconomic policies, of the local culture and of the environment, preserved as part of the local identity of the human being in his improvement of life quality.

**Key words:** natural gas; ceramics; local development.

**Resumo:** O presente artigo é parte da pesquisa em desenvolvimento, juntamente com as Universidades USP/IEE, UFMS e UCDB, cujo objetivo é identificar e analisar qualitativa e quantitativamente os fatores determinantes para o uso do gás natural de desenvolvimento local nas Empresas Ceramistas em Mato Grosso do Sul. O gás natural ainda não é utilizado como fonte alternativa de energia em grande escala no Estado. Pode ser considerado como um dos resultados da valorização da política sócio-econômica, da cultura local e do meio ambiente preservados como parte da identidade local do ser humano em sua melhoria na qualidade de vida.

**Palavras-chave:** gás natural; cerâmica; desenvolvimento local.

**Résumé:** Le présent article fait partie de la recherche dans développement, avec les Universités USP/IEE, UFMS et UCDB dont l'objectif est identifier et analyser qualitatif et quantitativement les facteurs décisifs pour l'usage du gaz naturel de développement local du ceramists de la section industriel dans Mato Grosso font Sul. Le gaz naturel n'est pas encore utilisé comme source alternative d'énergie dans grande échelle dans l'État. Il peut être considéré comme un des résultats de la valorisation des politique socio-économiques, de la culture locale et de l'environnement conservé comme partie de l'être humain identité locale dans votre amélioration dans la qualité de la vie.

**Mots-clé:** gaz naturel; céramique; développement local.

**Resumen:** El presente artículo es parte de la investigación en el desarrollo, junto con las Universidades USP/IEE, UFMS y UCDB cuyo objetivo es identificar y analizar cualitativo y cuantitativamente los factores firmes para el uso del gas natural para desarrollo local de la sección industrial ceramistas en Mato Grosso do Sul. El gas natural todavía no se usa como la fuente alternativa de energía en la gran balanza en el Estado. Puede ser considerado como uno de los resultados de la valorización de la política socio-económica, de la cultura local y del ambiente conservado como la parte del ser humano la identidad local en su mejora en la calidad de vida.

**Palabras clave:** gas natural; ceramica; desarrollo local.

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## Introduction

The use of natural gas (NG) as energy input in industry in the state of Mato Grosso do Sul (MS) presents important characteristics from the point of view of local development, because it allows emphasis to be given to aspects related to socioeconomic, to the environment, the improvement of life quality and the generation of direct and indirect employment.

The presentation of the potentialities and alternatives of natural gas and to confront them analytically with the reality of Mato Grosso do Sul, they contribute in this way, through the I intended study, for its best use. Above all, its availability in Mato Grosso do Sul, is a direct and decisive factor in the stimulation of the industrial process for local development.

In this context, this study will bring socioeconomic, cultural, political and

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environmental benefits, for the State of MS, because it will allow the entrepreneurs and the government to evaluate qualitatively and quantitatively the use of NG as primary energy and the reflection on these interrelations.

The importance of this proposal is also backed by the invigoration of research in the area of natural gas, directly or indirectly linked to the Post Graduate Degree Programs of the partner institutions (Electrical Engineering at UFMS and Local Development at UCDB) through the multidisciplinary integration reflected in the project.

## Objectives

### General Objectives

The aim of the research is to identify and to analyze qualitatively and quantitatively the decisive factors for the use of natural gas in the development of the industrial section of the State of Mato Grosso do Sul.

### Specific Objectives

- to identify and to analyze the decisive factors in the use of the natural gas for the industrial sector in MS;
- to adapt and to stimulate the development of public policies that allow the industries to develop the production of goods and services on a long and short term basis through the use of NG;
- to analyze the local relationships of development from social, economic and environmental aspects proposing, in the process of political decisions, the implementation of actions and permanent alteration and adaptation;
- to develop a simulation model using the technique of System Dynamics for modeling the influence of relationships in the NG sector, according to the vision of local development.

## Methodology

This research will obey the following stages

**Stage 1. Bibliographical Revision:** This phase will give theoretical support for the identification and analysis of the problem, which is the aim of this study. In this phase the relative concepts will be approached using the theory of the Causal Loop Diagram and initially identified interest variables (state and control variables) for future simulations of influence relationships.

**Stage 2. Acquisition and implantation of hardware and software (shells) for development and implementation of the integrated environment:** Based on the infrastructure solicitations (equipment and software) that will be established as of the previous stage, this phase consists of the acquisition of this equipment and of the availability of the necessary software for the development of the project.

**Stage 3. Acquisition of data:** This phase consists of collecting data together with the target sectors making possible the verification of the real conditions with which the companies are faced, that is, permitting the collecting and identifying of decisive factors for the use of NG in the sector through personal observation and utilization/application of primary resources (questionnaires, forms and interviews).

**Stage 4. Analysis and Interpretation of the Collected Data:** The data collected in the previous stage will be analyzed and interpreted seeking to establish the cause and effect relationships (Causal Loop Diagram - DCB), according to the vision of local development.

**Stage 5. Development of the Model of Simulation:** In this phase, the starting point will be the variables of interest established previously in Stage 1, also the established influence relationships in Stage 4, the simulation model will be elaborated based on the technique of System Dynamics. This model will allow the calculation of the several necessary acting indexes for validation of the developed methodology.

**Stage 6. Evaluation and Validation of the Obtained Results:** This phase consists of the validation of the methodology developed, as

well as of gauging the parameters as far as the practice of the managerial sector that it is intended to assist. The results of the research will be presented through pictures and graphs, followed by a quantitative interpretation, having as a main focus, the search for the Identification of the Barriers and the necessity/alternative in the implementation of Public Policies.

**Stage 7. Documentation of the developed model:** As this study aims at the development of a methodology that can be used as much by entrepreneurs (evaluation of projects using NG) as well as by the state government (establishment of public policies) in the evaluation of the decisive factors for the use of NG in the industrial sector of MS, it becomes essential that this tool is very well documented. Only in this way, such objectives can be reached.

**Stage 8. Promotion and popularization of the project:** In this stage, the results obtained with regard to the operational outcome of the methodology emphasizing the use of NG for the industrial sector and the reactions from local development should be made known through seminars, lectures and courses.

**Stage 9. Elaboration of report on the project:** This final stage will be the elaboration of the report that will characterize the conclusion of this study, where the whole potential of the methodology up to that moment developed should be approached and presented. The qualitative and quantitative analyses associated with the objectives obtained should be an integral part of this document.

### Theoretical basis

The presentation of the potentialities and alternatives of natural gas are to oppose them analytically with the reality of Mato Grosso do Sul, thus contributing, through the proposed study its best use. Above all, its availability in Mato Grosso do Sul, is a direct and decisive factor in the raising of the industrial process for local development.

To analyze local development as a strategy of sustainable conquest, that is, as a way of contributing to the transition in direction of a new standard of development. The valorization of new practices in modern

institutions and attributing innovative behavior set up by its own economic development, alters the political relationships and the existing social structures in the sense of its transformation.

In agreement with preliminary studies (IEE/USP, 2004), NG is presenting an important participation in the evolution of the final consumption by source, having gone from of 7,9 thousand TOE in 2001 to 113,0 thousand TOE in 2003. The table "Evolution of the consumption of NG in MS - 2003/2004" introduces the principal consumers of that energy source in the State.

It should be emphasized that theoretical presuppositions supply general orientation for all and any research. It should be taken into consideration that in the elaboration of a research project, ideally it should be defined with clarity from the theory that will give it support, so that one can have a correlation between theory and practice.

This is a time of changes and of instability, which seems redundant and prosaic. With the need of accompanying them, transformations are perceived in the diagnoses and in the situational evaluation with a view to helping all in vague situations, being the role of development.

Development is a process of economic, political and social transformation, through which the growth of the standard of living of the population tends to become automatic and autonomous. It is a global social process, in that the economic structures, - political and social - of a country suffer continuous and deep transformations. It makes no sense to speak only of economic development, or just of political or social. Actually, development of that nature does not exist, parceled out, departmentalized, unless for pedagogical reasons. Development, therefore, it is a process of global transformation. (ÁVILA, 2001 apud PEREIRA, 1985, p. 19)

In that sense and trying to think in the words of Oliveira (1977, p. 24) it can be seen that the planning cannot overcome basic contradiction of the economic system in force which would be the denial of a total vision. The traditional forms of growth impulse and development would be nothing else, in the economic system in force, which in a way enlarges its own reproduction. And it is exactly that which is looked for with the

amplification of the introduction of natural gas among the energy sources for the use of the productive system of Mato Grosso do Sul.

It is a global objective, with a view to thinking of another social organization based on life quality, solidarity and citizenship. Such organization should be open and constituted by local action, based on the integration of cultural resources, human, natural and economic in such a way that society becomes self-sufficient to be an agent of its own future.

"All development is local, be this place a district, a municipal district, a personal computer - area, an area of a country, a country, an area of the world" (FRANCO, 2000, p. 27).

The connotation of place acquires the socio-territorial target of the actions and it thus becomes retro-defined as an ambit reached by an on going development process, when that process is thought through, planned, promoted or induced. With relationship to the place, reference is habitually made, to development processes that happen in sub national spaces. In Brazil, in most cases, such spaces are municipal or micro regional, involving a certain amount of municipal districts within the same federative unit.

For Ávila (2001 apud LÓPEZ 1991, p. 42),

when we speak about place, we are referring to a space, to a territorial surface of reasonable dimensions for the development of life, with an identity that distinguishes it from other spaces and from other territories and in which people lead their daily life: they inhabit, they relate to others, they work, they share norms, values, habits and symbolic representations.

Local development is frequently suggested as a process of unchained experiences starting from multiple initiatives. These processes become focused in their unfolding, visualizing progressive arrangements in the territory, instead of predetermined arrangements.

Silveira et alii (2000, p. 24), point out that

the fomentation field for local development, in your institutional expression today in Brazil, is predominantly a compound of foundations and methods gone back to the unchaining of processes: the methodologies

are defined as induction or support. In their own intentionality that characterizes them, their implementation is not of itself local development, but a stimulating factor, a factor seen as necessary.

The space is the territorial base of daily coexistence, where cooperation and solidarity come into being by organizational activity. The space of globalization is formed by points of interconnection, moving and inconstant, as to what it is really related.

"Space is a surface extension. Distance between two points. Where the factor position must be considered, because from it arises a series of consequences of great influence in the life and in destinies of the people" (CARDOSO, 1990, p. 14).

To execute activities operatively, in form of decisions, it is necessary to establish new solutions or new ways for development and to propitiate favorable conditions for the real operation of collective intelligence, which helps the construction of organizations for a territory.

Territory is a group formed by the existent natural systems in a given country or an area and by the increments that men superimpose on those natural systems. The territorial configuration, or geographical configuration, thus has its own material existence, but its social existence, that is, its real existence, is only given to it by the fact of social relationships. (SANTOS, 1999, p. 51)

The valorization of natural and human resources should be characteristic of a process that combines innovation in the action strategies with use of the promotion of economic activities that involve the population within a common identity. The importance of these values, has been presented as a way out for making sections of the economy more dynamic and gaining in potential.

The concepts of human and social capital need to be thought of from the point of view of totality. Human and social capital only make money to continue subduing nature, limitless growth only at the service of the profit, deepens inequalities, and continues to break the economic system. (JARA, 1999, p. 14)

This is a new way of looking at the promotion of human communities, that allows critical and creative performance in their work, new visions and focuses of the relation-

ships with the environment that they live in.

We need to increase economic development, qualifying the process, but it is an oversimplification of things to suppose that the economy can alone lead to human development. It is necessary to articulate the objective and subjective subjects, to try to harmonize the various dimensions of development. And that means to think of social justice, the access to knowledge and information, by the individual and collective empowerment, in social participation, beginning with ethics. (JARA, 1999, p. 20)

These observations emphasize aspects of outstanding characteristics for local development, for which they should interrelate in the socioeconomic environment, the effects of the enterprise that are already healthy and highly positive such as: the improvement of life quality, the generation of direct and indirect employment. Thus, integration, economic balance, social and environmental concerns are indispensable to the conservation and maintenance of human life. To attain such objectives it is necessary to come up with a new conception of production and consumption.

Given these transformations the basic instruments of local power and community participation acquire prime importance, not as a panacea, but as an additional mechanism of other concomitant transformations (DOWBOR, 1995). Community participation constitutes the rational mechanism of regulation of the main activities of the social area clearly, of urbanization, of the small, average and large producer, besides building an indispensable ballast to the balance of the group of activities at economic level. The State of Mato Grosso do Sul is in fifth place among the Brazilian states, in the index of human development (IDH), according to the United Nations Organization.

The implantation of natural gas as an alternative source of clean energy can be considered as one of the results of the valorization of local culture and of the environment that should be preserved as part of local identity. The results of the investments are noticed in historical preservation on the part of the State, the conservation of nature and of programs of social development, besides the labor policies that value the relationship with the community that

provides the human being with improvement in life quality. The amplification and the expansion of natural gas in industries in the State should be seen as a viable alternative for local development, seeking to assist the expectations and the socio-economic and cultural yearnings of the community inserted in the place where such industries opt to consume this type of available energy.

The sustainability of the development and the need to treat it from a multidimensional perspective articulates the economic, political, ethical, social, cultural and ecological aspects, avoiding the reductionism of the past. The final objective of this sustainable character is to guarantee the continuity of the development process, avoiding draining its sources of action.

With the installing of the gas pipeline and the construction of two thermo electric plants, the State increases the offer of an energy generator, to guarantee local development.

Natural gas is the mixture of hydrocarbon light, gaseous methane and ethanol, mainly obtained from the extraction of deposits. It can be used as industrial, domestic and automobile fuel (POULALLION, 1986, p. 104).

Industry, local culture and natural gas can emphasize outstanding perspectives for growth and development. In these they are correlated to social, economic, political and environmental interfaces; as integration for the balance, the improvement of quality and the conservation of human life in the local space.

The concentration of income is still excessive in the State, and only with maintainable and diversified development can an alteration in the quality of life for the population take place. It is easy to see that the period of development of inertial growth of the State stopped when faced with the serious difficulties of the national economy and the low globalized insertion of the State. We have to think globally and act on the regional characteristics accordingly. Conservatism and traditionalism limit our maintainable expansion. (VERRUCK in CUNHA, 1999, p. 168)

The use of natural gas comes to benefit the lack of energy. As a clean source of energy, it vanishes more easily in the atmosphere in the case of leakage, there is

the warranty of the green stamp, reducing the deforestation of reservations to around 60%, because some industries use firewood as a source of energy, the cleanest combustion, with larger productivity.

Para atraer capital transformando el territorio en un territorio competitivo hacia adentro, es decir con capacidad de atraer justamente capital y tecnología, hay que desarrollar un trabajo profesional y sistemático vinculado a la creación de una imagen corporativa, un logo, y una idea fuerza. (BOISIER, 1999, p. 22)

With the presentation of the potentialities and viable alternatives for the use of natural gas and its opposition to the reality of Mato Grosso do Sul, the contribution is to motivate the local use of this source of energy by improving its potential. Such readiness is a direct and decisive factor in the raising of the industrial, agricultural, transportation and residential sectors, within current parameters.

It is inferred, from the reflections here developed, that there is a pressing need for the use of available natural gas, as a clean source of energy for industries and as an option for the maintenance of local culture. The aim of this study is to offer an economic option for the state of Mato Grosso do Sul, which allows the developing of the production of goods and necessary services to the population and to establish a base of balanced commercial exchanges. It is also sought to establish a cultural and demographic base that imposes revitalization, if necessary, of the adjacent zones of the gas pipeline in the State. Industrial activities do not eliminate the local, natural, cultural, economic, social, political and institutional contexts, but they should reinforce them.

The importance of the discussion of the context, of the focuses and of local values in that the developed or intended economic activities should be established through cultural processes. The practice of the construction and reconstruction of the proposals during the interaction process with the communities should be exercised, in which is included in this context the trust and the full exercise of citizenship.

### **Comparative analysis between the current situation and the intended one, demonstrating, unmistakably the benefits to be brought by the project**

Considering the lack of subsidies for aid in the decision making process, the shortage of resources and growing environmental and social appeals for better technologies and energy, this study will provide through the identification and analysis of the decisive factors for the use of NG in the industrial sector of MS the following benefits:

#### **Political Benefit**

The presentation of the potentialities and viable alternatives for the use of natural gas and the opposition to the reality of Mato Grosso do Sul, contributing in this way, to the motivation for the use of this clean source of energy contributing to managerial improvements. Such readiness is a direct and decisive factor in the raising of the industries and it makes possible maintainable development, within the current parameters.

Improving the regulating activities, most of the time, is characterized as a network of industries, overshadowing the dynamics of the interconnection that is fundamental for the installation of the service in an efficient way.

The obtaining of the amplification of markets for natural gas should be motivated by federal and state governments, through mechanisms of fiscal policies, public credit and tax encouragement, since only these subsidies are incorporated in the initial phase of the expansion of the gas sector and only internalized for that industry, seeking not to burden Brazilian taxpayers.

#### **Economic benefit**

Increase of the consumption of NG in MS, seeking the use of NG in industries in the State should be seen as a viable alternative for development, seeking to assist the expectations and the community's socioeconomic and cultural longings inserted at the place where such industries opt to consume this type of available energy.

The reduction of costs with the maintenance of equipment and machinery,

is according to production time.

Improvement in the quality of life of the employees of the industrial sector where they are in touch with such aspects as: poor health, quality of the air breathed, thermal comfort, low self-esteem, the need of a training policy, good work conditions and an analysis intra- and interpersonal of the company itself.

MS industries can benefit doubly from the use of the new source of energy in economic terms and adapt, besides providing for economic earnings and the opening of new work positions. Once it absorbs the labor of the suburbs, it keeps the worker in the place he was qualified in to improve the quality of community life, starting from the installed economic activity and there is, on account of this factor greater probability of maintaining the local cultural values to keep the community in the locale.

### **Social benefit**

The employees need to be qualified for the use of the gas. Besides motivating the administration of the development process with community participation, it is done within the perspectives of sustainability according to the characteristics of the place.

External exchange can be stimulated and allow the usufruct and the incorporation of technologies and values beginning from situations lived out in the locale.

The generation of employment and income, can only increase according to the expectations of the market which is more and more competitive, or when the entrepreneur takes on loans from banks or from financiers for the amplification of the industry, however, the interests are high.

The analysis and identification process is involved in the formation of income in that section in relation to regional and technological factors.

### **Environmental benefit**

To relate the environmental subject and the possibilities of the increase of income from gasification should be evaluated in the light of the improvement of life quality of modern society. On the other hand, it is important to verify several factors connected

to a certain regional space, as to the introduction into the industry as an important economic activity of this area.

The integration and balance, between the environmental and social concerns are fundamental for the conservation of human life on Earth.

The use of natural gas represents gain in environmental terms, with the substitution of firewood resulting from deforestation of native forests and smaller emissions of material particles into the atmosphere, and moving forward in technological terms, because it requires greater control of the process of burning and the operation of better working ovens providing a more even and non-toxic burn, which contributes to the increase of productivity of the industry.

The use of wood or native biomass is worrying from two aspects: vegetation destruction, burning and the generation of residues which can compromise the final product. The scarcity of eucalyptus for firewood on the local market has been contributing to the accelerated deforestation of native vegetation of the savannah. The demand is greater than the request.

Certification plans should consider the sustainability of production by the conservation of biotic and abiotic factors of the forest ecosystems. Pollution and the predatory use of natural resources accelerate the greenhouse effect and the destruction of the forests. This does not provide quality within the industrial process or of the final product.

### **Expected results**

As a global result of this network of research (made up of UFMS, UCDB and USP) together with other partners, they will be offering to the industrial sector of the state of Mato Grosso do Sul a new methodology in the evaluation of the decisive factors in the use of NG, as well as its influence in local development. As specific results, the following can be mentioned:

- ✓ Interactive computational model, based on system dynamics, for the simulation of decisive factors for the use of NG in the industrial sector of MS;
- ✓ Technical and scientific documentation of the study;

- ✓ Qualitative improvement in the training of professionals for the evaluation of interrelations between the industrial sector and the natural gas sector in the state of Mato Grosso do Sul;
- ✓ Introduction of a new teaching methodology - learning in the area of decision making;
- ✓ Training in the implementation of technology in the use of natural gas;
- ✓ Development and increase of potential of the creative capacity of researchers through the use of the technique of system dynamics.

### Final considerations

The aim of this study is to list the aspects and the factors that determine the use of natural gas on a larger scale. It is a partial study satisfying all the collaborating Institutions.

Questions have been asked throughout the period in which the plan of the gas pipeline was implemented in the State, such as the natural gas not being used by the cities that it goes through.

It is observed that the benefits would be of innumerable dimensions, not reported here, but considerably imagined.

Simulations will be made so that these decisive factors can be brought to reality with the passing of time.

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