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RUNIN

The Role of Universities in Innovation and Regional Development

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

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Introduction

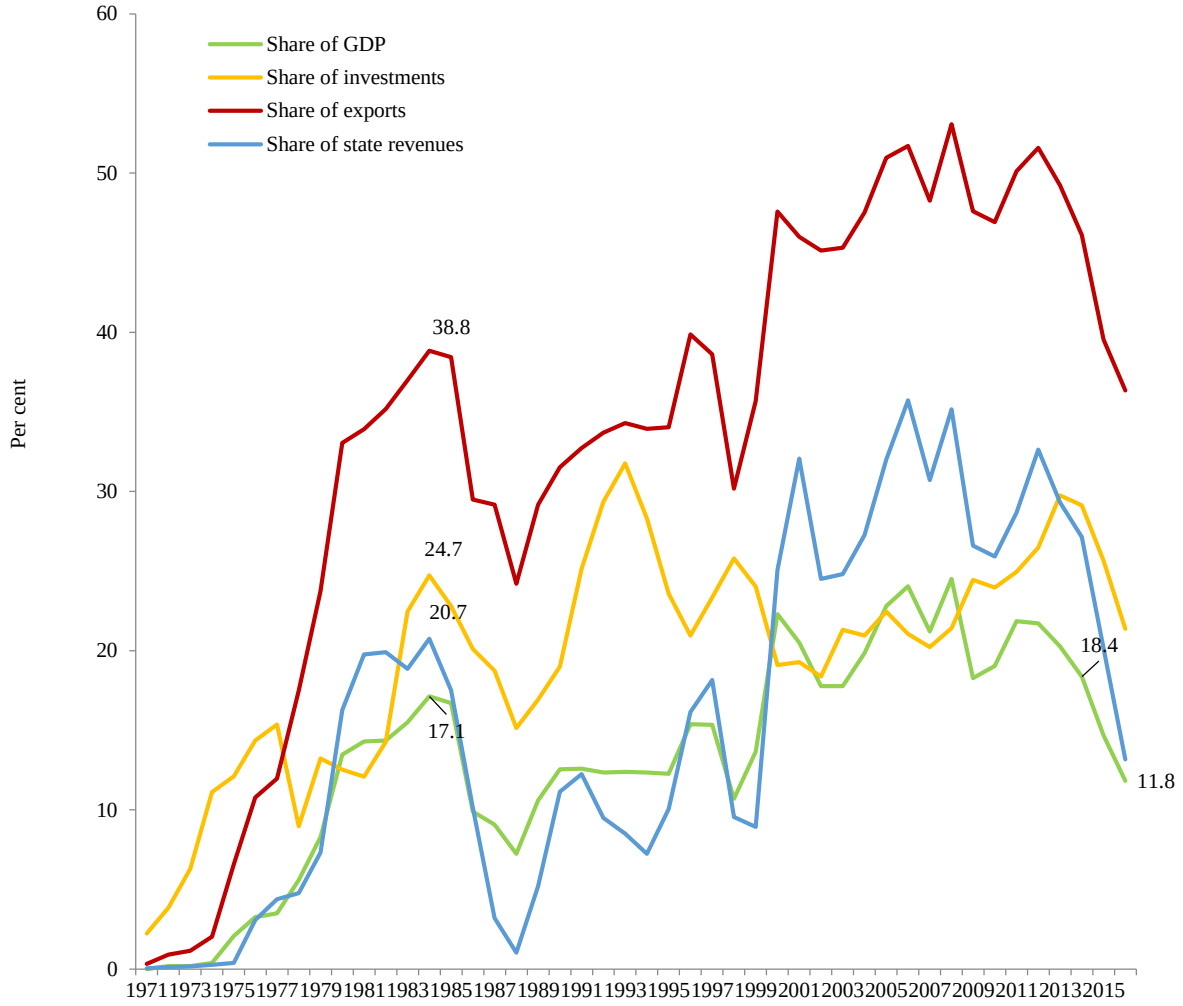
- Rogaland
  - The 4th largest region in terms of population
  - Stavanger; The Oil and Gas Capital of Norway
  - Ranks the 2nd in terms of GDP per inhabitant
  - 2nd in terms of patent applications in Norway (16.2% of applications in Norway)
  - 1st in terms of granted patents in Norway (NIPO, 2017).

- 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



Source: Norwegian Petroleum Directorate. (Retrieved from http://www.norskpetroleum.no/en/economy/governments-revenues/)

Regional Economic Structure of Rogaland (2)

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

	Employment (%)		Value Added (%)	
	1997-2007 Average	**2008-2015 Average**	**1997-2007 Average**	**2008-2015 Average**
Oil and gas extraction including services	5.04	9.73	11.44	**18.36**
Construction	6.28	7.41	5.78	7.34
Health and social work	16.14	17.16	9.14	**9.71**
Manufacturing	16.80	11.55	17.00	**10.39**
¬ Building of ships, oil platforms and moduls and other transport equipment	5.55	2.48	5.40	2.05
Agriculture and forestry	4.19	2.41	1.46	0.92

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)

Model	Generative-developmental	Economic-societal development	Industrial transformation
Main proponent(s)	**Gunasekara**	**Trippl, Sinozic and Lawton Smith**	**Lester**
Key Premise	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	The **economic** and **societal development** roles that universities in their regions is influenced by the prevailing national policy initiatives and incentives	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.
Strengths	Shifting from the focus on university technology transfer role to address its **broader societal roles**	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	**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.
Weaknesses	Static model; tends to place universities at the forefront of regional development	Static model; does not explain dynamic changes in regions	Typology tend to be idealized and simplistic; too narrow definition of economic success or growth

Literature Review and Theoretical Perspective (3)

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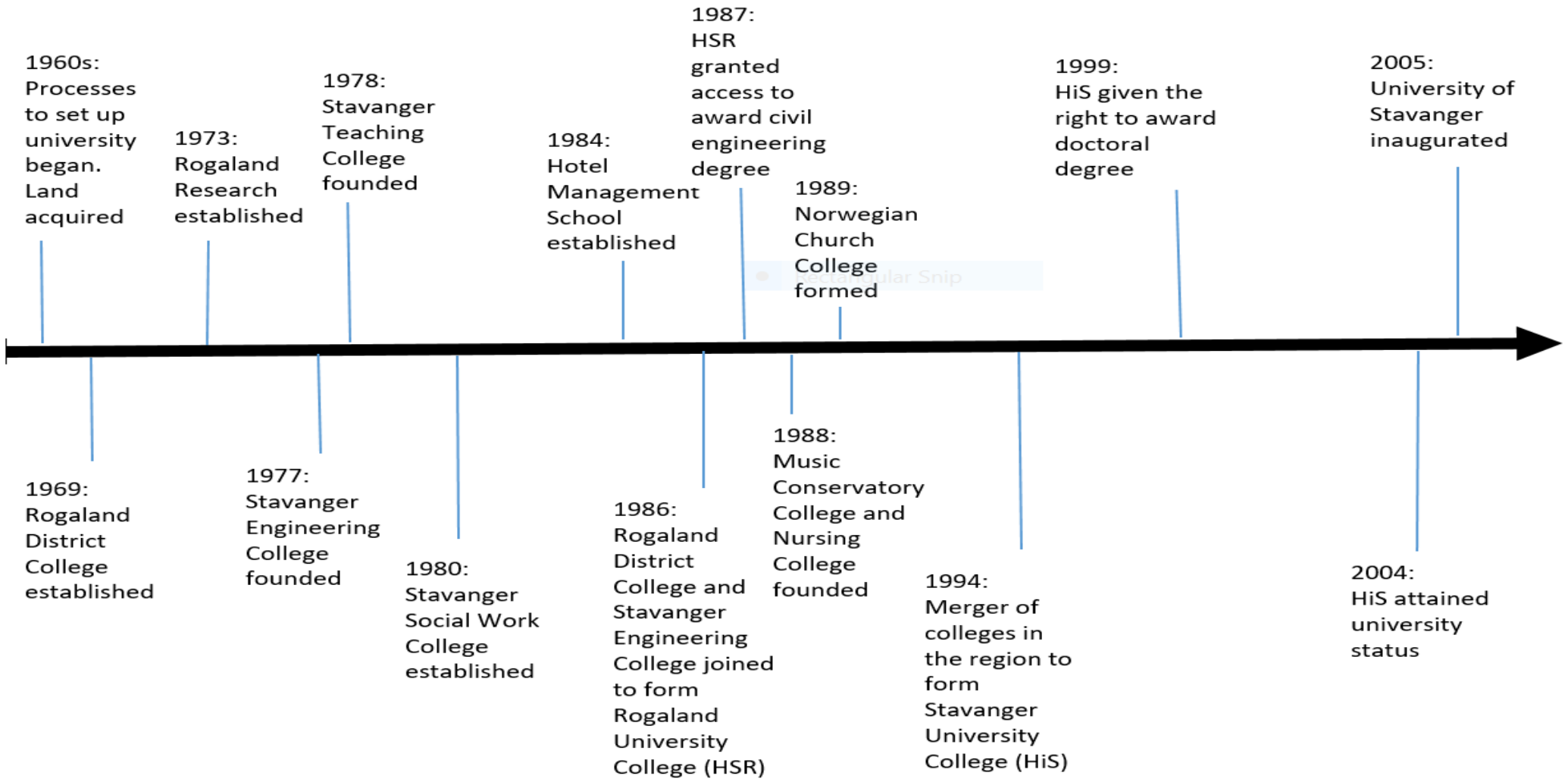
- Lester's Industrial transformation typology

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

The Founding, Educational and Research Impact of UiS



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

* The Research Council of Norway's Programme for Regional R&D and Innovation (2007 - 2017)

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

Priority industry	RIS deficiency	UiS role	Assessment
Energy	Lock-in	Transplantation, upgrading, and recently, diversification into related new industries.	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.
Healthcare	Fragmentation	Transplantation and upgrading.	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.
Maritime	Organizational thinness	No significant role	-
Food production	Organizational thinness	No significant role	-

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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