Exploring the role of knowledge and technology transfer in innovation systems

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Contributors: Jofre, S.
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Strategic Management: The theory and practice of strategy in (business) organizations.

This work is the result of an ongoing study on the patterns and trends on both the theory and practice in the field of strategic management carried out at the Section of Innovation Systems and Foresight. The report focuses on different issues regarding the broad topic of strategy in organizations, but special attention is given to three relevant issues regarding the current diversification and fragmentation in the field of strategic management: • The lack of a universally accepted definition of what strategy is, • The multi-disciplinary nature of the field, and • The development and evolution of our knowledge on human cognition and organizations’ behaviour. These issues are addressed from the perspective of influential scholars and practitioners of different disciplines, yet they are discussed from the angle of business organizations.

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The challenge of a greener European construction sector: Views on technology-driven (eco)innovation

The aim of this report is to disseminate crossdisciplinary knowledge regarding innovation in the European construction sector. The review focuses on the challenge of incrementing the productivity and competitiveness of the sector while increasing its environmental sustainability. In this context, particular emphasis is given to the description and discussion of technology-driven eco-innovation initiatives such as nanotechnologies for a greener construction. Although the scope of this report covers the European construction sector, most data presented is at an EU scale. In this context, particular emphasis is given to the discussion of the main topics from the perspective of Nordic countries.

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An Innovation Systems Perspective on EU Governance of Energy Innovation

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A triple Helix Approach to the Future Innovation Flagship of Europe: Exploring the Strategic Deployment of the European Institute of Innovation and Technology

This paper explores the strategic context of the implementation of the European Institute of Innovation and Technology (EIT). The analytical framework is based on a comparative study of National Innovation Systems (NIS) and the particular Triple Helix of University-Government-Industry relationship in the European Union and its closer competitors, Japan and the United States. Main results suggest that the innovation systems in this study are in a transition stage at different degrees of change. Such transitions, broadly motivated by the challenge of globalization and sustainable development, are transforming the profile of the triple helix relationships. This transformation is bringing the American and the Japanese innovation system to an unprecedented level of commonality and the EU to a yet uncertain stage of transition characterized by the conflict between national and supranational priorities, and the different innovation capabilities of its Member States. The paper argues that in such conditions, the current strategy to deploy the EIT is not appropriated and an alternative strategy is proposed.

Bibliographical note
Appendix 6.4 in Finn Hansson et al. SUCCESS Workpackage 1. Benchmarking Successful Models of Collaboration. SUCCESS. Pilot Study WP1, Stockholm
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Research output: Research → Report – Annual report year: 2009
Overview and Analysis of the Japanese and US Innovation Systems

This paper presents an overview of the Japanese and US national innovation systems. The information is organized, analyzed and discussed in the context of the Triple Helix Model of university-government-industry relationship. Current innovation systems in Japan and the US are in a state of transition. Main drivers behind the adaptation process are globalization of economies and sustainable development. Despite historical and cultural disparities, the innovation systems of these countries are evolving towards a common strategy based on the concept of “innovation ecosystems”. This concept stresses the dynamics of innovation in connection with evolving environments, economies and societies. The analysis indicates that in the history of both systems there is a clear trend to learn from common success and failures. Therefore, the disparities between the systems observed in previous decades are now less evident. The transition process in both systems is guided by concerted national actions. However, the transition in Japan, currently in a more advanced stage, shows a greater systemic approach guided by comprehensive plans and roadmaps for medium and long-term strategies. As an important reflection from this analysis we consider that from a systemic perspective, models of collaboration are less relevant that the benefit implicit in the simple action of collaborating. This is the constant creation, diffusion, and absorption of knowledge as economic and social inputs/outputs within an innovation system. Availability and diversity of collaborations at any time and rate can bring then, the desirable consequence of synergy and the required systemic flexibility to enhance its adaptability to changing environments.

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Partnerships for innovation and deployment

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Strategizing on innovation systems: Alternative scenarios for university-government-industry collaboration on sustainable energy innovation

This paper explores the strategic context of the implementation of the European Institute of Technology (EIT) from the perspective of National Innovation Systems (NIS) and the Triple Helix of University-Government-Industry relationship. The analytical framework is given by a comparative study of NIS in the EU and its closer competitors the US and Japan, with emphasis on the particular features and developments of their respective Triple Helix models. Based on the results of this analysis, the paper suggests strategic recommendations regarding the EIT deployment. The work aims an additional contribution to the innovation and Triple Helix literature and research. The study is based on observations and considerations made during an ongoing EU project. Background The increasingly fast pace of economic globalisation has utterly changed the world economic order, bringing together unprecedented opportunities and challenges. This new economic order, demands countries to strengthen their inventiveness and capability to adapt to changing environments, and to quickly react to emerging social needs and preferences, and therefore to innovate more (EC, 2006a). Although the European Union (EU) has already implemented several action plans and programmes aiming at improving its technological and non-technological innovation capability, its performance in the global context is yet weak, particularly if compared to rival economies such as Japan and the US (EC, 2008a). A recent initiative to foster Europe’s innovation performance is the establishment of the European Institute of Innovation and Technology – EIT (EC, 2006b; 2008b). The EIT is the first attempt to fully integrate all dimensions of the “Knowledge triangle”; education, research, and innovation. Although inspired by best practice examples observed within the US innovation system such as the Massachusetts Institute of Technology (MIT), the EIT deployment does not considers the establishment of a physical institution such as MIT but a supranational network of pre-existing institutions. Whether this strategy will be able to bring the expected outcomes is a question yet to be answer. However, the EIT is still at an early stage of development and transcendental actions can still be taken in order to ensure a successful and sustainable deployment Framing Innovation literature provides a variety of analytical frameworks and multi-lateral collaborations models in which the EIT future deployment can be respectively analyzed, compared and based. However, these references often involve systems with well-defined aggregation levels such as for example geographic boundaries of nations (e.g. Freeman, Nelson, Lundvall, ) and regions (e.g. Cooke, Asheim) , industry sectors (e.g. Malerba) or specific technologies (e.g. Hekkert, Bergek, Jacobsson). In this context, the complex supranational character of the European Union entails a challenging political, cultural, and economic environment for the establishment of a “virtual” institution aiming a deep reform of Europe’s current (and mostly national) education, research and business innovation systems. This impasse remarks the challenge of redefining and reinforcing a supranational innovation system in line with national demands and their particular environments, and calls for new theoretical and empirical developments enabling proper policy actions. The concept of innovation systems assumes that flows of technology and information among people, companies and institutions are crucial to the innovative process. At national level, innovation and technical development are the result of a complex set of interactions between agents producing, distributing and applying different types of knowledge. Literature suggests that the innovative performance of a country greatly depends on the particular arrangement of these agents within the collective knowledge system and the technologies they use. These agents are primarily private enterprises, universities, public research institutes, and the people within them. The linkages between these agents can take the form of joint research and publications, personnel exchanges, cross-patenting, purchase of equipment and a variety of other channels. The particular educational, economic and political environments of countries might in turns define the characterization, role and interaction of agents within the innovation system (Etkowitz, Leydesdorff). The resultant framework given by the interaction of these environments is driven by university (education), industry (economy) and the government (politics). Understanding the dynamics of their relationship gives an insight into characteristic functions and operations in the innovation system. In the analytical perspective of NIS, the role of these three agents is valued in terms of the outcome of innovation – value and welfare creation – therefore, the NIS analysis inherently focuses on economy and emphasizes the role of industry over government and university. A complementary analytical concept that regards NIS from a slightly different perspective is the Triple Helix Model of innovation (e.g. Etkowitz & Leydesdorff), that emphasises the role of university in the innovation system and its co-dependency with and within government and industry. The model supports the hypothesis that universities, governments and industry play an equally important role in innovation and that interdependency and evolution is what defines the systemic outcome over time. In a historical context, most countries have formerly based their innovation systems in a triple helix in which governments did greatly influence the performance and relationship of universities and industries. In this case, boundaries and competences of the three agents were well defined and did not overlap. Nowadays, most countries are in transition to – or fully developing – a triple helix model in which each of the innovation agents takes account of the role of the others and hybrid and tri-lateral networks emerge at the interfaces. The study The study uses NIS as an analytical framework to compare patterns and trends in innovation developments in the US, Japan and the EU. The comparison provides with a qualitative reference to identify strategic issues regarding the innovation systems’ functions. A complementary analysis is based on the characterization of the university-government-industry relationship in order to identify driving factors in the management of education, research and business innovation. A final analysis is conducted in order to develop a strategic approach to the future EIT deployment in the context of a triple helix model entailing considerations at both the national and the supranational levels. Data is gathered from available literature. Conclusions and discussion The findings suggest that there are important disparities among NIS particularly at the level of systemic functions such as knowledge creation, knowledge diffusion, guidance, and human and financial
resource mobilization. These disparities are less evident when comparing NIS in Japan and the US alone, suggesting a merging trend encouraged by mutual learning. Conversely, the average innovation performance in the EU is greatly affected by the heterogeneous performance among Member States, notably among those newly accessed. In general terms, in the US and Japan NIS are mature but yet undergoing important reforms, particularly in terms of education, research guidance and entrepreneurship. These reforms are not yet fully implemented in the EU. From the perspective of a University-Government-Industry relationship, the common path observed in the US and Japan becomes more evident. In the EU this relationship varies greatly among States, however, an overall trend is identified. We observe that the predominant EU triple helix model is characterized by a strong link within government and university and a weaker link between university-industry. This finding is in line with EC studies (EC, 2006a) calling for a greater autonomy of national universities and a stronger and efficient collaboration between industry and academy. Crucial factors regarding these issues are the mobilization of human and financial resources and Intellectual Property Rights mechanisms. Finally, our analyses suggest that the future EIT deployment should consider a different supranational Triple Helix model in which leading national universities around Europe take a leading role. Accordingly, we suggest and further describe a strategic approach to implement and deploy such a model. Research activities required to further develop our proposal are also depicted. References EC (2006a) “Putting knowledge into practice: A broad-based innovation strategy for the EU” COM (2006) 502 final, Brussels, 2006 EC (2006b) “Developing a knowledge flagship: the European Institute of Technology” COM (2006) 77 final, Brussels, 2006 EC (2008a) “European Innovation Scoreboard 2007: Comparative Analysis of Innovation Performance” EC Publications Office, Luxemburg, 60p. 2008 EC (2008b) “Establishing the European Institute of Innovation and Technology”, 2006/0197 (COD): EIT 23/EDUC 215/RECH 395/COMPET 406/CODEC 1334, EC, Brussels, January 2008
Waste Management of Electric and Electronic Equipment: Comparative Analysis of End-of-life Strategies

This article analyzes diverse aspects of the waste management of electronic and electric equipment. The scope of the study focuses on end-of-life strategies currently implemented in industrialized economies such as Japan, the United States, and the European Union. The objective is a comparative analysis of such strategies in order to identify logistic issues that may contribute to the further improvement of waste management policies. The results indicate that although all strategies follow the extended producer responsibility principle, in practice several logistic differences arise due to particular interpretations of the concept. In general, it was observed that a direct comparison is rather difficult since the strategies consider different legal frameworks, they cover different types and numbers of products, and the resultant mass flows and related operational costs are highly context-dependent variables. Therefore, it is not possible to indicate which strategy presents the highest overall efficiency. The study concludes that a little contribution is feasible if the advantages and weaknesses of the models depicted and discussed here are considered in further regulatory decisions.
Keyword: Waste Management, Jofre, End of Life, LCA, WEEE

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Scopus rating (2014): CiteScore 0.96 SJR 0.435 SNIP 0.745
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BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.491 SNIP 0.761
Scopus rating (2007): SJR 0.586 SNIP 0.991
Scopus rating (2006): SJR 0.135 SNIP 0.197
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Eco-Evolution: An Evolutionary-Oriented Strategy for Sustainable Product Development

The sustainable development debate has motivated the interest on the development process in which products and services are conceived and their characteristics and performance determined. In order to address environmental issues in the product development process, several methods and tools for innovation have been developed. However, the yet narrow scope and relevance of environmental innovation in firms, has been centred on cost-effective modifications with moderate impact on the overall environmental performance of products. Recently, it has been indicated that the complexity of the question of sustainability demands a substantial technological change connected with a reciprocal change in the social, economic and cultural patterns that rule the production-consumption system. Thus, tools and models are needed in order to allow the evaluation of what is possible within the present technological and cultural frameworks and what the new directions to explore are. This thesis addresses sustainable development as a function of socioeconomic, technological, and environmental co-evolution. Therefore, the requirements and implications of sustainability are investigated in the context of modern evolutionary theorizing. As a result, an evolutionary-oriented strategy called eco-evolution is introduced. As a concept, eco-evolution represents the progressive shift of a product development process in order to deploy and deliver functions in line with sustainability. As a strategy, eco-evolution represents the systematic internalization of environmental issues at the initial stages of product development process in order to establish a horizon for sustainable design and product management. In order to illustrate the practical application of the eco-evolution strategy, a case study on the home appliance industry with focus on Japanese domestic refrigerators is included. The overall results indicate that eco-evolution is an efficient knowledge-based strategy for early identification and correction of non-optimal trajectories and for the generation of design and managerial directions in accordance with sustainability requirements. The thesis concludes that evolutionary theorizing has a practical application on sustainable product development and systemic innovation, and that eco-evolution as a concept and strategy, respectively addresses the complexity of sustainable development and assesses the sustainable product development in a practical way.

Keyword: Service oriented economy, Evolutionary Design, Jofre, Innovation, Foresight, Eco Design, Sustainable Product Development

A New Eco-design Strategy to Assess Sustainable Environmental Innovations

This paper analyzes and discusses the potential role of evolutionary theories in environmental innovation with emphasis on sustainability. The study focuses on the dynamic mechanisms driving the adaptation of products to their changing environments. As a result, a strategy, called the Eco-evolution, is proposed. Eco-Evolution is a strategy based on incremental innovation through re-examination of existent knowledge and technological trajectories. The strategy attempts the identification of lock-in of non-optimal technologies and sustainable alternatives, in order to outline the sustainable design and organizational horizons. To illustrate the practical application of the strategy, an example on domestic refrigerators is included. The study concludes that eco-evolution is efficient when identifying non-optimal technological trajectories and sustainable options for innovation on the bare of existent knowledge.

Keyword: Service oriented economy, Eco Innovation, Jofre, Innovation, Dematerialization, Eco Evolution, Evolutionary Theorizing, Eco Design, Evolutionary design

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Evaluation of Efficient Repair System for Electrical/Electronic Equipment by Reuse
Keyword: Reduce Reuse Recycle, Jofre, WEEE

Strategy and Principles for Sustainable Product Development of Home Appliances
Keyword: Jofre, Dematerialization, Product Service Systems, Sustainable Product Development, Service Oriented Economy
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**High-level OECD Conference: ICTs, the Environment and Climate Change**
Sergio Jofre (Participant)
Department of Management Engineering
Innovation Systems and Foresight

**Related event**

**High-level OECD Conference: ICTs, the Environment and Climate Change**
27/05/2009 → 28/05/2009
Helsingør, Denmark
Activity: Attending an event › Participating in or organising a conference

Period: 20 Apr 2009 → 24 Apr 2009
Sergio Jofre (Reviewer)
Department of Management Engineering
Innovation Systems and Foresight

**Description**

**Related journal**

Local database
Activity: Research › Peer review of manuscripts

**Analysis of DTU Management Competence, its Equivalent Abroad and Potential Strategic Alliances (Journal)**
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Sergio Jofre (Reviewer)
Department of Management Engineering
Innovation Systems and Foresight

**Related journal**

**Analysis of DTU Management Competence, its Equivalent Abroad and Potential Strategic Alliances**
Local database
Activity: Research › Peer review of manuscripts

**DIME International Conference: Innovation, sustainability and policy (DIME GREThA); 2008**
Period: 11 Sep 2008 → 13 Sep 2008
Sergio Jofre (Participant)
Department of Management Engineering
Innovation Systems and Foresight

**Related event**

**DIME International Conference: Innovation, sustainability and policy (DIME GREThA); 2008**
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Sergio Jofre (Participant)  
Department of Management Engineering  
Innovation Systems and Foresight  

**Description**  
Note: EU project meeting  

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European Commission  
Belgium  
Activity: Other  

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**OECD-Workshop – ICTs and Environmental Challenges**

Period: 22 May 2008 → 23 May 2008  
Sergio Jofre (Participant)  
Department of Management Engineering  
Innovation Systems and Foresight  

**Related event**  

OECD-Workshop – ICTs and Environmental Challenges  
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Eigtveds Pakhus, Copenhagen Denmark 22-23 May 2008  
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.