

Technology transfer models for Smart Specialization Strategies (S3)

The development of cutting-edge technologies, the new industrial revolution and the evolving consumer's needs, ask firms for new business models able to get the competitive advantage in the international market. In a such changing world, Cohesion Policy is the EU's investment policy aimed at responding to economic and societal challenges, reducing differences between regions and ensuring growth across Europe. In this context, the Smart Specialization Strategy (S3)¹ promotes the activation of innovation strategies for local development. Through the S3 implementation, the EU adopted the Quadruple Helix Innovation System Model, for the fastest flow of knowledge in the European innovative ecosystem. This approach requires an open and inclusive governance system to support the participation of all innovation actors. Despite in this open innovation context (both in firms and research areas) the policy makers investing huge amount of European Funds on the development of the technology transfer process (on the regional national, international levels), most of innovation stakeholders are not aware of the value added that the implementation of the S3 can offer to the innovation system. Hence, our research question can be formulated as follow: *Which model of technology transfer can better support local stakeholders and policy makers within the S3's framework?*

The most recent literature is focusing on the role of TTOs in the complex of the Quadruple and Quintuple Helix (Miller et al., 2018). The most recent works highlight the need to adopt a holistic approach (Cunningham and O'Reilly, 2018) that takes into account the role of civil society and stakeholders in the analysis of innovation process and state the concept of the Helix Quadruple or the N-Tuple helix. This is a "customer oriented" approach (Passarelli et al, 2018) that puts the user at the heart of the innovative ecosystem, fostering customized innovations and enhancing the innovative capability of the regional industrial system (Cerrato et al, 2012). While the overall TTOs role was widely analyzed in literature (Balderi et. Al, 2012;), still few empirical contributions have been

¹ The concept was initially proposed by Dominique Foray, Paul David and Bronwyn Hall inside the "Knowledge for Growth" (K4G) expert group, established in 2005 by Commissioner Janez Potočnik to reinvigorate the Lisbon Strategy and it is going to be implemented in all European region (Foray et al. 2009).

focused on the technology transfer models in the context of the Quadruple or the n-Tuple Helix (Carayannis et al., 2018), as well as on S3 (Asheim, 2018; Höglund & Linton, 2018), due to their very recent implementation.

The proposed empirical analysis adopts the multiple case study method. In particular, two technology transfer organizations are analyzed: the “Emilia Romagna Agency for technological development” (Soc.Cons.p.ASTER) operating in Emilia Romagna region and T3 Innovation operating in Basilicata region. The cases were chosen analyzing the annual report of the Innovation Union Scoreboard (2017), that place the two regions among the “moderate European regions”. In this study, both the strategic and operating technology transfer variables were investigated. Specifically, we use the broad term of “Technology and Research Exploitation Organization” (TREO) to identify the regional/national technology transfer entities created by public/private initiatives, through structural funds programs (direct or indirect). The analysis is based both on secondary data from web sites, sectoral studies and on direct interviews and design thinking session with policy makers and TREOs. In their recent work "A review of qualitative case methods trends and themes used in technology transfer research" Cunningham, Menter and Young (2017) show how the qualitative case studies methodology is still considered emerging in technology transfer studies: "*What is an overall case study in the field of technology transfer research? Thus, continuing to progress qualitative case methods based on an important contribution to making advancing knowledge and for theory building.*" (pp. 939). Since, from the scientific point of view, the technology transfer literature in the context of the Quadruple Helix and S3 is an underdeveloped issue, then, according to Flyvbjerg (2006), we believe that the proposed case studies can offer a relevant contribute to the research field. From a methodological point of view, we use the *design thinking (DT)* approach (Bianchi et. Al, 2018). In the Define stage of DT, we started to progress to the third stage, Ideate, by asking a question which can help us look for ideas for solutions by asking: "*How might we design a regional TREO able to support all the innovation stakeholders (industry, research, start-uppers, government) fully and efficiently realizing the smart specialization strategy (S3)*". DT approach has been used to build a

“prototype” for the TREOs in the S3 context, as designed by the participants to the design thinking sessions. In Fig. 2, the T3 Innovation prototype is shown. The represented Custom Journey Map (CJM) partially corresponds to the current T3 Innovation services. However, this result could act as an incentive to T3 Innovation management for improving its role through new proposals in a developmental perspective. A comparable result has been obtained analyzing the *Customer Journey Map* built by ASTER respondents (see Fig. 1). Even in this case, the TREO’s prototype partially corresponds to ASTER services and role in Emilia Romagna region. Nevertheless, as above, it could act as an incentive in a developmental perspective.

Figure 1. Synthetic Customer Journey Map of ASTER

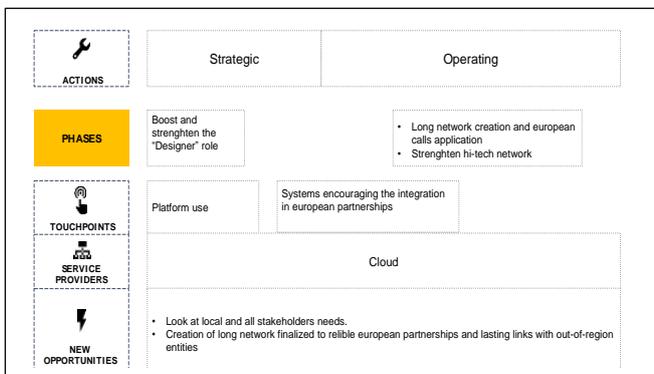
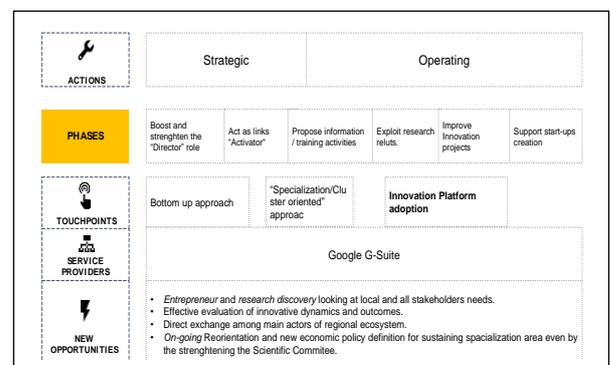


Figure 2. Synthetic Customer Journey Map of T3



The S3 implementation implies a deep reorganization of TREO which are requested to actively participates and promoting S3 strategy. The two analyzed cases highlight some key variables acting as strategic and operational drivers. In particular, from a strategic point of view, the results suggest that the evolution of TREOs relies mainly on two key concept: 1) the density of the connections among local innovative actors and 2) the stakeholder’s awareness of the advantages deriving from S3 implementation. Combining these two variables, we can define different typologies of TREOs.

Table 1. The TREOs ‘ models

STAKEHOLDERS CONNECTIONS		
S3 AWARENESS	WEAK	STRONG
LOW	ACTIVATOR (A)	REINFORCER (B)
HIGH	ANIMATOR (D)	DESIGNER (C)

If stakeholder's awareness about S3 strategy is **low**, and the connections between and within S3 areas are **weak**, TREO should have the role of "Activator" of the connections among local innovative actors (companies, Academia, public research centers, public authorities, venture capitalists and final consumers), constantly promoting S3 strategies. A TREO operating in this context must strategically drive research and entrepreneurial systems towards the enhancement of local resources, accordingly to realistically tailored to their capabilities, opportunities and needs. If stakeholder's awareness about S3 strategy is **low**, and the connections between and within S3 areas are **strong**, TREO should have the role of "Reinforcer" of the connections among local and extra- regional innovative actors (companies, Academia, public research centers, public authorities, venture capitalists and final consumers). A TREO operating in this context must strategically drive research and entrepreneurial systems towards the enhancement of local resources, accordingly to realistically tailored to their capabilities, opportunities and needs. Both activators and reinforcers have to promote among innovation actors, the awareness and all the advantages related to the S3. If stakeholders have **high** awareness about S3 strategy and the links between and within S3 areas are **strong**, TREO structure should act as "Designer" of new strategies and new services for the local innovation system. If stakeholders have **high** awareness about S3 strategy but possess weak connections between and within S3 areas, the ecosystem is dynamic and active but stakeholders operate autonomously. Thus, TREO structure should invest in services quality acting as "Animator" of new services for the stakeholders, with the aim to also reinforce the networks among them. From a strategic perspective, since the link among local stakeholder are still weak, T3 Innovation, is running as the "activator" of stakeholder networks within and between S3 areas, while ASTER acts as "designer" organization because the networks between and within S3 areas are well established and there is full awareness of the advantages deriving from the implementation of S3 strategy. A TREO, according to S3, facilitates companies in developing new products and processes by cutting edges technology and contemporary induces the research system to develop new research activities addressed to industrial application. A TREO, in partnership with the regional government, should adapt its own organization to the local

context and its specific conditions in order to be able to fully contribute to the development of a solid and smart innovation system. Our results represent a contribution for developing new technology transfer models adopting quadruple helix approach. We are collecting more data from other important Italian TREOs to complete the qualitative analysis and to develop also a quantitative analysis.

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