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TECHNO-ECONOMIC INTELLIGENCE

IN BRAZILIAN INDUSTRY.

BASIS FOR THE ESTABLISHMENT

OF DEMONSTRATION UNITS.

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## TECHNO-ECONOMIC INTELLIGENCE IN BRAZILIAN INDUSTRY.

### BASIS FOR THE ESTABLISHMENT OF DEMONSTRATION UNITS.

#### 1. BACKGROUND

UNIDO is exploring the development of techno-economic intelligent systems (INTELL) to improve strategic decision making, to foster the acquisition of competitive advantages by small and medium industries in developing countries.

Modern information infrastructures can provide data, reports and references in such large quantities that, in few minutes, it may overflow the analytical capabilities of the decision makers. Decisions that lead to competitive advantages depend on timely and comprehensive information about the business environment.

An INTELL system brings the exact information needed by the decision makers, not more, not less.

A project proposal for an INTELL system related to agroindustry was elaborated in 1990 (Project: XP/RLA/90/112). The report recommended the establishment of INTELL demonstrative units in Argentina (related to Dairy Products), Costa Rica (Fruits and Vegetables) and Ecuador (Shrimps).

The demonstration project is based on several interrelated concepts, that are presented in the third section of this report.

The Sao Paulo Industries Federation (FIESP), Brazil, indicates the interest in an application of the INTELL system on two branches of the local industry.

UNIDO sent a mission to Sao Paulo to:

- a) choose two sectors on the basis of their contribution to industrial development and on their suitability for the establishment of an INTELL demonstration unit. This was made in consultation with FIESP.
- b) Meet managers and technicians in those sectors to assess requisites for the functioning of the units.
- c) Make suggestions about the possible design of such INTELL units.

The mission had interviews with ABINEE (Brazilian Association of Electrical and Electronic Industries) and ABIMAQ (Brazilian Association of machinery manufacturers).

The findings of the mission, specially the general and specific conditions for the units, are analyzed in this report.

## 2. CONCLUSIONS

This report is a first approach to a project proposal on the installation of INTELL demonstrative units to provide services to the Brazilian industries.

It was found possible to supply INTELL to the branches selected (Electric Appliances and Machine-Tools) and the institutional infrastructure seems to be enough to support the project. Financial contribution by local institutions was not compromised yet.

UNIDO may send a second mission to discuss the installation conditions (budget, date of start up and other requirements) with FIESP-DETEC and with the entrepreneurs of ABINEE and ABIMAQ.

## 3. CONCEPTUAL BASIS OF THE DEMONSTRATION UNITS

### 3.1 GENERAL AND SPECIFIC INTELL

Competitiveness is the result of public and private decisions. The former are mostly related to the macroeconomic framework, sectorial policy, taxes, utilities regulations and "rules of competition". The latter are in the domain of entrepreneurial dynamics: how to combine technology and managerial skills to increase the marketing capabilities and to lower the costs.

The Latin American firms, among them the small and medium sized, need advanced information on the market, technology and regulation shifts, to adopt strategies to remain competitive.

INTELL, conceived as the use of available sources to prepare value added information on competition, markets, technology and policies, may provide knowledge for decision making according to the needs of the firms and government.

INTELL products may be "specific" or "general". The first kind is developed for the use of one firm and it aims at obtaining competitive advantage from innovations or commercial operations. This kind of INTELL is not shared with potential competitors. It is used in strategic planning and also in operational planning.

General INTELL, like pre-competitive research, is a knowledge that is shared by the decision makers of a branch of activity and brings an overview of the present and forthcoming business conditions. This information is reserved and is used for: international negotiations, branch competitive capacity building, projects and markets preliminary evaluation and also as input to specific INTELL.

Both kinds of INTELL are complementary. As long as general INTELL may be shared, it becomes matter for international cooperation.

General INTELL is the principal information used in the

communication flows inside the branch network. International cooperation may be used to enhance its content and to provide a standard methodology.

The strategy suggested is to focus the initial efforts on general INTELL. Such approach can be expected to give the following benefits:

a) each actor will have broader information on the business conditions which, in turn will stimulate further efforts to acquire specific INTELL for his own use;

b) weak institutions, such as the government agencies or small enterprises, will obtain a general framework that may be used to improve the quality of their decisions;

c) separate decisions of firms, government agencies, and specially those taken in academic institutions (human resources development) and R&D centres (decisions on research lines) will have the benefit of sharing the same overview, raising the coherence and complementarity among them.

d) information systems will have an increased demand.

### 3.2 THE INTELL INFORMAL NETWORK

An INTELL system has several actors: firms, government agencies, R&D groups, business promotion boards, academic institutions and also external connections: correspondents, experts, suppliers and customers. All the actors have their own INTELL activity, most of them implicit.

A living INTELL system is a network of institutions and persons that perform several functions. Some of them are mostly engaged in information gathering, some are users and producers of INTELL, and some are gate keepers and brokers.

The U.S. Department of Agriculture Cooperators Program is an example of a network created for export promotion. It aims at developing a partnership between government and private sector to improve overseas marketing.

Cooperators are non profit commodity groups representing primary and industrial producers, trade and related associations. Their activity is generally not designed to make sales but to promote and achieve future market access. Their main activity is to provide elaborated information and INTELL. There are more than 200 cooperators in the USDA Program.

They normally promote either a single commodity or a group of related goods and provide leadership for the programs. Their organizations have, generally, less than ten employees.

Government provides assistance to entrepreneurs to cut through regulations and trade barriers that hamper sales. The

cooperators provide the private expertise and spirit of enterprise that is equally important to the successful marketing.

The partnership makes it possible for each to accomplish what neither could do alone. Government provides, as an average, one third of the cooperator's budget.

One of the Attache Service major functions is to work closely with the Cooperators in their information requirements and market development activity.

It seems possible to adapt the cooperators organization to the Latin American environment: small private non profit agencies acting with the help of the governments to promote sectoral development.

### 3.3 COMPETITIVE CONDITIONS

The macroeconomic policy has a great influence on the competitive conditions and on the demand of INTELL.

In Latin America from the '50s to the '80s most of the countries adopted the strategy of industrialization based on the domestic market. In such conditions the enterprises faced only domestic competition and the competitive advantages were obtained by making use of opportunities opened by government regulations.

Brazil was the Latin American country that had the best development performance in those decades. In the '60s its contribution to the Regional GNP was 28,6%; this share grew, according to Interamerican Development Bank figures, to 38,8% in the '80s. As a result a large industry was established (manufacture value added in 1990: u\$s 90 billions).

Some of the representative institutions were developed to press for government regulations and larger subsidies. Instead of elaborating INTELL, the information systems were related to how to influence the agencies and government officers, instead of assessing the international competitive conditions.

In the '60s. the Latin American countries adopted a macro policy directed to opening their economies and, therefore, to progressive international competitive conditions were established. This meant the progressive change, from "domestic" to international management style, characterized by an increasing use of INTELL and related networks.

The change from a closed economy to an open one is taking place in Brazil, but it is difficult and slow process.

The global change is not homogeneous: each activity has its own specific speed of "internationalization". Therefore the competitive context varies from one to another.

Since June 1990 the macroeconomic framework has shown signals of

internationalization through deregulations and elimination of barriers to competition.

The New Industrial Policy announced by the Government in June 1990 changed the prevailing business environment based on strong barriers to imports; fiscal, financial and institutional promotional instruments.

The Informatic Policy adopted by Brazil from the beginning of the '80s is intended to strengthening the local production of electronic equipments. At the end of the decade evidence was found of delays in the introduction of innovations and of efficiency losses, not only in the manufacture, but, more important, among its clients, when compared to similar products from other countries.

The New Industrial Policy is aimed at the technological modernization and increasing competitiveness of the Brazilian industry.

This accelerated the opening of the economy to stimulating higher efficiency through external competition, while, at the same time, an increase in the industrial technological capabilities are promoted.

The Mercosur Integration Agreement (with Argentina, Paraguay and Uruguay) provides an "intermediate step" towards the opening of the economy.

The Brazilian macroeconomic policy is evolving towards internationalization, but inflation and changes in relative prices still remain too high to stimulate investments.

In spite of the confusing macro signals some activities are restructurating. The entrepreneurs of those branches are planning for future conditions. They are also sharing with the government the objectives of promoting trade and competitiveness. Therefore both are active members of the same INTELL system.

Restructuring means, among other actions, the acquisition of technology and managerial skills in an effort to catch up an adequate level of competition, either for survival in the internal market or for sustainable participation in international trade.

The INTELL system may support the restructuring stage providing information for strategic planning on subjects such as: market opportunities and access requirements, technology availability and product forecast, competitive conditions, competitors, pricing, regulations, costs, etc.

In an advanced stage of competition the firms intend to gain participation by taking a market share from other competitors. The INTELL system becomes an instrument for "fine tuning" competition.



The competitive intelligence efforts made by multinational corporations is mainly directed at the advanced stage, while the UNIDO project is mostly related to the restructuring phase.

#### 4 DEMONSTRATION UNITS

To promote the use of INTELL, a Demonstration Unit (IDU) may be established to provide services and to use and process INTELL.

The IDUs may be located at firm level, at branch level or at industry level. For demonstration purposes the best location seems to be at branch level: the results may be shown to the others and the benefits will be easy to monitor by entrepreneurs, chambers and industry federations, leading to interest in other units.

To initiate INTELL activity the IDU may be installed in one of the institutions that belong to an industry branch and, at the same time, to its information network.

A small team may produce general INTELL products such as: newsletter, inquiry service, reports, etc.

The size of the team will depend on the objectives, which will define the comprehensiveness of the tasks to be carried out.

The size of the IDU is not only a matter of efficient organization. It also depends on the commitment of the sponsors.

In the UNIDO demonstration effort the host institutions must accept to support the Unit on a permanent basis, beyond the end of the project.

UNIDO will provide consultants, suscriptions and training to the staff of the Units.

#### 5. THE BRAZILIAN INTELL PROJECT

##### 5.1 SELECTED BRANCHES

It was found possible to install two IDUs at branch level and a third unit at the FIESP Department of Technology (DETEC).

The branches selected were:

- a) electrical appliances, not portable, also called "white goods"
- b) machine-tools

The selection process suggested by DETEC began with the visit to three industry associations:

ABINEE Brazilian Association of the Electrical and Electronic Industry  
ABIMAQ Brazilian Association of Machine and Equipment Manufacturers  
ABIA Brazilian Association of Food Industries.

In the first and second institutions it was possible for the managers and representatives interviewed to suggest a specific branch for the installation of a demonstrative unit. At ABIA further consultations were required, but they have not indicated a branch for INTELL project yet.

## 5.2 ELECTRICAL APPLIANCES, WHITE GOODS

The products covered are: laundry appliances, cooking appliances, refrigerators, dishwashers, food waste disposers and trash compactors.

In Brazil the family of appliances that reached the greatest development are the refrigerators. In 1967/70 the average annual sales were 493.000 units; in 1977/80: 1.672.000 units; and in 1987/90: 1.850.000 units.

There are 25 enterprises in the branch, but production is highly concentrated: two firms (Brasmotor and Fripar) manufacture approximately 70 % of the total. In addition there are 75 component suppliers, some of them are also exporters. The personnel of the branch is estimated in 15.000 employees.

The main concern of the entrepreneurs is the competition of local production with the appliances manufactured by the SE Asia Countries.

The opening of the economy will expose, in the medium range, the local industry to the competition with the most efficient world manufacturers.

There are also some opportunities: the Mercosur Agreement provides the possibility to negotiate with the entrepreneurs of Argentina and Uruguay in order to concentrate the family of products of the three countries on fewer models, eliminating the expensive ones and those that do not have competitive capacity. The concentration and the complementarity will allow larger production scales, reduce the unit costs and improve the competitiveness of the industry.

There is a long tradition of integration efforts in this sector through the LAFTA and LAIA branch agreements on duties, standards, product certification, etc.

This will ease the way to concentration and complementary productions.

The intelligence needed by the branch is mostly related to:

- International market: new products, prices, and commercial news.
- Standards used in different countries
- Technological forecast: design and processes
- Competitive situation: competitors, pricing policies, cost comparisons, identification of technical and commercial barriers to trade, etc.
- Development of the own competitive strengths
- Management development.

In principle ABINER indicates that the local expenses for the demonstration project will be covered by the enterprises or by the Association.

In this branch technological requirements emerge from new products and only a few from processes; the latter are mostly related to consumers defense regulations.

### 5.3 MACHINE-TOOLS

Brazil is a traditional manufacturer of Machine-Tools.

In 1977/80 the local annual production was u\$s 310 millions and the apparent demand reached u\$s 453 millions. In 1986 the production rose to u\$s 370 millions, but the apparent demand was only u\$s 380 millions.

The industry made its largest exports in 1980/1 (u\$s 72 millions) and after that suffered a reduction in the demand, as a consequence of lower investments in 1982/85.

The production of Numerical Control Machine-Tools (NCMT) grew from 5% of total production in 1980 to 8% in 1985. The stock of installed NCMT increased from 500 in 1980 to 3800 in 1987 (local: 2900 and imported: 900).

This branch of the industry has 15000 employees.

As a consequence of the New Industrial Policy there has been a major change in the strategic plans of the machine tools manufacturers and specially in the numerical control equipment suppliers.

The Informatic Policy, after almost a decade of protection, affected the efficiency of the numerical control components of the machine-tools manufactured in Brazil. The entrepreneurs recognize that this is one of the most important problems of the industry of machine-tools.

The industry representatives indicate that the Brazilian production of NCMT has to reach competitiveness through specialization and larger series of machines apt not only for the local market and Mercosur, but also for other countries.

The real competitors to be aware of are the big German, USA and

Japan firms and also the cheaper manufacturers of small serial equipment of SE Asia.

In the Brazilian NCMT a technological jump seems necessary to catch up with an adequate level of competitiveness.

The manufacturers of conventional machines, in spite of their broad range of supply and large exports in the '80s, also need substantial technological improvement and increased managerial skills to face international competition without the help of fiscal and financial promotion.

The Mercosur framework may facilitate a complementarity agreement with Argentina, that in fact is well advanced through previous negotiations between the two industries: cooperation in selling abroad, internal distribution and component supply may also improve the competitiveness of the firms of both countries.

Since the machine-tools have a direct influence on the efficiency of the mechanic industry, there must be a permanent effort to improve their performance.

The need of intelligence for this industry includes:

- International markets: demand in other countries, prices.
- Economic risk of importing countries.
- Competitive conditions for different machine-tool families.
- Standards and requirements of importing countries.
- Technological forecast: products
- Technological forecast: process, design, software, quality.
- Patents and industrial property
- Competitive capacity: production costs comparison, pricing strategies, development of own competitive strengths.
- Training needs according to new technology emergence.
- Joint ventures and associations: basis and candidates.

The best opportunities in the international market of machine-tools seems to be related to the development of software for numerical control. This has replaced the role that traditionally had the design in the definition of the machine.

The industry tends to subcontract the mechanical processes and also to associate with former rivals to gain efficiency and survive.

#### 5.4 FIESP-DETEC INTELL SERVICES

The installation of two branch IDUs to look for the opportunities and threats described above may be followed by a third team, inside the Department of Technology at FIESP, they may act in the promotion of the INTELL activities in other branches.

The main functions of this Unit may be:

- training in INTELL methodology;

- promotion of the INTELL activities among firms and organizations at branch level;
- stimulate the cooperation of the IDUs and among other units installed in Latin American countries;
- elaborate general INTELL in subjects of common interest to several IDUs, like: import countries legislation, country risk, patents and intellectual property, etc.;
- networking;
- diffusion of information on INTELL.

As a result FIESP-DETEC may become the promotor of the techno-economic intelligence in Brazil.

## 5.5 SUPPORTING INSTITUTIONS

### 5.5.1 FIESP-DETEC

The Sao Paulo Industry Federation Department of Technology provides advice in industrial automation, design, training and technical information, standardization and quality control.

Ten professionals provide advice to industries and industrial associations on the mentioned field.

The possible incorporation of INTELL to its activities as an advanced form to provide technical information seems natural. But it would need the incorporation of another professional for this purpose.

### 5.5.2 ABINEE - Electric Appliances

ABINEE is a non profit association with the purpose of researching, studying and collaborating with the Government in the solution of sectorial problems.

The entity has more than 1000 firms affiliated, distributed among various States of Brazil.

To meet the needs of its associates, ABINEE maintain technical staff to provide economic studies, advice on trade operations, design promotional policies, advice on labor and legal matters, collect statistics and information and establish standards (technical, quality, productivity, etc.).

The associated enterprises participate in Sectoral Groups and Subgroups meetings, among manufacturers of the same product lines, to discuss the specific subjects of each branch and set forth suggestions and contributions for the Entity.

There are 9 Coordination Directions representing 45 Sectorial Groups and Subgroups and 26 Committees, Working Groups and Coordination Groups.

One of the Coordination Directions is the Electric Home Appliances Area.

The IDU for appliances would need two professionals: one team leader and one market analyst.

### 5.5.3 ABIMAQ - Machine Tools

ABIMAQ is also a non profit association with the purpose of representing its associates, researching, studying and collaborating with the Government in the solution of sectorial problems.

The entity has more than (95.000) firms affiliates, distributed in 25 Departments according to their speciality: Machine tools, Agricultural Machines, Road Construction Equipment, Tools, Printing Machines, Mining Machines, Valves, Pumps, Compressors, Engines, Food Equipment, etc.

The IDU for Machine-Tools seems to need three professionals: one team leader, one technologist and one market specialist.

### 5.5.4 Science and Technology Secretary

The Federal Science and Technology Secretary showed great interest in INTELL methodology and is supporting the installation of the Demonstration Units.

### 5.5.5 Information infrastructure

The information infrastructure will be provided by several services, among them: Statistics and Geography Brazilian Institute, FIESP-DETEC, Technological Research Institute of Sao Paulo (IPT), etc.

## 5.6 IDUs BUDGET

In Table 1 the characteristics of the three units is presented and in table 2 the budget for the first year is estimated.

TABLE 1 BRAZILIAN INTELL PROJECT: IDUs CHARACTERISTICS

	FIESP	El. App.	Mach.T.	TOTAL
NUMBER OF PROFESSIONALS	1	2	3	6
ANNUAL OUTPUT:				
-Inquiry service (answers)	50	550	1000	
-Reports on competitiveness		3	5	
-Bulletin (issues/year)	6	12	12	
-Special reports		2	4	
-Training	yes	no	no	

TABLE 2 BRAZILIAN INTELL PROJECT: IDUs BUDGET, First year

	FIESP	El. App.	Mach.T.	TOTAL
Team Leader u\$s 2000x13	26.000	26.000	26.000	78.000
Market esp. u\$s 1500 x 13		19.500	19.500	39.000
Technologist u\$s 1500 x 13			19.500	19.500
Secretary u\$s 300x13	3.900	3.900	3.900	11.700
Subtotal Personnel	<u>29.900</u>	<u>49.400</u>	<u>68.900</u>	<u>148.200</u>
Office equipment	2.000	3.000	4.000	9.000
Computers and software	3.000	4.000	5.000	12.000
Office expenditures	6.000	12.000	18.000	36.000
Subtotal Office	<u>11.000</u>	<u>19.000</u>	<u>27.000</u>	<u>57.000</u>
Subscriptions	2.000	5.000	10.000	17.000
Experts	10.000	15.000	20.000	45.000
Permanent Training		4.000	6.000	10.000
Subtotal training and experts	<u>12.000</u>	<u>24.000</u>	<u>36.000</u>	<u>72.000</u>
TOTAL	<u>52.900</u>	<u>92.400</u>	<u>131.900</u>	<u>277.000</u>

The personnel and office expenditures must be supplied by local institutions, while the training and experts may be requested from UNIDO and International Cooperation Agencies.

It is possible to start with one of the IDUs (the Electric Appliances seems the most appropriate one to begin with) and then initiate the installation of the Unit devoted to Machine Tools. The small IDU at FIESP may start at the beginning or jointly with the Machine Tool team.

#### 5.7 IDUs STAGES

The IDU start up may be seen as a sequence of four stages: installation, pilot operation, semi-autonomous operation and autonomous operation.

The Installation includes the physical settlement in an office and the beginning of some activity. One of the main tasks is to recruit and train the staff. Part of the training may be done in an initial meeting, but the larger part will be on-the-job.

Networking and relationship with the users must be done from the very beginning.

The Pilot operation is aimed at providing systematic service in

the form of a small number of INTELL products. A second training effort will be made at the end of this stage, to improve the operational methodology and to provide the team with an overview of the branch (Appliances / Machine-Tools) INTELL.

The Semi-Autonomous operation may last months and perhaps years. The targets to achieve are: a close relationship with customers, the provision of INTELL in a wide range of formats, and an income from the products provided. Prices of the services must cover some of the costs.

The last training phase for the Unit staff will be a permanent effort to reinforce links with high quality information sources. UNIDO will provide the opportunity to the team leader to attend an international event related to the branch.

The Autonomous operation means the financial self-sustainment of the IDU. This will be attained by a combination of product sales, institutional support and special financing for definite purposes.

The first two stages and the first part of the third may be accomplish in one year.

The budget for the second year will be concentrated on operative expenses and according to the speed of development of the INTELL activity, the fourth stage may be reached.



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ANNEX: INTERVIEWS

FIESP-DETEC

Joice Joppert Leal - Chief  
Edson Ferman  
Valdair Jose Tonon  
Angélica Cintra

ABIA - Brazilian Associations of Food Industries

Leo F. Brick - Technical Director  
Denis Ribeiro - Economic Adviser

ABINEE - Brazilian Association of Electrical and Electronic Industries

Fabian Yaksic - Technical Manager  
Agostino Tomaselli Neto - Technology Dep.

ABIMAQ - Brazilian Association of Machine Manufacturers

Odilao Texeira - Technical Manager  
Otamar da Costa e Silva - Chief Industrial Information Dep.  
Rubens Lehmann - Chief Technical Data Banks Sect.  
Casemiro Bruno Taleikis - Sectorial Coordinator

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Science and Technology Secretary (Federal)

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