THE ROLE OF UNIVERSITIES IN INNOVATION AND REGIONAL DEVELOPMENT: THE CASE OF ROGALAND REGION

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Outline

• Introduction
• Regional Economic Structure of Rogaland
• Literature Review and Theoretical Perspective
• The Founding, Educational and Research Impact of UiS
• Trajectory of UiS’s Regional Engagement
• Discussion and Conclusion
• Policy Implications
Introduction

• Rogaland
  • The 4th largest region in terms of population
  • Stavanger; The Oil and Gas Capital of Norway
  • Ranks the 2nd in terms of GDP per inhabitant
  • 2nd in terms of patent applications in Norway (16.2% of applications in Norway)
  • 1st in terms of granted patents in Norway (NIPO, 2017).

• University of Stavanger
  • Origins date back to 1960s with Rogaland District College
  • 6 faculties, 11 departments, 11,194 students and 1,363 full-time employees
Regional Economic Structure of Rogaland

- Regional Economic History
  - Fisheries and shipbuilding until 1960s
  - Turning points: 1962 and 1969
  - 1970s: Emergence of the booming economy dependent on petroleum sector
- Resonance of International Oil Sector Developments in Rogaland
  - Late 1980s: Unprecedented increase in employment, decline in establishments
  - 1998 Asian Crisis
  - 2008 Financial Crisis
  - 2014 Oil Price Crisis

### Regional Economic Structure of Rogaland (2)

- **Sectoral Composition of Regional Economy**
  - 1997-2007 vs. 2008-2015 data in employment and value added of sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>Employment (%)</th>
<th>Value Added (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil and gas extraction including services</td>
<td>5.04</td>
<td>9.73</td>
</tr>
<tr>
<td>Construction</td>
<td>6.28</td>
<td>7.41</td>
</tr>
<tr>
<td>Health and social work</td>
<td>16.14</td>
<td>17.16</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>16.80</td>
<td>11.55</td>
</tr>
<tr>
<td>~ Building of ships, oil platforms and moduls</td>
<td>5.55</td>
<td>2.48</td>
</tr>
<tr>
<td>and other transport equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture and forestry</td>
<td>4.19</td>
<td>2.41</td>
</tr>
</tbody>
</table>

Source: Statistics Norway. Authors’ calculation
Literature Review and Theoretical Perspective

- Universities perform three broad roles (Charles, 2006; Gunasekara, 2006; Uyarra, 2010)
  - Knowledge production
  - Entrepreneurial
  - Developmental

- Universities tend to perform a combination of these roles in their regional engagement

- Different conceptual approaches for analyzing universities’ regional roles (Uyarra, 2010)

- Focus on three of these frameworks
  - Gunasekara (2006)
  - Trippl et al. (2015)
  - Lester (2005)
## Literature Review and Theoretical Perspective (2)

<table>
<thead>
<tr>
<th>Model</th>
<th>Generative-developmental</th>
<th>Economic-societal development</th>
<th>Industrial transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main proponent(s)</td>
<td>Gunasekara</td>
<td>Tripp, Sinozic and Lawton Smith</td>
<td>Lester</td>
</tr>
<tr>
<td><strong>Key Premise</strong></td>
<td>Universities perform generative and developmental roles in catalysing their regional innovation systems. The performance of a particular role is contingent on variations in universities internal environment and regional settings.</td>
<td>The economic and societal development roles that universities in their regions is influenced by the prevailing national policy initiatives and incentives.</td>
<td>Local economies develop when local industries adapt and apply new technologies to develop innovative products and services. This process industrial renewal takes place over time. Thus, universities role in regional development depends on the type of industrial transformation occurring.</td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td>Shifting from the focus on university technology transfer role to address its broader societal roles.</td>
<td>Comprehensive model that analyses the utility of different standalone models under varied policy regimes; brings to the fore the importance of policy institutions in shaping the behaviour of universities. This has hitherto been missing from the analysis of universities role in regional development.</td>
<td>Dynamic model that focuses on industrial transformation process; asserts local industries’ locus in regional economic growth; emphasizes universities supporting role; and recognizes importance of external actors.</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
<td>Static model; tends to place universities at the forefront of regional development.</td>
<td>Static model; does not explain dynamic changes in regions.</td>
<td>Typology tend to be idealized and simplistic; too narrow definition of economic success or growth.</td>
</tr>
</tbody>
</table>
## Literature Review and Theoretical Perspective (3)

- **Lester’s Industrial transformation typology**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Example</th>
<th>Universities Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>New industry creation</td>
<td>Local formation of new industry with no technological antecedent in the region</td>
<td>Development of PC industry in Silicon Valley. Development of the wireless industry in the region of Helsinki</td>
<td>- Cutting edge science and technology research</td>
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<td></td>
<td></td>
<td>Development of the wireless industry in the region of Helsinki</td>
<td>- Prioritise technology licensing, technology transfer and entrepreneurial policies</td>
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<td></td>
<td></td>
<td></td>
<td>- Brokering ties between academic scientists and local entrepreneurs</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Building an industry identity</td>
</tr>
<tr>
<td>Industry transplantation</td>
<td>Importation of an existing industry from elsewhere to develop a new industry in a region</td>
<td>The development of the oil and gas industry in Stavanger and Aberdeen following the first oil find in the North Sea</td>
<td>- Provision of quality education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The development of the oil and gas industry in Stavanger and Aberdeen following the first oil find in the North Sea</td>
<td>- Training of high calibre human capital</td>
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<td></td>
<td></td>
<td>The development of the oil and gas industry in Stavanger and Aberdeen following the first oil find in the North Sea</td>
<td>- Continuous improvement and alignment curricula to industry needs</td>
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<td>The development of the oil and gas industry in Stavanger and Aberdeen following the first oil find in the North Sea</td>
<td>- Provision of technical support and capacity building for local businesses</td>
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<td>The development of the oil and gas industry in Stavanger and Aberdeen following the first oil find in the North Sea</td>
<td>- Building linkages between separate regional actors or technological bases</td>
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<td>The development of the oil and gas industry in Stavanger and Aberdeen following the first oil find in the North Sea</td>
<td>- Creation of industry identity and legitimacy</td>
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<td>Industry diversification</td>
<td>The harnessing of a declining industry’s core technologies to develop a related new industry</td>
<td>The development of a polymer industry in Akron, Ohio following the collapse of the region’s tire industry</td>
<td>- Problem-solving interaction with industry</td>
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<td>The development of a polymer industry in Akron, Ohio following the collapse of the region’s tire industry</td>
<td>- Exploring global best practices</td>
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<td>The development of a polymer industry in Akron, Ohio following the collapse of the region’s tire industry</td>
<td>- Training of high calibre human capital</td>
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<td>Industry Upgrading</td>
<td>The enhancement of an existing industry’s technological base through improvements in production technologies or the introduction of innovative products or services</td>
<td>The upgrading of the pharmaceutical and food industries in Turku through the introduction of biotechnology</td>
<td>- Problem-solving interaction with industry</td>
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The Founding, Educational and Research Impact of UiS

- 1960s: Processes to set up university began. Land acquired.
- 1969: Rogaland District College established.
- 1973: Rogaland Research established.
- 1978: Stavanger Teaching College founded.
- 1984: Hotel Management School established.
- 1986: Rogaland District College and Stavanger Engineering College joined to form Rogaland University College (HSR).
- 1987: HSR granted access to award civil engineering degree.
- 1988: Music Conservatory College and Nursing College formed.
- 1989: Norwegian Church College formed.
- 1994: Merger of colleges in the region to form Stavanger University College (HiS).
- 1999: HiS given the right to award doctoral degree.
- 2005: University of Stavanger inaugurated.
Trajectory of UiS’s Regional Engagement

- **1970s**: the system of *regional colleges* in Norway (as a tool for regional development and a decentralization).
- **1973**: Rogaland Research institute (Rogalandforskning - RF), +90% of its research financed by oil industry - the engineering college in Stavanger becomes exceptional among its peers in conducting substantial R&D.
- **1994**: College Reform in Norway – merger to HiS, one of the 26 university colleges from reorganizing of 98 regional & vocational colleges.
- **1998**: HiS establishes 2 *PhD programmes* in *petroleum engineering* and *offshore engineering*.
- **2002**: the Centre for Oil Recovery (COREC) (joint initiative of HiS, RF, and some of Norwegian and international firms in the oil and gas industry).
Trajectory of UiS’s Regional Engagement (2)

- **2002**: the Collaborative Competence Center for Industrial Asset Management (CIAM) is established, with partner companies mainly from the oil and gas industry.
- **2002**: Prekubator is founded by RF and Rog. Knowl. Park (now Ipark).
- **2003**: HiS establishes 2 other PhD programmes in risk management and educational sciences.
- **2004**: HiS applies for receiving university status, having established 4 PhD specializations. COREC was a major contributor to the uni. fund.
- **2005**: HiS becomes UiS. Prekubator becomes Prekubator TTO.
- **2005**: three other PhD programmes are established - in the areas of IT, chemistry and biological sciences, and management, economics and tourism.
Trajectory of UiS’s Regional Engagement (3)

- **2006**: RKP becomes Ipark. RF becomes IRIS.
- **2006**: Centre for Organelle Research (CORE) is founded, a joint initiative of UiS and IRIS, and Stavanger University Hospital (SUS).
- **2007**: NCE Culinology is established in the Ipark.*
- **2008**: Centre for Innovation Research is established.
- **2009**: Centre for Risk Management and Societal Safety (SEROS) is established by UiS and IRIS.
- **2009**: Centre for Sustainable Energy Solutions (CenSE) is established.*
- **2011**: PhD specialization in *Health Sciences* and *Sociology*.
- **2012**: Centre for IP-based Service Innovation (CIPSI) is founded.

* No longer active.
Trajectory of UiS’s Regional Engagement (4)
- Latest changes in the UiS and IRIS research priorities

• Priority areas of Tekna changing from merely petroleum & offshore eng. and risk mgmt. to **cross-sectional themes** of
  - Oil and energy
  - Oceanic science and technology
  - Healthcare technology
  - ICT and infrastructure
• Externally funded research: from 20.1% (in 2016) to **25%** of total income in 2020.
• Data Science and Big Data as a new education and research field → Smart City, Triangulum project.
• IRIS has MedTech as a new research focus area (**Norway Pumps and Pipes**).
• Rogaland: highest level of regional synergy in Norway (Strand *et al.*, 2017)
• **Value Creation Forum** (verdiskapingsforum): Triple Helix practice
Discussion

- priority industries for the Rogaland region

Based on value added

• Oil and gas extraction including services
• Manufacturing (*but it is falling, esp. due to shipbuilding and oil platforms*)
• Health and social work

Based on VRI Programme*

• Energy
• Maritime industries
• Food industry
• Healthcare

Discussion (2)
- RIS failures / deficiencies (Tödtling and Trippl, 2005)

- **Organizational thinness**: weak crucial parts in the innovation system, such as low level of clustering;
- **Lock in**: over-specialization in declining industries;
- **Fragmentation**: lacking knowledge flows in the innovation system.

- Energy sector: risk of lock-in (mono-industry specialized R&D).
- Healthcare sector: fragmentation (knowledge flow not optimal).
- Maritime sector: No significant capacity in UiS (e.g. no Knowledge Hub).
- Food sector: No significant capacity in UiS.
## Discussion and Conclusion

<table>
<thead>
<tr>
<th>Priority industry</th>
<th>RIS deficiency</th>
<th>UiS role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Lock-in</td>
<td>Transplantation, upgrading, and recently, diversification into related new industries.</td>
<td>Diversification into new related industries is a suitable response to the lock-in risk. But it is a new direction in the university’s research, hence premature for assessing its success.</td>
</tr>
<tr>
<td>Healthcare</td>
<td>Fragmentation</td>
<td>Transplantation and upgrading.</td>
<td>Upgrading is a fitting response to the fragmentation problem. The continuously increasing relation between the university, hospital and other healthcare actors in the region indicates a successful role.</td>
</tr>
<tr>
<td>Maritime</td>
<td>Organizational thinness</td>
<td>No significant role</td>
<td>-</td>
</tr>
<tr>
<td>Food production</td>
<td>Organizational thinness</td>
<td>No significant role</td>
<td>-</td>
</tr>
</tbody>
</table>
Policy Implications

- RIS dialogue with NIS (higher education policies for regional development).

- Embedding the diversification vision in the HE policies (*unrelated variety, regional resilience*, cf. Boschma, 2015; Coenen et al., 2016).

- Preparing for Mode 2 university (*transdisciplinary research*) requires strong *disciplinary* research.

- University engagement strategies need to comprehend sectoral RIS deficiencies in order to be able to address them.
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