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#7. From Smart Specialization to Insightful Diversification: Balancing Incremental and Discontinuous Regional Innovation Strategies

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INTRODUCTION

A persisting issue in regional economic development is the balance between industrial heritage and future potential. Whether to adopt a cautious industry-facing incremental policy focused on improving existing firms' capabilities, and retaining a region's classic economy, or a risky university oriented discontinuous approach, seeking out new sources of firm formation and growth in novel knowledge opportunities? This is the Hamlet-like "To Be or Not to Be" question, setting sail with or against fickle and outrageous fortune. After reviewing the areas declining firms in the 1930's, it was the dilemma faced by the New England Council, a coalition of university, industry and government leaders charged with developing a strategy to renew the region's economy.

How to respond to decline of a region's industrial base is a persisting concern. Whether to stay with the existing industry and "double down" on its familiar features in order to halt decline and even renew growth or to accept defeat and seek out a new source of innovation and growth is a classic issue. After careful study, the New England Council concluded that the region's traditional firms were beyond salvage and turned to an MIT proposal to create new firms from academia, the region's comparative advantage (Etzkowitz, 2002). Schumpeter's concept of "creative destruction" only emphasized the likelihood of decline and the inevitability of change while "creative reconstruction" was hardly developed as an alternative approach.

In the following we suggest the complementarities and differences between the two basic innovation approaches, and provide data showing that the balance is shifting during the past decade even as both approaches persist in tandem. We offer a US example of balance, the classic steel producing city of Pittsburgh, less well known for its academic resources than coastal academic complexes like Cambridge Mass or the Bay area. We also suggest how regional innovation strategies are a function of higher level policies often undertaken for other purposes, as well as bottom up efforts to shape a region's future.

INNOVATION FRAMEWORKS AND REGIONAL CHOICES

Although, of course, not limited to these two venues, the choice between the two approaches is exemplified in explicit European and implicit US regional innovation policies of smart specialization

and insightful diversification. The smart specialization strategy is typically one of incremental innovation, exemplified by the National Systems of Innovation (NSI) framework, pioneered with agricultural related industries in Sweden (Lundvall, 1992), and exemplified by Finland's wood industries. It can be seen in the US, in the Manufacturing Extension Program, a joint federal-state initiative that offers consulting services to industrial firms to improve their production processes.

The insightful diversification strategy is a university-facing approach of discontinuous innovation driven by an entrepreneurial university, like MIT, seeking to create new

industries and new firms from advanced research from the 1930's and Stanford's early twentieth century strategy of embedding its then isolated engineering school within a penumbra of firms generated by the school, representing the origins and efflorescence of the Triple Helix model.

The discontinuous innovation approach, with an entrepreneurial university at its core, is a model abstracted from local practice rather than defined theoretically in advance (Etzkowitz and Zhou, 2017). Nevertheless, as it was theoretically elaborated, Triple Helix became a normative guideline as well as a research agenda. It was adopted by aspiring universities and regions attempting to enhance their knowledge capabilities and create a firm formation eco-system (Etzkowitz and Zhou, 2018).

Explicitly defined as regional policy, we call it "insightful diversification" to denote the efforts of less favored regions, or those with modest academic resources attempt to further develop their relatively small knowledge spaces and build an innovation space and industrial infrastructure upon advanced research. According to Ballardo Cardenas et al (2020) 'In one way or another, most countries and regions are currently trying to apply the [optimal] Triple Helix III model properly'. Based on the experience of Guanajuato state Mexico, in responding to a plant disease threat to a key agricultural product, these authors operationalized the Triple Helix into a four stage "productive articulation model" (PAM) to address crises in regional innovation systems.

EUROPEAN REGIONAL INNOVATION POLICY

The European Union (EU) policy bureaucracy hit on the concept of smart specialization in its search for a cost- effective innovation model, applicable to a wide variety of places at different stages of development. It desired at one and the same time to achieve its goals of inclusion, raising the level of the lesser off as well as the better off, and subsidiarity, not undertaking at the multinational level what could be accomplished at the national level. On the other hand, a macro analysis of US innovation strategy shows an unbalanced development, focused on relatively few regions with advanced research capacities, especially on the east and west coasts, with notable exceptions where key academic resources were available as in Pittsburgh

The US Rustbelt phenomenon of declining industries without replacement became a dominant theme in the 1980s. In response to stagnation and decline of traditional industries, the European Union

sponsored the concept of "smart specialization", identifying a topic from its repertoire on which an area might focus, renew a traditional industry by applying new technology, especially exploiting the potential of digitalization to make this transition. The EU brought in an international team of academics to provide a theoretical foundation and launched a template in which regions and localities were incentivised to develop a coherent scheme, based on their capabilities, in order to access EU innovation

funds (Foray, David and Hall, 2011). Of course, if sufficient resources are available, smart specialization and insightful diversification may be combined, typically with a weighting towards one or the other.

US REGIONAL INNOVATION POLICY

De-facto US regional innovation policy is to concentrate resources in a few favored regions, primarily bi-coastal as a side effect of university-based military and health research strategies that reify a an historic university stratification system that has had remarkable stability despite a few exceptions. An ideology of "best science," in which money flows primarily to those sites that already have resources, expressed in the early post-war as the endless frontier, new industrial complexes are built upon these "Islands of Innovation," as the concentrations of federal research funding have been called (Hilpert, 1992).

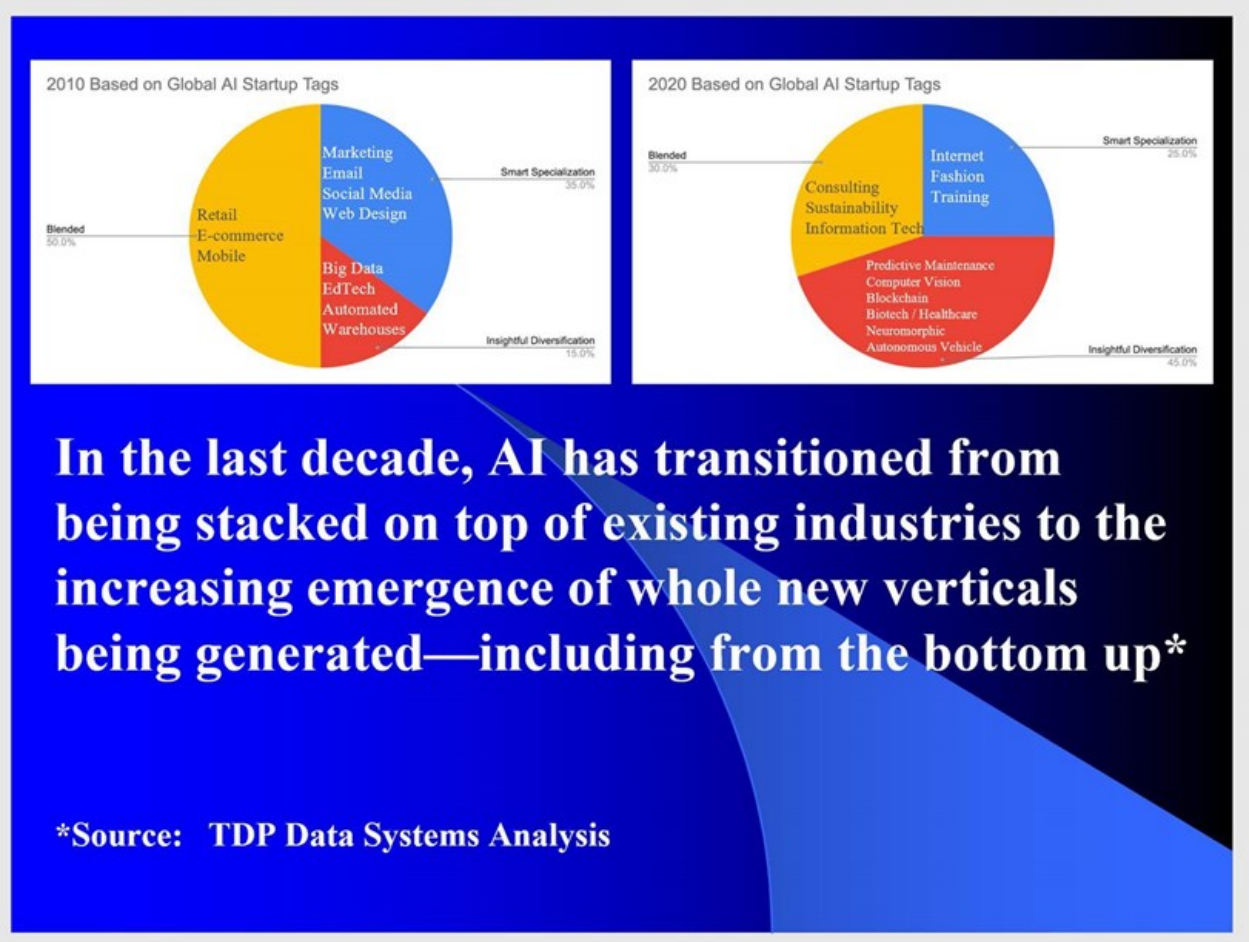
The European Union developed an NSF-like individual investigator focused research agency but not a DARPA like agency focusing on strategic technologies. It cannot be said that EU is unaware of the latter strategy since European innovation researchers have been among the closest analysts of US developments (Mazzucato, 2013). Nevertheless, the overall focus is on the local and regional rather than Europe- wide projects. There has been no successor to the multinational Airbus aircraft initiative or earlier coal and steel community. Insightful diversification, on the other hand is the implicit, de facto US model based on developing new industries and firms from advanced research, often in universities supported by federal government research funds. AI and biotech are quintessential examples.

SMART SPECIALIZATION AND INSIGHTFUL DIVERSIFICATION

TDP Data Systems analysed the key words that were associated with over one million startups for 2010 and 2020 to determine if any trends over time could be discerned regarding smart specialization and insightful diversification.

For 2010 and 2020, a sample of the top keywords self- reported by AI startups were used to identify the distribution of the number of AI startups into three categories: i) smart specialization, ii) insightful diversification, and iii) a blended combination of i and ii. Startups that self-described themselves with keywords that added a layer of artificial intelligence (AI) on top of other business activities/technologies keywords were classified as smart specialization; for example, marketing plus

AI. Startups that self-described themselves with keywords that combined AI with keywords for other aspects of AI, such as machine learning, or new AI-enabled verticals, were classified as insightful diversification; for example, AI plus big data. Startups that self-described themselves with keywords that were classified in both smart specialization and insightful



diversification were grouped in the blended category; for example, retail, AI plus big data.

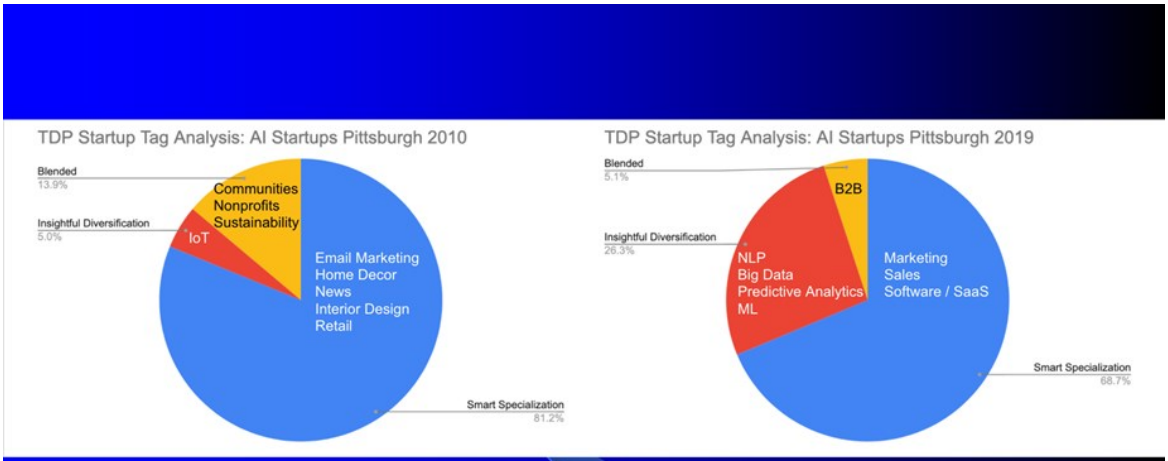
As illustrated from the two pie charts, insightful diversification has grown from the smallest slice of the pie in 2010 with 15%, to being the largest slice in 2020 with 45%, or an increase of 200%. At the same time, smart specialization decreases from a 35% share of the 2010 pie, to a 25% share in 2020, and the blended category decreased from 50% to 30%..[2]

The two strategies of course, can be pursued in tandem. As in our prime example Pittsburgh, a classic rustbelt city that lost its major industry steel production. However, the technical base left by that industry provided the means to create a specialty steel industry, applying advanced technologies to renew, on a smaller scale, the region's main industry

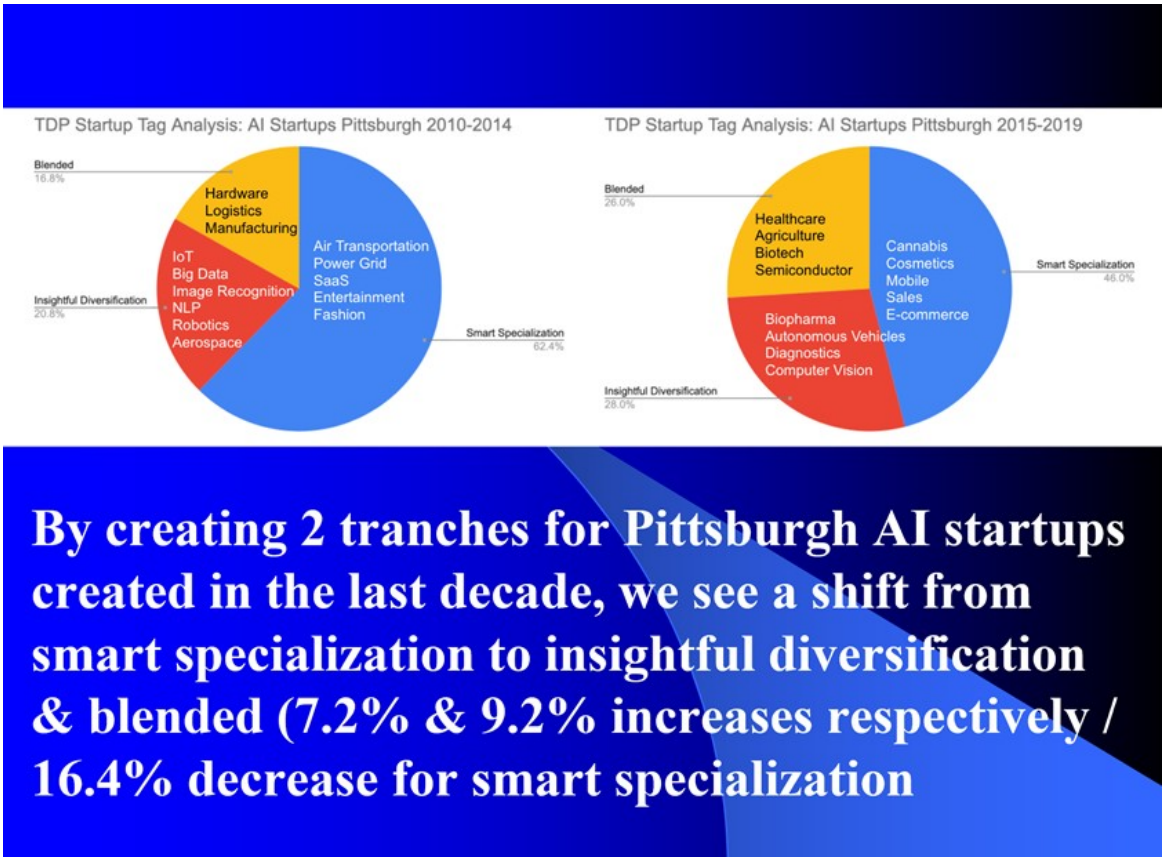
If this smart specialisation strategy were the only one pursued, Pittsburgh would have been left with a much smaller employment base. However additional possibilities of renewal were available in technologies that could be spun off into new industries from the city's two major universities,

Carnegie Mellon University (CMU) and the University of Pittsburgh. Pittsburgh had developed unique competencies in comparison to other rust belt regions that made its regeneration exceptional. Newcastle upon Tyne, a coal mining and shipbuilding urban area pursued a similar strategy but the support for its emerging academic resources in new fields with economic potential, like stem cells, were insufficient to achieve a similar objective, at least, to date (Etzkowitz and Zhou, 2018).

Carnegie Mellon, founded through the merger of a technical school with an Industrial Research Institute, early in the twentieth century, developed a unique university wide intellectual framework by mid-century based on the charismatic ideas of Herbert Simon and Allan Newell, founders of Artificial Intelligence and proponents of its applications in the behavioral and organizational Sciences. DARPA inserted one of the first five computer science departments that it funded in the 1960's at CMU which took leadership in robotics. AI and robotics became the source of spin-off firms as well as the impetus for the attraction of research units of large technology firms to the region in recent years. In parallel, the University of Pittsburgh' expertise in medical devices and biotechnology became the source of spin-off firms in these areas. There was also some hybridization of the intellectual resources of the two universities in developing spin-offs.



In the last decade, in Pittsburgh, AI startup companies have shifted from smart specialization & blended towards insightful diversification



TDP Data Systems analyzed keywords to determine if similar trends over time could be discerned regarding smart specialisation and insightful diversification for startups in Pittsburgh. Due to the smaller counts of startups in Pittsburgh, data was analyzed for both two points in time (ie, 2010 and 2019) and two periods in time (ie, 2010-2014 and 2015-2019).

For both 2010 versus 2019 and 2010-14 versus 2015-19, we see that insightful diversification is a growing slice of the overall AI-startup pie in Pittsburgh.

CONCLUSION

Smart specialization may be seen as a balance wheel to creative destruction, limiting the deleterious effects of new industry emergence on viability of old. Insightful diversification, on the other hand, drawing deeply on the sources of knowledge based economic development in the arts and sciences, provides a pathway to the sources of creative destruction, with both as complementary elements of creative reconstruction, hopefully removing some of the negative effects of recession from the economic and social transformation process.

These two strategies have their locational correlates in the Industrial District and the Science Park. As opposed to the industrial district in which firms are closely related in technical skills and knowledge subdividing tasks on the same topic, cooperating as well as competing with each other, Science Parks typically host a diverse array of firms, united only by an advanced technology base and some interest in accessing academic resources. The Science Park is an organization of diversification, firms emanating from different academic areas without a necessary connection to each other.

Globalization's logic of outsourcing to reduce production costs inexorably reduces significant sectors of traditional industries, as in the industrial community of Saint-Florent- sur-Cher, France, that were not rooted in unique local cultural features (Alderman, 2020). Leaving insightful diversification as the remaining recuperation strategy, we hypothesize that this explains a significant portion of the shift during the past decade away from smart specialization.

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