Path development



Criticism: many of the theories and models related to economic development of regions and innovation systems are too static



Path development

Path dependence and path creation

Path dependence and path creation (also referred to as new path development) are key concepts in regional development studies (Hassink, Isaksen & Trippl, 2019)

New path development is about ‘the emergence and growth of new industries and economic activities in regions’(MacKinnon, Dawley, Pike, & Cumbers, 2018a)



Photo by Elijah Hail on Unsplash

Path dependency

- Explains a current state of affairs from its history
- Explains how existing industrial structures preserve what already is
- Explains how industrial restructuring is slowed down

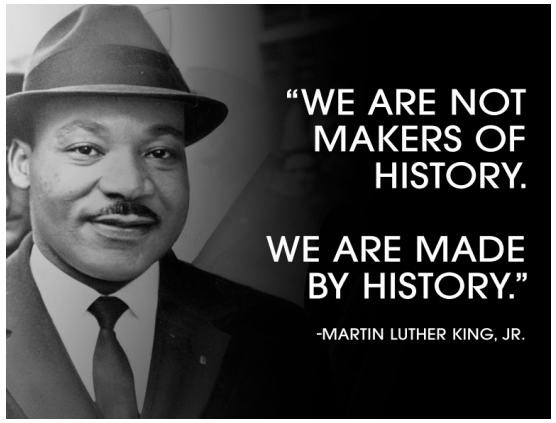
An entire region may lock into its past (Grapher 1993)

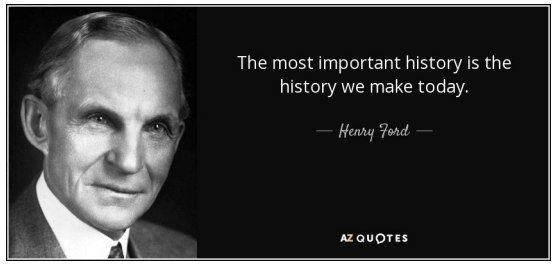
- Cognitive lock-in
- Structural lock-in
- Political lock-in



The past matters

- Early events or choices shape later options
- Self-reinforcing mechanisms make new path creation increasingly costly
- Different industries within a region may be subject to quite different sources/mechanisms of path dependence
  (Martin and Sunley 2006)





PATH DEPENDENCE

What makes regional paths sticky – path dependent

Source	How it binds a region
Agglomeration & increasing returns	Specialised suppliers, labour pools and knowledge spillovers reward staying put
Sunk costs & infrastructure	Plants, grids, the built environment and R&D infra make a new path search expensive
Knowledge & skills	Competences are cumulative; actors search close to what they know
Networks & interdependence	Dense supplier, customer and innovation networks - social ties align behaviour
Institutions & policy	Rules, organisations and funding reproduce existing priorities
Cognitive frames	Shared beliefs define what counts as realistic or desirable
Adaptive expectations	Actors invest because they expect others to continue investing.

Martin & Sunley, 2006

FROM STRENGTH TO RIGIDITY

Path dependency is multidimensional

Technological
Assets and standards tied to mature technologies

Organizational
Firm routines and supplier relations resist change

Institutional
Rules, policy instruments and funding reproduce the path

Cognitive
Shared narratives define what seems possible or legitimate

Political
Incumbents protect rents, jobs and influence

Regions may innovate intensely while remaining on a same broad development path.

CASE · RUHR, GERMANY

The weakness of strong ties

LEGACY

Coal and steel built a dense cluster of large firms, unions, utilities and state and city policies, tied together for a century.

LOCK-IN

From the late-1950s coal crisis on, ties turned rigid.
Subsidy and delay replaced reorientation.
The last hard-coal mine closed only in 2018.

TURN

New universities from the 1960s, technology transfer mechanisms and growth in logistics, health and environmental technology slowly layered new paths onto the old.

Path dependency → slow, layered renewal

Grabher 1993; Hassink 2010

Path development - from explaining lock-ins to explaining transformation

Path development asks how economic activities continue, change, branch, arrive or disappear.



A practical taxonomy of path development



Path extension	Incremental innovation within an existing trajectory	Same knowledge base; more of the same
Path upgrading	Qualitative improvement within a path	Incremental innovation or changed market positions
Path diversification	Major redirection of an existing path	Old assets used in substantially new ways, a new industry emerges
Path branching	New activity related to existing capabilities	Recombination and related diversification
Path importation	New activity attracted from elsewhere	External firms, entrepreneurs or knowledge
Path creation	No strong local antecedents	Radically new knowledge or business model

Synthesised from Isaksen & Trippl (2016); Hassink, Isaksen & Trippl (2019); Grillitsch et al. (2018); Isaksen et al. (2018); Lester & Sotarauta (2007)

CASE · DENMARK

Wind power: path creation through bricolage

LEGACY

Farm-machinery makers, skilled craft engineering, and a grassroots energy movement with local cooperatives after the 1970s oil crises.

PROCESS

Small, robust turbines improved step by step through user feedback, a test station at Risø and supportive tariffs. The US ‘breakthrough’ route faltered.

LESSON

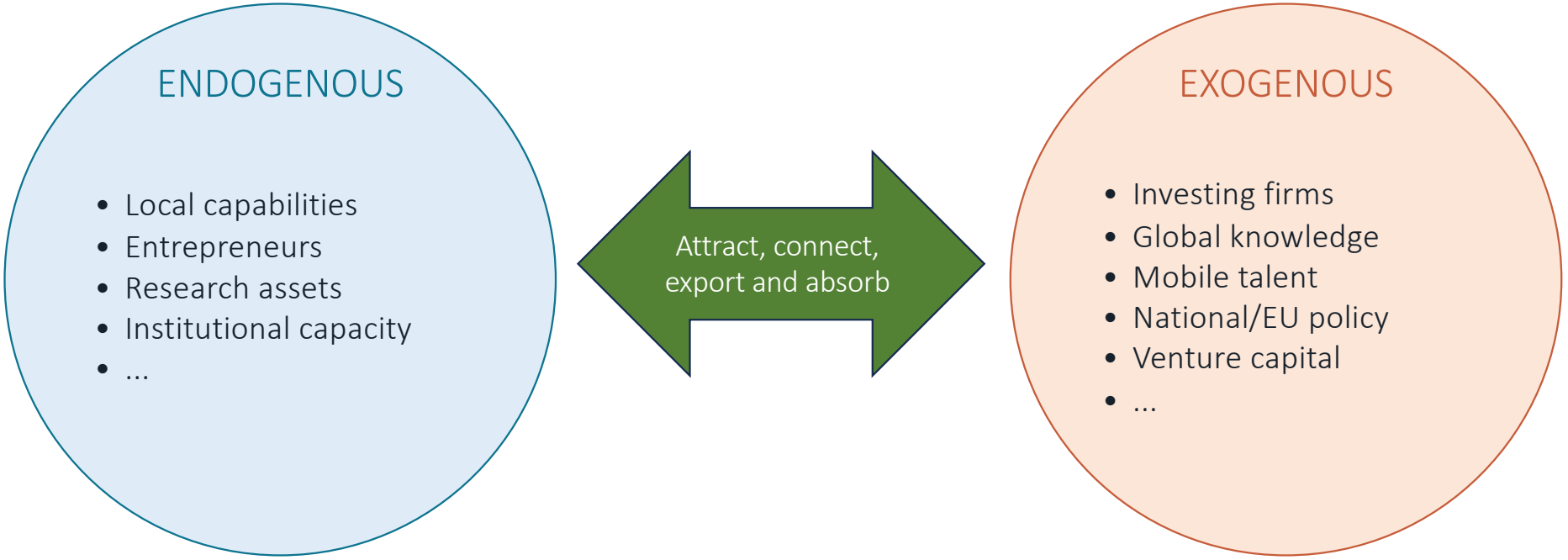
New paths can grow from distributed, embedded agency that recombines what a place already has, rather than from one heroic leap.

New path creation

Garud & Karnøe 2003

BEYOND THE LOCAL TRAP

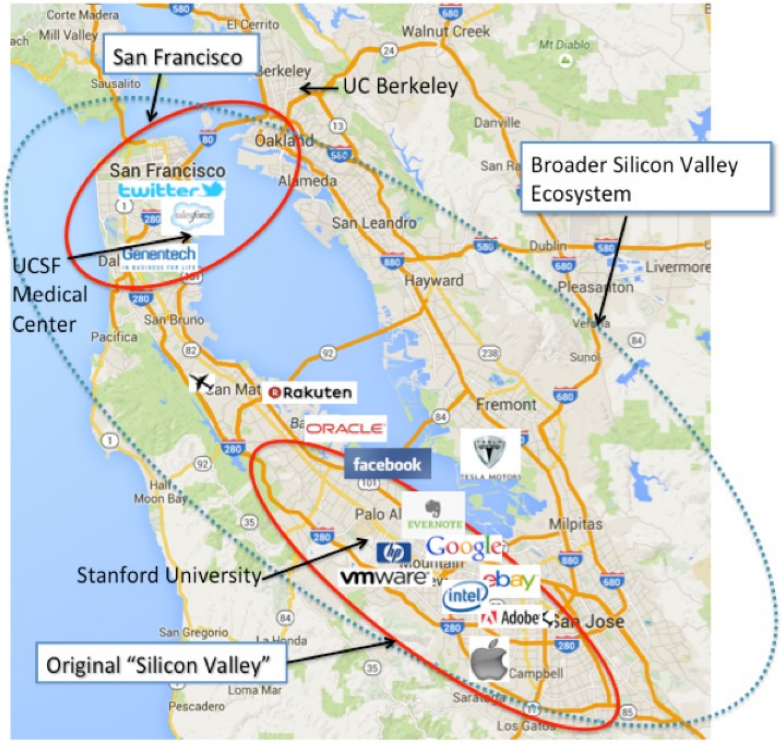
New paths combine endogenous and exogenous resources



External resources matter only when regional actors can anchor, translate and combine them.

Path creation

New technologies, new competencies



Emergence and growth of entirely new industries based on radically new technologies and scientific discoveries

Silicon Valley

(Source: Kushida 2015)

The Silicon Valley system

- Entrepreneurial experimentation
- Venture capital finance
- Firm specialization and focus
- Open labor markets & information exchange
- Governance via cross-cutting institutions

- Regional economy may adapt when individual firms and even industries don’t survive!

The “Secret” of Silicon Valley

- Tolerance of failure
- Hyperactive and risk seeking culture
- Willingness to give back
- Meritocracy
- Obsession to find disruptive innovations
- Tolerance to treachery

Silicon Valley is highly multicultural, with a tech workforce comprising 47% Caucasian, 41% Asian American, 6% Hispanic, and 3% African American employees, according to a U.S. Equal Employment Opportunity Commission analysis.

Path branching

New functions of technology and competencies

New regional industrial paths emerge building on the capabilities in existing industries

Path diversification

New technology and competencies based on unrelated knowledge combinations

A micro-level process, where firms move into new industries by combining their existing knowledge base with new, unrelated knowledge.

CASE · NORTH-EAST ENGLAND AND NORWAY

Offshore wind: diversifying from oil and gas

SHARED LEGACY

Offshore engineering, ports, fabrication yards and supplier networks built for oil, gas and shipbuilding.

NORTH-EAST ENGLAND

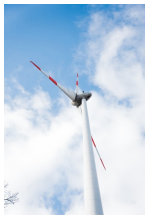
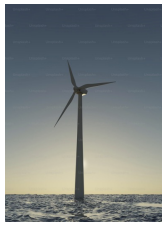
Policy activism and port and test infrastructure attracted activity, but core manufacturing stayed with foreign firms in global production networks.

NORWAY

Strongly related competences, yet a small home market and weak policy support held the path back in the 2010s.

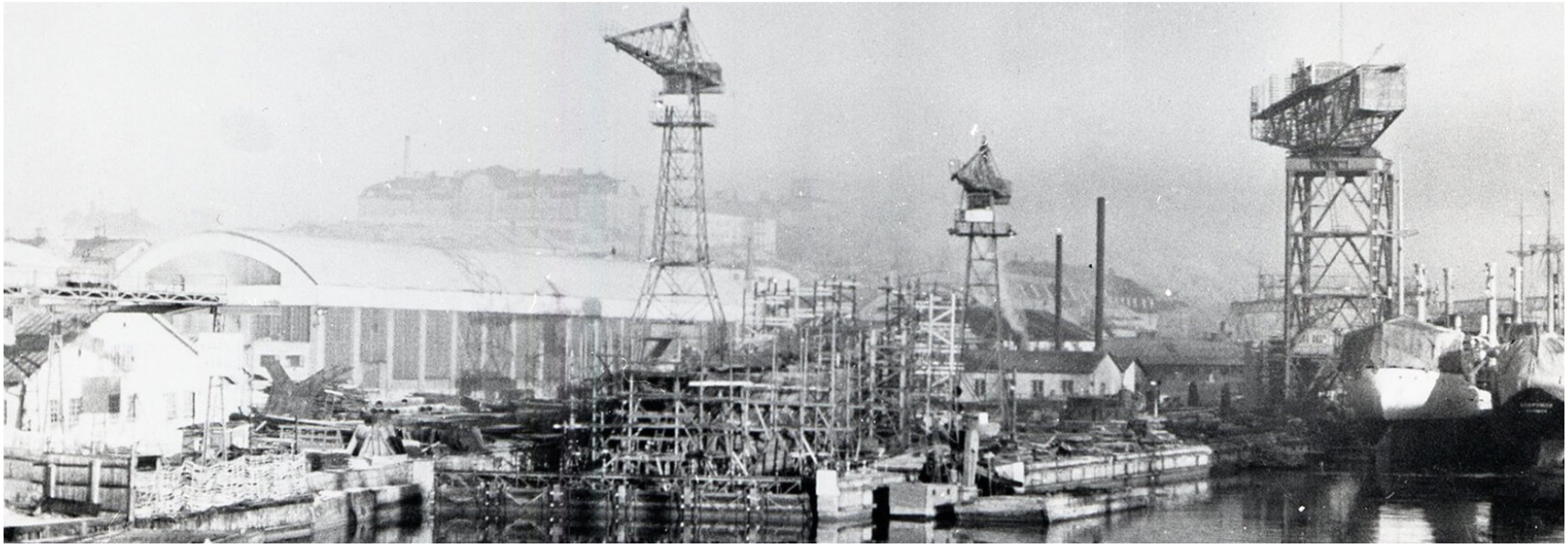
Path diversification & importation

Dawley 2014; Dawley et al. 2015; Steen & Hansen 2018

The Turku shipyard – building ships since 1737

Hypothetical example: What if the Meyer Shipyard in Turku would go bankrupt? What might the new functions of technology and competencies be? Or the new industries to dive into?



A quick case of Rochester – path branching

(source: Sean Safford)

Rochester

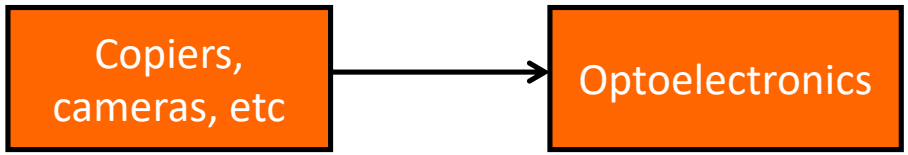

CANADA
ONTARIO
Lake Huron
Lake Erie
Lake Ontario
Toronto
Rochester
Buffalo
Hamilton
Oshawa
Mississauga
Richmond Hill
Kitchener
London
St. Catharines
Niagara Falls
Syracuse
Erie
Detroit
Cleveland
Pittsburgh
Columbus
Akron
Toledo
Sterling Heights
Flint
MICHIGAN
OHIO
PENNSYLVANIA
NEW YORK
WEST VIRGINIA
VIRGINIA
MARYLAND
DELAWARE
NEW JERSEY
UNITED STATES
Philadelphia
Baltimore
Washington, D.C.
New York
Newark
Allentown
Harrisburg
Scranton
Wilkes-Barre
Williamsport
Binghamton
Ithaca
Elmira
Corning
Jamestown
Erie
Youngstown
Akron
Cleveland
Toledo
Detroit
Flint
Sarnia
Chatham
Windsor
Kitchener
Hamilton
Toronto
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Barrie
Orillia
Owen Sound
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Massena
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Utica
Rome
Syracuse
Albany
Troy
Schenectady
Saratoga Springs
Glens Falls
Lake Pleasant
Tupper Lake
Saranac Lake
Plattsburgh
Burlington
Ticonderoga
Lowville
Richland
Carthage
Fulton
Oswego
Auburn
Cortland
Norwich
Oneonta
Hudson
Delhi
Poughkeepsie
Newburgh
Middletown
Stamford
Paterson
Hazleton
Easton
Allentown
Reading
Lancaster
Chester
Wilmington
Trenton
Atlantic City
Vineland
Elkton
Newark
Annapolis
Aspen Hill
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Essex
Frederick
Hagerstown
Cumberland
Keyser
Romney
Winchester
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Hanover
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Lock Haven
Williamsport
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Scranton
Honesdale
Towanda
Bradford
Corning
Elmira
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Ithaca
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Fredonia
Mayville
Jamestown
Warren
Conneaut
Ashtabula
Meadville
Kane
Coudersport
Tionesta
Clarion
Brookville
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Ebensburg
Somerset
Bedford
Frostburg
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Fairmont
Clarksburg
Weston
Parsons
Elkins
Woodstock
Potomac
Manassas
Luray
Franklin
Sutton
Clay
Summersville
Monterey
Staunton
Harrisonburg
Fredericksburg
Dale City
Seaford
Salisbury
Princess Anne
Pocomoke City
California
Parsonsburg
Atlantic Ocean
Chillicothe
Athens
Zanesville
Cambridge
Wheeling
Steubenville
Washington Court House
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KENTUCKY
Millersburg
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Canton
Mansfield
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Alliance
New Castle
Youngstown
Warren
Ashland
Findlay
Bowling Green
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Parma
Sandusky
Mentor
Port Clinton
Bucyrus
Marion
Millersburg
Waverly
Hillsboro
Chillicothe
Circleville
Lancaster
Washington Court House
Wayne National Forest
Shawnee State Forest
Monongahela National Forest
Allegheny National Forest
Finger Lakes National Forest
Green Mountain National Forest
Adirondack Park
Catskill Park
Pocono Mountains
Poconos
Appalachian Mountains
Appalachian Trail
Susquehanna River
Delaware River
Hudson River
Mohawk River
Genesee River
Niagara River
St. Lawrence River
Lake Champlain
Lake George
Lake Placid
Lake Winnipesaukee
Lake Sunapee
Lake Memphremagog
Lake Ontario
Lake Erie
Lake Huron
Lake Michigan
Lake Superior
Lake Simcoe
Lake Nipissing
Lake Temagami
Lake Timiskaming
Lake Abitibi
Lake Nipigon
Lake Superior Provincial Park
Algonquin Provincial Park
Killarney Provincial Park
Bruce Peninsula National Park
Fundy National Park
Kejimkujik National Park
Prince Edward Island National Park
Gros Morne National Park
Terra Nova National Park
Torngat Mountains National Park
Auyuittuq National Park
Quttinirpaaq National Park
Sirmilik National Park
Ukkusiksalik National Park
Wapusk National Park
Nahanni National Park
Kluane National Park
Ivvavik National Park
Vuntut National Park
Tuktut Nogait National Park
Aulavik National Park
Banks Island
Victoria Island
Baffin Island
Ellesmere Island
Axel Heiberg Island
Melville Island
Prince of Wales Island
Somerset Island
Boothia Peninsula
King William Island
Southampton Island
Coats Island
Mansel Island
Akimiski Island
James Bay
Hudson Bay
Ungava Bay
Labrador Sea
Gulf of St. Lawrence
Gulf of Maine
Bay of Fundy
Chesapeake Bay
Delaware Bay
Long Island Sound
Great Lakes
Great Salt Lake
Great Bear Lake
Great Slave Lake
Great Lakes Basin
Great Lakes Region
Great Lakes Megalopolis
Great Lakes Megaregion
Great Lakes Megalopolis
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Great Lakes Megaregion

Rochester - The Silicon Valley of its Day

(source: Sean Safford)

Kodak, Xerox and Bausch & Lomb

- By the 1980s, companies had moved manufacturing to lower cost regions
- Broadened research and development beyond local area
- Moved away from optics and optical electronics and into new technologies



the study and application of electronic devices that source, detect and control light

Rochester, New York

The Silicon Valley of its Day

(source: Sean Safford)

What was there to build on:

- Strong community of scientists and researchers
- Significant wealth and access to funding
- Well established manufacturing infrastructure
- Commitment of policy makers
- Strong universities

What proved crucial

- Absorptive capacity
- Unlocking capabilities
- Generating the broader social and institutional context for something new to emerge