

JOGAI CEFET – THE INDUSTRIAL ADMINISTRATION UNDERGRADUATE GAME

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ABSTRACT

The Industrial Administration Undergraduate Game, JOGAI, is used in the subject called Business Simulation (Simulação Empresarial) of Industrial Administration undergraduate course of CEFET-RJ. It is a playful and interactive game that involves several variables from its conception to the classroom applications. No one plays any roles and the negotiations are as close to real life as possible, determined solely by the parties involved. JOGAI simulates a supply-customer chain involving gems, precious metals, and jewelry. The whole market participates in the assessment of companies – suppliers, customers, audit committee, and game simulator, according to previously defined criteria.

INTRODUCTION

The use of Business Games and Corporate Simulations has been increasing in the Brazilian academic field in the last few years, which can be observed not only by the increasing number of articles presented in local and international congresses, monographs, dissertations, theses or

books on this subject, but also by the number of professionals working in this market (BARÇANTE & CASTRO PINTO, 2007).

In Brazil today, games on logistics, HR, finance, marketing, are developed and applied, whether or not computer-based, and each author develops and applies the Game that is more convenient to them. However, according to the bibliography referenced, there has not been much concern about developing a game based on internationally recognized managerial models, such as the Management Excellence Model of the National Foundation for Quality (Fundação Nacional da Qualidade), the EFQM Excellence Model or the ISO set of Standards (BARÇANTE, BROCHADO E PITHON, 2010).

From these assumptions, we have developed and applied a business game based on the Management Excellence Model. Here we present the whole process of elaboration and some of the results obtained by this game. But first we need to introduce the concepts on models, management models, and business games.

LEARNING WITH GAMES

The use of corporate games allows participants to be able to learn by means of a process in which they play as main actors of their learning, within a simulated environment. The final result is not the most important, but rather the planning and decision-making exercise.

The students take decisions and get as feedback information that is often not compatible with the decisions made or the results aimed. They then must revisit their decisions and try to understand what happened. This process of continuous evaluation provides a much higher level of learning than the methods known as “traditional”.

According to Barçante (2010) the literature on Games and Learning deems some aspects as critical:

- Enabling the immediate application of the material learned;
- Promoting the participation of the trainees;
- Offering the opportunity of interaction with peers;
- Emphasizing the individual as a whole: emotion and cognition;
- Creating conditions to get in touch with the environment;
- Including situations of variability and uncertainty;
- Proposing the exercise in a structured and oriented manner;
- Enabling the assessment of the experience by the participants;
- Including feedback comments offered by the teacher.

WHAT ARE BUSINESS GAMES

Different approaches and ways to focus are used by each author to define Business Games.

BEPPU (1984): business games are simplified mathematical abstractions of a situation in connection with the business world. Game participants, as individuals or as a group, manage the company as a whole or in part by means of management decisions for successive and sequential periods...

MARTINELLI (1987): the important and peculiar aspects of Business Games are their extremely dynamic character, their wide scope as a method of teaching and personal development, as well as the sequential aspect, which motivates and brings them as close as possible to the business reality which they are trying to simulate.

WILHELM (1997): structured corporate games are systems that, by simulating various activities inherent to a company, are capable of creating situations that involve issues related to production, distribution and consumption, enabling the group to experience situations that involve the application of knowledge and skills according to an objective.

GRAMIGNA (1993): a previously planned activity, in which players are invited to face challenges that reproduce their day-to-day reality.

KOPITKE (1992): Business Games are efficient learning tools. They are based, in general, on mathematical models developed to simulate certain business environments considering the main variables that operate in such environments¹¹.

Teaching technique, decision-making sequential exercise, mathematical abstractions, systems, activity, etc, these terms show the total lack of conceptual consistency of the various authors that approach the issue.

WHAT ARE MODELS

Back (1983) defines it as mental idealizations for physical situations, thus emphasizing the importance of models to man’s psychological mechanism of understanding reality.

Tomiyaama et al (1989) [39] says that a model is a technically-based set of descriptions of a real object. According to this author, the existence of a theoretical basis – a modeling theory – is, indeed, a fundamental condition for the modeling of an object.

Hubka (1988) states that a model is a representation by appropriate means of a technical system, process or idea.

For Skilling (1964), models may be hypotheses, theories, data syntheses, functions, relations or equations. Even structured ideas which connect arguments that present some explanatory power may be deemed models. They are, thus, structures that represent reality, presenting supposed features or relations in a general format.

All in all, models are subjective approximations of reality, as they do not include all associated observations and measurements. If, on the one hand, this is restrictive, on the other hand, models are valuable because they avoid secondary details and value the fundamental aspects of reality.

Models have, therefore, variable degrees of application and a limited reach. The most successful models possess a high degree of application and a vast range of conditions in which they can be used. The value of a model is often related to its level of abstraction.

As seen, a model meets several purposes, but mainly it serves as a way to communicate some aspect of the modeled object, so as to generate a more appropriate understanding of reality; the act of modeling, in turn, provides the modeler with a clear view of what is being modeled.

Hubka (1988) states that a model is a representation by appropriate means of a technical system, process or idea.

THE LANGUAGE OF MODELS

A model is built by taking a set of concepts that usually comprise a language (ULLMAN, 1992). According to this author, languages are divided into four groups.

Semantic: a verbal or textual representation of an object. These are characterized by textual explicatory descriptions, such as the operation of a product or its physical structure, a list of requirements, a list of materials, etc.;

Graphical: a geometric representation of the object. These are characterized by depictions in two or three dimensions, such as designs, cross-sections, perspectives, etc.;

Analytical: represents the shape or function of an object by means of equations and matrices. Examples are differential equations that rule certain product behaviors, rigidity matrices, etc.;

Physical: uses a solid model of the object, such as miniatures, mock-ups, models for wind-tunnel or channel simulation, prototypes, etc.

MANAGEMENT MODELS

According to Pereira e Santos (2001), management model is a set formed by a trilogy of principles, techniques and explanations. Their goal is to guide the conception and the operation of all the elements of an organization. This trilogy has evolved with time, which made the management models evolve from a mechanist and simple view of organizations to much more complex and dynamic models, which take into account the various processes and internal

and external influences, whether they are intrinsic to the organization or environmental or regulatory.

Management models seem to have, at first, been supported and systematized within the philosophical foundations of thinkers like René Descartes, Isaac Newton and Francis Bacon, who influenced the culture from which such models emerged (REGINATO, 2010).

We shall consider the management models as classified according to a historical perspective, into three large blocks: mechanist, organic, and strategic.

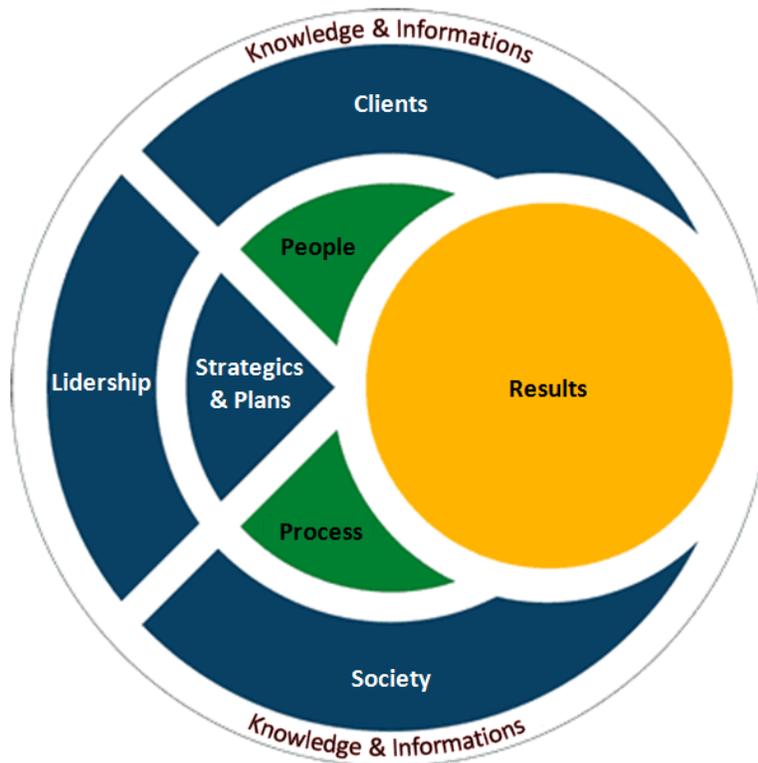
MANAGEMENT EXCELLENCE MODEL

The Model of Management Excellence is a Strategic Management Model comprised of eight Criteria: **1. Leadership; 2. Strategies and Plans; 3. Customers; 4. Society; 5. Information and Knowledge; 6. People; 7. Process; 8. Results.**

The Criteria incorporate state-of-the-art management for performance excellence skills and serve as a base for awarding and feedback for the National Quality Award applicants. They also add three important aspects to make companies more competitive:

- Supporting management practice, performance, and education improvements in organizations;
- Enabling communication and sharing of Best practices among all types of organizations; and

**Exhibit 1
Management Excellence Model**



- Serving as a reference model to improvement of understanding and application of management practices.

JOGAI CEFET

JOGAI is used in the Corporate Simulation subject of the 8th term of the Industrial Administration graduate program at CEFET-RJ. The classes involve contents such as Vision and Mission; Excellence Principles; Costs x Pricing; Revenues x Expenses; DLP; Assets x Liabilities and Balance Sheet. The plays take place during the last six weeks of class. JOGAI comprises two plays, all evaluated according to the criteria presented herein. After each Play, a comparative analysis of the business is made during a general meeting.

In general, teams are divided into:

- Three Mines – obtain concessions from the Government to operate precious metal and gem mines and sell these to the Goldsmiths;
- Five Goldsmiths – buy precious metals and gems from the Mines, produce jewelry and sell them to the Jewelry Stores;
- Three Jewelry Stores – buy jewelries from the Goldsmiths and export them.

The companies sell, buy, produce and evaluate. The Audit Committee only evaluates. The Mining Companies compete among each other, receive from the Government, on consignment, gems (aquamarine, tourmaline and rubellite) and precious metals (platinum and gold) and sell them to the goldsmiths. At the end of each play, they evaluate a few aspects of their customers.

The Goldsmiths compete among each other, buy raw-material from the mining companies, produce jewels, and sell them to the jewelry stores. At the end of each play, they evaluate a few aspects of their customers and suppliers.

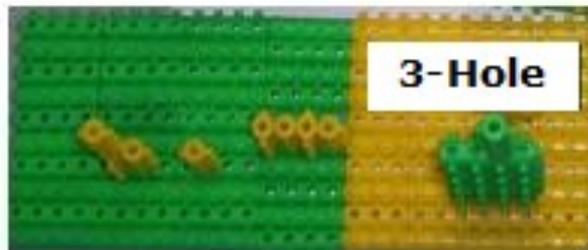
The Jewelry Stores compete among each other, buy jewels from the Goldsmiths and export them. At the end of each play, they evaluate a few aspects of their suppliers.

The Audit Committee evaluates all companies for several aspects such as Vision, Mission, Ethics Code etc.

The Exporters provides goals in connection with market demands for Jewelry Stores to meet.

The Government manages the Game as a whole.

Exhibit 2 JOGAI Raw Material



The colors represent the following raw-materials: White – Platinum; Yellow – Gold; Blue – Aquamarine; Green – Tourmaline; Red – Rubellite.

EVALUATION QUESTIONNAIRE

According to Barçante (2010), the Evaluation Questionnaire is based on the Excellence Criteria of the National Foundation for Quality, using a scale of 1 (worst) to 5 (best) in each criterion.

Abbreviation represents who evaluates: AC – Auditor Committee; SM – Supplier Market; CM – Consumer Market; EO – Everyone; GAME – Performance at JOGAI.

1. Leadership – 110 points (AC)
 - 1.1 The Vision defined by senior management is clear.
 - 1.2 The Mission defined by the senior management considers the organization's values, focus on the customer, mutual respect and trust, ethical behavior, the participation of people, and high performance expectations.
 - 1.3 The manager assumes his/her place in the company.
2. Strategies and Plans – 60 points
 - 2.1 The company has performed customer satisfaction surveys. (post-sale) (CM)
 - 2.2 Actions are taken based on satisfaction surveys and customer complaints. (CM)
 - 2.3 The company searches to set partnerships with its competitors. (AC)
 - 2.4 The company takes actions based on the analysis of its competitors. (AC)
 - 2.5 The company analyses the competitive environment in search of new opportunities. (AC)
 - 2.6 Actions are taken in connection with the analysis of the competitive environment. (AC)
 - 2.7 The company searches to set partnerships with the Supplying Markets. (SM)
 - 2.8 Actions are taken based on the search for partnership with Supplying Markets. (SM)
3. Customers (CM) – 60 points
 - 3.1 The company knows the expectations and the current and future needs of Customer Markets. (pre-sale)
 - 3.2 The company evaluates and improves its product based on the information from Customer Markets.
 - 3.3 The company has a line of products differentiated by quality.
4. Society – 60 points
 - 4.1 People from the work force, suppliers and other stakeholders are made aware and involved in matters concerning social and environmental responsibility. (AC)
 - 4.2 The company has set an ethics code. (AC)
 - 4.3 The company communicates to the society the impacts and information concerning its products, processes and facilities. (EO)
 - 4.4 The level of satisfaction of the community with the company is identified and evaluated. (EO)
5. Information and Knowledge – 60 points
 - 5.1 The information about competitors is used by the company. (AC)
 - 5.2 The information about product quality is used by the company. (AC)
 - 5.3 The information from customers is used by the company. (CM)
 - 5.4 The information about operational performance is used by the company.. (AC)
 - 5.5 The information about financial performance is used by the company. (AC)
6. People – 90 points (AC)
 - 6.1 People are satisfied with what they do.
 - 6.2 The Business function is empowered to act.
 - 6.3 The Production function is empowered to act.
 - 6.4 The communication is clear, objective and noise-free.
7. Processes – 110 points
 - 7.1 Best average price paid in the purchase of raw-material. (GAME).
 - 7.2 Best average price received in the sale of raw-material in the product. (GAME)
 - 7.3 Value added: Price of final product sold / cost of raw-material purchased. (GAME)
 - 7.4 Delivery lead-time (period from the moment the buyer confirmed the purchase until product is received by such buyer). (CM)
 - 7.5 The criteria used to select and qualify suppliers are clear and well defined. (AC)
8. Results – 450 points
 - 8.1 The company has met all expectations. (CM)
 - 8.2 Profitability – ROI (GAME)
 - 8.3 Market Share: amount of sales. (GAME)
 - 8.4 Financial Share: Value of sales. (GAME)
 - 8.5 Organizational Climate. (AC)
 - 8.6 Ranking of companies that have best dealt with Supplier Market. (SM)
 - 8.7 Considering all items evaluated, what score would you give the company? (EO)

JOGAI RAW MATERIAL

Elka Magic Pins are used. They come in five colors and four shapes, for a total of twenty different pins.

JOGAI MODEL

JOGAI is divided into three parts: Plays, Information Consolidation and Feedback.

PLAYS

Each company must find the most appropriate way to organize itself, in such a way that the students may put in practice, in a synergic manner, the knowledge obtained during the Industrial Administration Undergraduate Game, among which we may highlight business planning; work organization; decision-making; business controls; negotiation; business time management; general conflict handling; appropriate allocation of human, financial and material resources; market knowledge and monitoring customer current and future needs and expectations.

JOGAI is composed of two plays of about three hours each.

INFORMATION CONSOLIDATION

After each Play, the students consolidate the information obtained during the game with the purchase of raw-

material, product sales (quantity and values), investments, and make evaluations. They record all information in an Excel file containing three worksheets: Fiscal Note, Evaluations and Complementary Information.

FEEDBACK

That is the culminating point of JOGAI, where important facts concerning knowledge, skills and behaviors experienced during each play are commented and debated and results are presented.

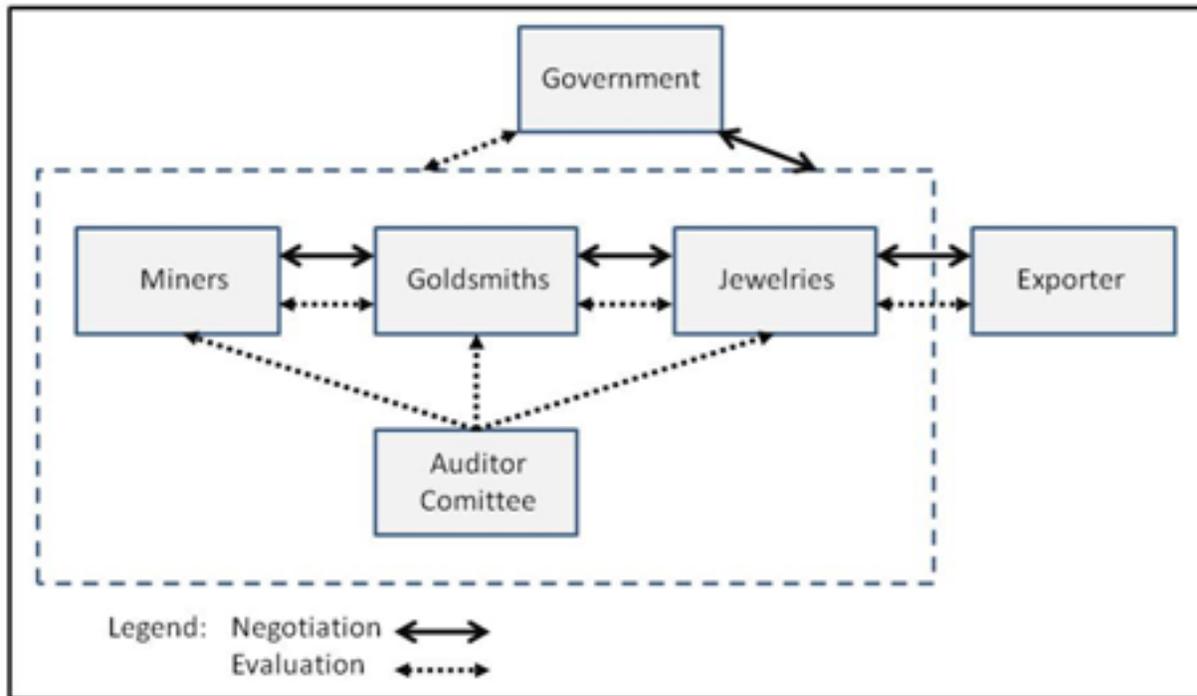
The final result of JOGAI – made with every evaluation category – is presented in the form of bar graphs where every bar shows the points that each company obtained during the Play, and the maximum score is 1,000 points, according to the model in use.

One Miner, one Goldsmith and one Jewelry Store win their respective segments and the one with the highest score wins the JOGAI. In the figure below, the winners were Miner 3, Goldsmith W and Jewelry Store D, and the latter won the JOGAI.

CONCLUSIONS

JOGAI was implemented in the first semester of 2007 at the Industrial Administration Undergraduate Course of CEFET-RJ.

Exhibit 3
JOGAI model



We may notice that some variables are smaller than in a common class, such as the degree of absenteeism, and the number of students missing class. Other variables have grown, such as the degree of class participation and the interest of students for the subjects involved.

We have found some difficulties, especially concerning the control of the degree of eagerness and the noise made by the students, most of which in their late teens.

One thing is for sure, it is very rewarding to see students who usually just “attend class”, and who are not sure of what they will do for a living, dive headfirst into the simulated market trying, by means of failed attempt vs. successful attempt, to get an opportunity to make a difference in their daily real lives.

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