

Abstract

Applied microeconomics represents a term, a concept, that is quite debated over different research papers or projects. If microeconomics strives to understand how individuals, households or companies choose to allocate their limited resources and how they arrive at those decisions in a rational fashion, applied microeconomics is the application of different theories and methods in specific settings in order to address practical issues in a range of fields like demographic economics, labour economics, business economics, industrial organization, agricultural economics, development economics, education economics, health economics, monetary economics, public economics, managerial economics and economic history. The process often involves a reduction in the level of abstraction of this core theory. There are a variety of approaches including not only empirical estimation using econometrics, input-output analysis or simulations but also case studies and historical analogy.

This thesis proposes a modern approach to the field of applied microeconomics in a society/economy dominated by fierce competition and uncertainty, where knowledge represents the most important asset to have, through the use of modern informational technologies sustained, where needed, by intensive computation architectures.

The study cases and advances presented throughout this material are not intended to cover all fields related to applied microeconomics. Topics that will be presented further on will cover the following areas:

- *Business economics*, a field that is concerned with economic issues related to business organization, management, and strategy. For example, the significance of organizational structure; the relationship of firms with the employees, the providers of capital, the customers, the government; the interactions between firms and the business environment;
- *Industrial economics*, a field that build on the theory of the firm by examining the structure of firms and markets. It analyzes determinants of firm, market organization and behavior as between competition and monopoly. Also it tries to explain internal firm organization and market strategy;
- *Agricultural economics*, a field concerned with the application of economic theory in optimizing the production and food distribution;
- *Managerial economics* represent the application of the economic concepts and economic analysis to the problems of formulating rational managerial decisions. It bridges economic theory and economics in practice. Often it is using quantitative techniques such regression analysis, correlation and calculus. It tries to optimize business decisions in the presence of some resources and constraints through many types of programming or different computational methods;

As stated in the title of this paper, we believe that it is extremely beneficial to place our contemporary economic research into a broader context that heavily influences the behavior of the economic environment. We refer this global context as knowledge society. Actually, this context is a consequence of a technological revolution that was based on information processing, knowledge creation and informational technologies.

Still, because examples are often better than definitions, this thesis was structured in such a way where we will start by presenting different researches that were conducted after finishing doctoral studies and afterwards. In the second part, based on the current projects and research I am currently working on,

we will present possible research trajectories in the field of applied microeconomics based on modern informational technologies and architectures.

Taken into consideration that many contemporary economical practices are influenced by the concept of knowledge, we started several years ago to identify exactly how this concept is influencing the modern organization. As a result, we were able to provide some insights about organizational competitiveness in a knowledge aware context. Also, we approached the concept of organizational knowledge models and proposed a unified model in the presence of different knowledge related organizational strategies. After investigating this knowledge-economy-organizational space, we reached the conclusion that distributed informational technologies are extremely well suited to model almost any organizational knowledge environment.

Due to the fact that, these days, it is quite obvious that there is a strong competition among companies, we researched the field of "competitive intelligence" as part of the "business economics" field, where we showed that it is possible to obtain answers, through ICT tools, for questions like "What are the most significant key performance indicators for the company, indicators that are able to assess their performances in the context of competitive intelligence application?" Of course, the set of critical indicators will vary according to company specifics and it will be important to be identified according to the context.

Moving forward from knowledge organizational contexts, competitive intelligence and informational technologies, we reached a point where it was possible to test, apply and prove these concepts, plus some other related to agricultural economics and managerial economics, in several research projects related to fish industry. The first part of this paper will present different applied microeconomics insights that we gather during conducted projects that involved economic fishery activities from the ICT perspective.

For example, a good ICT knowledge system in this field must provide for the currently operating fish farmer and for the potential new investor critical information that will allow the user to model expected cash flows and associated profitability ratios and indices for a particular sized operation farming a particular species of fish. Any proposed system architecture must allow to create a general report which summaries the farm scenario outlined in the assumptions laid down. Reports and graphics can include: consolidated report, bio-economic variables, profit and loss account, financial ratios, (assets and liabilities), trading results, cash flow account, internal rate of return, analysis, volume cost analysis, profitability linkage model (return on equity), capital, start-up payback period bar chart, current costs pie chart, fish tonnage chart. Another important aspect, at least for the distribution chain is traceability. Traceability is important for many reasons like responding to the food security threats, documenting chain of custody, documenting production practices, meeting regulatory compliance or analysing logistics and production costs. The benefits of traceability translate into larger net revenues for the firm. Thus, food traceability has become important for reasons other than just the legal obligations in several countries. The reinforcement of confidence in aquatic products depends on good fishery supply chain management and *traceability*. A traceability knowledge system is considered as an effective tool to guarantee safety in fish products and improve the supply chain transparency.

The second part of this thesis presents a plan for career development where several research trajectories were proposed, in order to provide scientific guidance for the future PhD students. For the proposed subjects, we will switch focus from agricultural economics to managerial and industrial economics found in the field of maritime industry. The themes we propose came from several direct interactions with organizations activating in this sector, which expressed their current and future needs.

For example, a possible direction could be the creation of a distributed knowledge based architecture that could be applied inside shipyard clusters insider a maritime group. This would be highly

beneficial to sustain organizational objectives like: increasing financial performance, optimizing decision process, increasing level of certitudes, gaining and storing expert's knowledge, tacit knowledge transfers and achieving a high level of organizational unity. In this sense, we will present possible conceptual blueprints for systems built to provide software service spaces, knowledge interfaces or knowledge portals by taking into consideration the existence of modern ICT technologies like: advanced programming languages, very large database servers, complex collaborative systems, data mining tools, statistic software, that can be used to support such architectures.

Another important topic for all players in maritime industry is *competition*. For any organization, activating in this field, it is very important to correctly position on the market and for this, it is necessary to use state of art analytics software that can provide valuable knowledge. Starting from a context in which the demand for maritime transport services was influenced by global economic fluctuations, and Asia continued to be the most prominent player, we can investigate and research possible architectural solutions for developing analytical knowledge platforms that would make possible to automate the process of obtaining valuable knowledge about ship operations status, providing valuable insights to ship owners, charterers and ship brokers to optimize the way their ships are handled and utilized. For example, complex statistical models, enforced by intensive calculation platforms, should make possible to calculate and demonstrate the effect of the most important ship variables over speed-power-consumption relationship. This kind of knowledge would bring huge savings for shipping companies.

For a company to be *competitive* it must be efficient. While the amount of data is growing fast – see satellite based AIS data, the marine industry, and not only, is lacking centralized platforms constructed on top of distributed services that gather information, platforms that would allow to flexibly share knowledge between different stakeholders. In this paper, we propose some field of research, like hull maintenance, voyage optimization, feedback to design, fuel saving devices, safety, increased transparency, where technical solutions based on large volumes of data, data mining techniques and statistical modelling would measurably enhance organizational efficiency.

In order to be competitive, it is extremely important for any organization to pay special attention to its *cost optimization strategies*. For maritime shipyards, the cost aspect is critical when building new ships. An unappropriated cost strategy can lead to heavy financial losses and serious issues when positioning with the competitors. Therefore, we proposed also as a theme of research the optimization of production costs in the shipbuilding industry by using distributed ICT technologies. Our presented approach takes into consideration shipyard clusters, organized as maritime groups for which we can obtain knowledge like number of hours allotted to each component category, cost per category, the total cost of the ship; worker, engineer, project manager cost; obtain real-time details about each component belonging to a category in a shipyard, selecting minimum price components (irrespective of the location where they can be found); dynamically defining ship construction parts

Starting from the fact that we strongly believe that collaboration is critical to reach competitiveness in the current global economy, we proposed also, as a field of research, the collaborative economy from the perspective of ICT technological advances. These days, we have a world that revolves around the trading of ideas, knowledge and innovative insights. The knowledge economy has potentially unlimited resources, it has a potential abundance and not a scarcity. Therefore, in our opinion, informational technology can sustain two fundamental assets for any company success: relationships and, as a direct consequence, reputation.