

A RESEARCH WORKSHOPS SERIES: INDUSTRIALIZATION, GEOGRAPHY AND POLICY

understanding the risks of deindustrialization and the dynamics of technological change to build socioeconomic resilience

WORKSHOP

ON SINES INDUSTRIAL INNOVATION DYNAMICS: *CHALLENGING INDUSTRIALIZATION AND RISK GOVERNANCE*

Includes the presentation and discussion of selected IST's Master Student Projects

(Course on "Technological and Natural Risks", of the IST's Master in Environmental Engineering and the Master in Engineering and Energy Management)

Venue: Theatre of the Galp Refinery, Sines

31 May 2013, 10h30-16h30

Scientific Coordination:

Joana Mendonça, Ryan Turner and Manuel Heitor

Center for Innovation, Technology and Policy Research (IN+/IST-UTL)

Organization:

Center for Innovation, Technology and Policy Research, IN+

Instituto Superior Técnico, Lisboa

<http://in3.dem.ist.utl.pt/>

International Risk Governance Council – Portugal, IRGC-Portugal

<http://www.irgc-portugal.org/>

Goals of the workshop

This workshop is intended to approach industrialization and risk governance from complementary viewpoints in order to allow the development of a comprehensive perspective on emerging risks and strategies for sustainable development.

The main goal of this workshop is to analyse potential strategies for industrialization in Sines, as well as for mitigating emerging deindustrialization risks. The focus will be on the dynamics of managing emerging risks to foster competitiveness and, ultimately, reducing socioeconomic vulnerability to local and global crises. The analysis will consider comparative studies at regional and country levels, including emerging pathways to innovate and expand manufacturing industries, mainly in Brazil and Southern Europe.

The workshop will be centred on the presentation and discussion of selected IST's Master Student Projects, which have been performed during the last months in the context of the Course on Technological and Natural Risks, of the Master in Environmental Engineering and the Master in Engineering and Energy Management.

Rationale

Analysis of emerging and systemic risks, facilitating societies to benefit from technical change, while minimising the negative consequences of associated risks. The focus is on technological and natural risks, as analysed together with major societal risks, including unemployment and related deindustrialization risks. The ultimate goal is to help design engineering practices to deal with uncertainty, including industrialization strategies that consider major opportunities associated with the need to mitigate energy and environment related risks. This includes the discussion of stakeholder engagement processes to help communicate emerging risks and to foster their mitigation.

The workshop will consider the presentation and discussion of various master student projects developed in recent months on selected issues on Sines industrial dynamics. A comprehensive framework for risk analysis and governance has been used following best international practices, as by the OECD and the *International Risk Governance Council*, IRGC (<http://www.irgc.org/risk-governance/irgc-risk-governance-framework/>).

Emphasis is on new opportunities for industrialization that consider job creation in the medium and long terms, giving a special attention to the need to mitigate energy and environment related risks, together with secure operation of industrial and/or port sites.

Students have worked in groups addressing specific projects, considering a strategy for industrialization and job creation and taking into account opportunities associated with the need to mitigate energy and environment related risks. Student integrated the views of different stakeholders, including industrial partners, field practitioners, and experts in relevant fields. Emphasis was on the creative design of engineering practices to deal with uncertainty based on the application of scientific knowledge and the need for social relevance and applicability.

In this context, an important goal of the workshop is to help developing students' competence and self-confidence as engineers able to deal with uncertainty and address complex issues associated with emerging and systemic risks. Emphasis is on designing strategies fostering industrialization processes that help addressing current patterns of deindustrialization and related unemployment issues, together with the need to mitigate energy and environment related risks and the secure operation of industrial and/or port sites.

Background note:

Deindustrialization risks and the geography of innovation

The role of "industry" as driver of competitiveness, and socioeconomic development and resilience is discussed in terms of the patterns of its geographical concentration and related deindustrialization risks at a world level. The discussion will be oriented towards identifying and understanding main variables that have influenced the current geographies of industry and knowledge, as well as the need to properly capture the complexities of current supply chains, their competitive profile and evolution, and their impact on socioeconomic resilience.

Addressing this issue requires analysis of specific case studies at country and regional levels to allow for illustrating deindustrialization patterns and their causes in different geopolitical frameworks. In this case, focus was made on a regional case study, while looking at specific industries such as oil, gas, integrating the main challenges of

industrialization for the future, such as human resources, natural and technological risks, in a context of uncertainty.

S&T strategies and policies for socioeconomic development and resilience

Innovation and competence building is paramount to foster industrialization strategies that promote development and socioeconomic resilience. In this context, the potential impact of the growing diffusion of scientific and technologic capacities across regions and countries will be discussed, as well as the increasing relevance of the internationalization of academic and scientific institutions, together with emerging paths to globalizing knowledge based economies and the need to foster forms of industrial entrepreneurship to build resilient enterprises.

Beyond the workshop: Governance framework for deindustrialization risks

Deindustrialization risks are slow-developing risks impacting economies and societies in their various dimensions. These risks are all but obvious since many have considered in the past deindustrialization as a sign of development. In this context, this workshop is aimed to launch a set of research tasks oriented towards the definition of a framework allowing to identify those risks, assess their potential impact and outline strategies for managing and communicating them.

Analysing industrialization patterns and technical dynamics demands for the use of methodologies able to encompass the complexities of the current global competitive framework. This requires considering technologies, markets, and firm relative positions in sectorial global value chains. The workshop will address these issues, by facilitating a discussion about tools and methods to set up an observatory for industrialization.

PROGRAM

Friday, 31st May 2013 – Galp Refinery (Sines)

10h15: Coffee

Session 1 - Introduction: 10h30-11h00

Opening:

Director, GALP Sines Refinery

Manuel Heitor, IN+/IST-UTL

Introductory Notes:

José Roque, Galp: “Sines: Challenges for industrialization, and risk governance”

José Manuel Félix Ribeiro

Session 2 – Project presentation and discussion: 11h00-13h00

- Project 1: “Governing Shale gas - risks and opportunities for Sines and elsewhere”
Pawel Brzdek and **Jan Kondratowicz**
- Project 2: “Governing Biofuels: implications for Sines and expectations for energy markets”
Ricardo Rodrigues and **David Luft**

Coffee

- Project 3: “Perspectives for new industrial symbioses towards Green Sines: is it possible?”
Catarina Jorge, **Carolina Costa** and **Inês Simões**
- Project 4: “Governing water supply systems for industry: perspectives for Sines”
Tiago Seco and **Renato Ribeiro**

Discussion

Lunch

Session 2 - Continuation: 14h00-15h00

- Project 5: “Risks associated to crude oil transportation systems between ports and refineries: opportunities for surveillance and maintenance”
Maria Joao Ramos, **Bernhard Tscharre** and **Linda Rehnen**
- Project 6: “Homos Sines: evolving patterns of human capital in Sines - risks of unemployment and opportunities for job creation”
Lukas Rabatin, **Liviu-Paul Botomei** and **Ionut Moisa**

Discussion

Coffee

Session 3 – New horizons for Sines and the changing patterns of industrial production: 15h15-16h30

Paulo P. Moreira and **Carlos Figueiredo**, ISCTE, “The Port of Sines: challenges and opportunities”

Ryan Turner, IN+/IST-UTL and CMU, “On the Panama Canal Expansion”

Joana Mendonça, IN+/IST-UTL: “Industrialization, Geography and Policy: The changing scenario of industrial production”

Debate:

Hugo Pereira, GALP

Ruben Eiras, GALP

Fernanda Margarido, IN+/ IST-UTL

Jose Roque, GALP

Closing Remarks:

Manuel Heitor and **Joana Mendonça**, IN+/IST-UTL, “A Research Platform for industrial innovation studies, i2”

Closure: 16h30

Brief summary of Master Student Projects to be presented and discussed:

- **Project 1: “Governing Shale gas - risks and opportunities for Sines and elsewhere”**

Pawel Brzdek, Jan Kondratowicz

Summary

The goal of the project is to make an analysis of the potential risks and benefits of shale gas production in Portugal (Lusitanian basin - surroundings of Sines) for example of the Poland and the United States of America, and to address the potential benefits for the Sines industrial zone as a result of the development of shale gas around the world (particularly for refinery and an LNG terminal).

Sines zone is located within the "Lusitanian basin", which potentially can be shale gas. Commencement of production in the region brings many benefits and risks that will be presented in the project as an example the experience of the Poland and the United States of America. Analysis of the potential benefits to the industrial area of Sines associated with increased shale gas production in the world (USA, China, Poland, etc.). This is mainly related to the refinery and an LNG terminal.

- **Project 2: “Governing Biofuels: implications for Sines and expectations for energy markets”**

Ricardo Rodrigues, David Luft

Summary

The Biofuels industry is mostly policy driven. This industry is very unpredictable and with that there are risks associated with it. Inherent to our project theme there are financial risks, market risks, technology risks, product performance risks, operational risks, feedstock supply risks. Concerning the raw materials and the type of technology applied, there are two groups of biofuels, the first generation and the second generation. Current available biofuels (first generation) are made from starch, sugar and oilseeds crops. The raw materials used for the second generation biofuels are lignocellulosic biomass. The main obstacle for second-generation biofuels is high initial investment costs as well as higher costs for the end-product compared to fossil fuels. In the present work, we will perform a risk analysis assessment on the national biofuel industry.

- **Project 3: “Perspectives for new industrial symbioses towards Green Sines: is it possible?”**

Catarina Jorge, Carolina Costa, Inês Simões

Summary

The project "Green Sines" focuses on the study of the possibility of setting up industrial symbiosis in Sines, providing a more ecological industry in Portugal. With this goal in mind, we start with an analysis of the most remarkable (and world famous) case of this type of setting - The Kalundborg Industrial Park in Denmark. Although we know that the conditions of creating this industrial ecosystem and its evolution were mostly spontaneous and under circumstances very different from those found in Sines, this case study helps us to better understand the concept and all that involves. We analyse the type of industries operating in Sines and its products / wastes, as well as the impact that these may have both for humans and the environment. In this first analysis of industrial Sines, we see if it's possible to generate a cycle and what kind of links already exists, and build scenarios for the future.

- **Project 4: “Governing water supply systems for industry: perspectives for Sines”**

Tiago Seco, Renato Ribeiro

Summary

Water used in refrigeration systems represents the main source of water consumption in many industries/companies, especially the ones that use some sort of heat source. With this paper we are going to analyse the current technology available in this specific area as well as their risks.

We focus mainly in the Galp Refinery of Sines, which is our case study. In order to improve the current installed system, we're going to compare the Galp Refinery of Sines with several companies around the world, namely, Saudi Aramco in the Middle East, Essar Oil Refinery in India and Denizli Industrial zone in Turkey. We will try to interview the responsible for the system in the Galp Refinery and collect some specific data about water consumption, efficiency of the system, costs and maintenance of the system,

treatment of the water before it enters the system and wastewater treatment (and where it is discharged).

After all the international comparisons and analysis of the several technologies available worldwide, we will compare all the risks associated to each one of them based on a risk model to see which one has the best cost-benefit (or cost-risk free). After that, we will check/study if the best solution it's feasible in the Galp Refinery of Sines and if it is economically viable.

We analyse the different technologies and how to apply them: open recirculating systems, closed recirculating systems and once-through systems. In each of those systems we can use several fluids, being the water our focus, which can be seawater (if companies are near the coast) or drinkable water. This water has to be submitted to different types of treatment to avoid corrosion, scale and fouling in the pipes and components of the system and since seawater has more minerals in its composition, the process will be costly and will last longer.

- **Project 5: “Risks associated to crude oil transportation systems between ports and refineries: opportunities for surveillance and maintenance”**

Maria Joao Ramos, Bernhard Tscharre, Linda Rehnen

Summary

Pipelines are widely used for the transportation of hazardous and non-hazardous liquids, especially for huge quantities on short distances. They have the highest efficiency when it comes to Euros per tonkm transported. The present project aims at the characterization of the pipelines' technology, infrastructures and stakeholders, analyzing the different risks associated with these systems. Due to the increasing demand on crude oil, this is a topic in need of attention, since there are different types of accidents associated to these pipelines. Therefore, a closer look will be taken to the crude oil pipeline that connects the port of Sines with the refinery, located only a few km from the coast. Furthermore, an international comparison is performed between two similar ports: Sines (Portugal) and Coruña (Spain). The applied legislations will be discussed according to the considered countries.

Throughout the research, the intention is to identify the most important risks and the ones likely to occur, giving some examples from Europe.

- **Project 6: “Homos Sines: evolving patterns of human capital in Sines - risks of unemployment and opportunities for job creation”**

Lukas Rabatin, Liviu-Paul Botomei, Ionut Moisa

Summary

“Industry is at the heart of Europe and indispensable for finding solutions to the challenges of our society, today and in the future. Europe needs industry, and industry needs Europe. We must tap into the full potential of the Single Market, its 500 million consumers and its 20 million entrepreneurs.” (Vice President Antonio Tajani – European Commission).

Across nations and political systems, manufacturing is regarded as an essential and uniquely powerful economic force. In advanced economies, a strong manufacturing sector is celebrated for creating well-paid employment and maintaining technical prowess; a shrinking manufacturing sector is seen as evidence of decline. In developing economies, manufacturing is recognized as the engine of development, raising agrarian populations out of poverty and turning poor nations into players in the global economy¹.

The scope of our project is to understand and address the mutual relations between industrialization potential and skills and competences level, characterizing this way both risks and opportunities associated.

In every corner of the world the nature of work is changing which leads both to opportunities and challenges. No doubt that over the year's industrialization was the engine that drove up development and social welfare.

¹ McKinsey Global Institute - Manufacturing the future: The next era of global growth and innovation

In our work we try to establish the institutional and structural factors that have fostered the development of Sines during the '60s – '70s decades and then to address the shortcomings of the actual growth model, trying to see if the process of development can be guided towards a “smarter” model.

In order to be able to create conclusions we compare, in the perspective of competitiveness, the area of Sines and Singapore.

- (1) We first try to create a context of the regions trying to evaluate their evolution during the last years, in terms of demographic and economic and especially in relation with the industrial economic sector.
- (2) We create then a scenario of a possible re-industrialization of Sines and asses both the opportunities that emerge (regarding the potential for job creation) and the risks that these changes will face (mainly the lack of skilled human capital). We try to characterize the weight that High Education System (HES) has on the development of the considered areas in terms of patent policies, creation of companies, participation in S&T parks, number of universities and of registered students, level of graduates entry on labour market, direct and indirect employment by public university system and of course the level of investments (R&D expenditures) made at regional level (alike by public and private sector).
- (3) The case study we will include will help us to get the sense of the reality

A RESEARCH WORKSHOPS SERIES: INDUSTRIALIZATION, GEOGRAPHY AND POLICY

understanding the risks of deindustrialization and the dynamics of technological change to build socioeconomic resilience

The workshop series on INDUSTRIALIZATION, GEOGRAPHY AND POLICY is aimed to help understanding the risks of deindustrialization and the dynamics of technological change to build socioeconomic resilience. This is because there is a raising - and justified - concern that deindustrialization is hampering growth and undermining the competitiveness of developed economies leading to loss of jobs. Understanding deindustrialization processes over the last decades in many regions worldwide and related risks associated with the dynamics of the geography of innovation will allow framing new industry and technology policies leading to socioeconomic development and resilience.

Organization and coordination:

Center for Innovation, Technology and Policy Research, IN+, Instituto Superior Técnico, Lisboa

International Risk Governance Council – Portugal

IRGC Portugal is based at:

IN+, Center for Innovation, Technology and Policy Research
Av. Rovisco Pais, 1
1049-001 Lisboa, Portugal

Tel.: (+351) 218417732

Fax.: (+351) 218496156

www.irgc-portugal.org

with the support of