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Tech Sovereignty and Industrial Ecosystems

Although not yet thematized in the academic literature on ecosystem theory, it could be observed based on industrial strategy documents provided by the European Commission that industrial ecosystems are perceived as a suitable network construct by policymakers to contribute towards a greater sovereignty; this should ultimately strengthen the geoeconomic position of the EU polity by reducing foreign dependencies (European Commission, 2020, 2021a, 2021b, 2021c). Such an approach has been politically initiated by the European Council meeting in October 2020, as noted in the conclusion document (European Council, 2020, p. 2):

“The European Council invites the Commission to identify strategic dependencies, particularly in the most sensitive industrial ecosystems such as for health, and to propose measures to reduce these dependencies, including by diversifying production and supply chains, ensuring strategic stockpiling, as well as fostering production and investment in Europe.”

Policymakers were thus called on to actively develop policies and government interventions that are aimed towards influencing industrial ecosystems. As today’s industrial development is more and more dependent on technological progress, it is argued in this PhD thesis that the sovereignty idea then must include considerations concerning the technological capabilities that are prevalent in a polity, which narrows down the concept of sovereignty to “technological sovereignty”.

Indeed, “technological sovereignty” is a concept that has gained more and more traction in policy debates over the past few years. Originating from the theoretical ideas of political sovereignty, which can be dated back to the middle ages, March and Schieferdecker (2021) dedicate the length of an academic paper to define the concept of sovereignty and transform it for an applicability in the context of technology and innovation. Their initial definition is thus followed for the purpose of this PhD thesis (p. 9):

“Technological sovereignty is the ability of a polity to self-determinedly shape the development and use of technologies and technology-based innovations which impact its political and economic sovereignty”.

35 A recent study conducted by Edler et al. (2021) has applied the concept as frame for
36 innovation policymaking and justified it on the grounds of an economic welfare argument.
37 They argue that state interventions targeting “technological sovereignty” can be
38 legitimised if competitiveness and welfare, thus higher prosperity, can be ensured (p. 17):

39

40 “Overall, state action to achieve technological sovereignty can therefore be legitimised from a
41 competitiveness perspective, albeit in a limited manner. At least in welfare states, governments
42 have the clear mandate to ensure future prosperity for their electorate. Without technological
43 sovereignty, however, such prosperity cannot be achieved and sustained. Accordingly,
44 governments not only have the right, but are mandated to safe-guard and improve their nation's
45 international standing and agency. Without a suitable foundation and reliable framework, which
46 only the government can provide, economic actors will not be able to ensure national welfare in the
47 long run.”

48

49 The spectrum of opinions about “technological sovereignty” as concept and related
50 approaches is nevertheless diverse. Although used in policy debates and strategy
51 documents, it has undoubtedly gained a political notion in recent times, as rival polities
52 might expect to gain a greater comparative geoeconomic position by adopting related
53 policies and strategies. In the context of this PhD thesis, geoeconomics describes
54 economic advancements to foster a polity’s geopolitical position following the definition
55 of Blackwill et al. (2016, p. 20):

56

57 “The use of economic instruments to promote and defend national interests, and to produce
58 beneficial geopolitical results; and the effects of other nations’ economic actions on a country’s
59 geopolitical goals.”

60

61 In one extreme, “technological sovereignty” is sometimes discarded as interventionist or
62 even protectionist aiming towards autarky; recent research on manufacturing reshoring
63 or economic decoupling of supply chains veers towards this end (Eppinger et al., 2021;
64 Hu et al., 2021; Zhai et al., 2016).

65

66 Others use the concept interchangeably with the term “strategic autonomy”, a phrase
67 originally describing a defence-related concept but that is increasingly applied in
68 economic contexts. Van den Abeele (2021) identifies industrial ecosystems, clusters,
69 supply chains and value chains as important cornerstones in the European Commission’s
70 strategy to achieve “open strategic autonomy”. Moreover, “technological sovereignty” as

71 strategic imperative is often regarded important for mastering transformative challenges
72 for a society, which relates to the ideas of mission-oriented innovation policies enabled
73 by an entrepreneurial state (Mazzucato, 2013, 2018). Undoubtedly, all these concepts
74 have become eminent ideas in the field of technology-related geopolitics, and the idea
75 behind the term “technological sovereignty” has long found its way into international
76 relations theory (De la Mothe & Dufour, 1991; Lungu, 2004; Sahin, 2020; Weiss, 2021).

77

78 Based on the above mentioned observations, the central hypothesis of this PhD thesis has
79 been abductively developed as Firstness that the present research is designed to explore
80 (Paavola, 2004, pp. 267-269). The logic of inference thus adopts an abductive approach
81 after Charles S. Peirce’s pragmatism to arrive at the central hypothesis, followed by the
82 categorial sequence of theoretical deduction and qualitative induction (Åsvoll, 2014;
83 Paavola, 2004; Staat, 1993, p. 227).

84

85 As industrial ecosystems are found to be of geoeconomic importance for a polity – the
86 European Union – in practice, it can be supposed that they are influenceable by policies
87 and government interventions. This would be especially desirable when the theoretical
88 concept of “technological sovereignty” is the decisive factor to achieve behind such
89 policymaking:

90

91 **It is proposed that industrial ecosystems can be driven by policy and government**
92 **interventions in a polity to achieve greater technological sovereignty.**

93

94 However, it is neither trivial nor evident to assume that this hypothesis holds true for the
95 construct of an industrial ecosystem as a type of ecosystems found in the strategic
96 management literature. Indeed, the ecosystem concept itself has many proponents, but
97 also a number of sceptics. They criticise the biological analogy in which the idea is rooted,
98 as well as the multitude of slightly varying ecosystem definitions and concepts (Oh et al.,
99 2016). A common objection can be accounted to the often-blurry boundaries and
100 geographical scope of such ecosystems, which are mainly defined by the actors and
101 interactions that facilitate a common value co-creation. This could potentially impede a
102 standardized design of policy instruments and might create the need for greater
103 individualization of interventions. Other forms of industry collaborations such as clusters,
104 regional innovation systems or fully domestic value chains could thus provide equal or

105 even superior forms of interconnected industrial development vehicles to be influenced
106 by policymakers. Also, problematic might be the ecological characteristics of ecosystems,
107 as Rinkinen and Harmaakorpi (2018, p. 346) reflect:

108

109 “Should we even try to influence business ecosystems with policy instruments or should the
110 ecosystem evolution be left to be driven by the processes of self-organization and self-renewal?”

111

112 As Problem 1, this questions the influenceability of industrial ecosystems in general and
113 allows for the possibility that policymakers should not attend to ecosystems at all. Policies
114 and government interventions would then not have a legitimization to influence this type
115 of collaborative network construct. Problem 2 is the focus on value co-creation, which is
116 counter-intuitive to go together with the idea of “technological sovereignty” since an
117 optimal value co-creation process might rely on foreign expertise and inputs and could be
118 weakened by an attempt for domestic substitution.

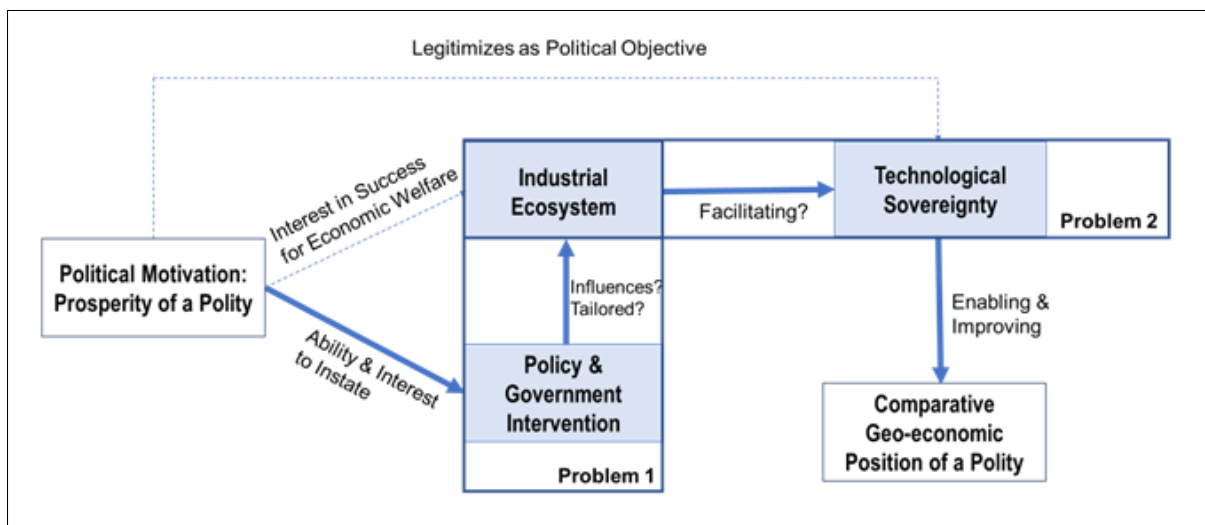
119

120 Figure 1 summarizes the abductive findings and contextualises the hypothesis with the
121 central problematics. The political motivation to advance a polity to greater prosperity
122 might not only be legitimizing for the aim towards achieving greater technological
123 prosperity as political objective which was suggested by Edler et al. (2021) before. It also
124 naturally leads to assume that policymakers should be interested in the economic success
125 of industrial ecosystems based on the economic welfare argument. This both mandates
126 and enables them to instate policy and government interventions that could shape such
127 ecosystems, potentially in a much-tailored form. In the chain of effects, this could then
128 increase the “technological sovereignty” and improve or even enable the comparative
129 geoeconomic position of the polity. It needs to be mentioned that other target parameters
130 of policymaking – such as productivity, competitiveness, foreign direct investment,
131 innovativeness, yield of tax – might be altered as welcome or undesired side-effects when
132 concentrating on “technological sovereignty” as political objective.

133

134 The PhD thesis needs to address the identified problematics though and aims to evaluate
135 the validity of the proposed hypothesis. It does so in the theoretical part with an approach
136 of analytical deduction as Secondness (Åsvoll, 2014, p. 292). First, characteristics of
137 ecosystems are identified in the scoping research. Second, policy and government
138 interventions that are applicable to influence the wider construct of inter-organisational

139 relationships, of which industrial ecosystems are considered a sub-dimension, are
 140 systematically derived in a literature review. Deductively combined with the ecosystem
 141 characteristics, the identified policy and government interventions are tailored to the
 142 theoretical construct of industrial ecosystems. This is modelled accordingly. In a third
 143 step, the construct of “technological sovereignty” is introduced as a theoretical concept,
 144 which includes reasoning found in the grey literature and policy papers that then
 145 augments the model.



156 **Figure 1** Contextualization of the Abductive Findings
 157 (Source: Own Analysis)

158
 159 The theoretical findings are empirically substantiated by a qualitative induction approach
 160 as Thirdness comprising a qualitative analysis of both secondary survey data as well as
 161 primary data collected in interpretative case studies (Åsvoll, 2014, p. 295; Yu, 1994, pp.
 162 21-24). In the first step, it is examined what policy and government interventions related
 163 to industrial ecosystems are reported in the form of policy instruments in practice. Since
 164 these findings offer only a static impression, the practical mechanisms are explored in-
 165 depth in the following step as case study research. The case selection likewise examines
 166 ecosystems in the light of the pursuit of “technological sovereignty”. In the discussion
 167 parts, the empirical findings are related to the findings of the theoretical part to collate
 168 the findings. In the end, it is evaluated if the abductive hypothesis can be substantiated
 169 both theoretically and empirically. Based on this evaluation, theory is derived on the
 170 compatibility of sovereignty as theoretical construct with ecosystem theory, and practical
 171 implications are highlighted.

172

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