



ORIGINAL RESEARCH

Modeling Transformative University Leadership in Regional Innovation: An Inductive Analysis of Duzce University Specialisation in Medicinal Herbs

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Abstract: Higher education institutions are nominated as the key actors in regional social and economic development. Smart specialisation as a policy instrument strengthens this role by attaching numerous collective leadership activities to the universities such as design and implementation of Smart Specialisation Strategies (S3) as the universities possess various capacity building assets in a specific region. This paper illustrates the case study of Duzce University specialisation in Medicinal Herbs by inductively analysing data sources and delivers a conceptual pattern of the transformative university leadership in regional innovation.

Keywords: Entrepreneurial University, Smart Specialisation, Regional Innovation

1. Introduction

Higher education institutions are nominated as the key actors in regional social and economic development. Smart specialisation as a policy instrument strengthens this role by attaching numerous collective leadership activities to the universities such as design and implementation of Smart Specialisation Strategies (S3) as the universities possess various capacity building assets in a specific region (Kempton, Goddard, Edwards, Hegyi, & Elena-Pérez, 2013).

Investigating the potential leadership avenues for the universities in a smart specialisation context will initiate institutionalised relationships (Kempton et al., 2013) beyond individual efforts. The transfer of strategic knowledge from universities can be achieved through fostering interactive processes between actors in a network led by a university (Fonseca & Salomaa, 2020).

2. Theoretical Background

As the third mission of the university, entrepreneurship mission emerged as the result of its historical key position in a knowledge society producing novelty either for institutional, personal or regional/national gains which can secure a “Smart Specialisation” mission (Etzkowitz, 2013). Smart Specialization Strategies (S3) is a regional competitiveness policy instrument underlining bottom-up determination of investment priorities by the interaction of Quadruple Helix actors namely as government, industry, academia, and society (Marinelli & Elena-Perez, 2017). “The entrepreneurial university” and “Triple Helix” concepts which were coined by Etzkowitz was extended by many scholars discussing the contribution of the higher education institutions to their immediate environment (see Table 1).

Converging the concepts of “Quadruple Helix” and “Smart Specialisation” promises a research agenda which can explore the assumptions about the role of universities in a knowledge transfer context (Miller, McAdam, Moffett, Alexander, & Puthusserry, 2016) which is essential for leveraging Smart Specialisation outcomes. The bottom-up approach and flexible governance in

Smart Specialisation allow the Quadruple Helix actors' involvement become relevant in a regional innovation system (Höglund & Linton, 2018).

Table 1. Universities and Regional Innovation. Adopted from (Gur, 2020; Kempton, 2019; Trippl, Sinozic, & Lawton Smith, 2015)

Concept	Author	Definition
“The Entrepreneurial University”	Etzkowitz (1983)	“a ‘triple helix’ of partnership between government, business and the academy where universities complement their traditional research and teaching roles with a ‘third’ mission, namely economic development. The main contribution of the entrepreneurial university to regional innovation is through commercialization of research by patenting, licensing, etc.”
“The Regional Innovation System”	Cooke (2004)	“universities playing a central role both as knowledge generators and as a connector between public and private actors in the region. This, therefore, puts universities at the heart of regional innovation and not just as one of a number of actors but as a key driving force.”
“Mode 2” knowledge production’	Gibbons (1994)	“a new approach for the production of knowledge from a linear, science and technology ‘push’ (‘mode 1’) to a more collaborative system of research using co-production methods that cuts across disciplines and involves external partners in efforts to solve (local) societal problems.”
“The engaged university”	Gunasekara (2004)	“moves the role of the university beyond teaching and generation of knowledge to a much wider, developmental one which sees the university collaborating with the wider community (society as well as industry). The focus of the engaged university is on a reciprocal partnership, sharing knowledge and resources for mutual benefit.”
“The Civic University”	Goddard (2009)	“It was explored in depth by Goddard et al. (2016, pp. 16–29) and describes a holistic, institution-wide approach to engagement with society at large. Unlike other models, it pays considerable attention to the internal management and leadership tensions derived from pursuing a ‘civic’ mission”
“The Transformative University”	Gur (2020)	In contrast to the concept of transformative university in Guzmán-Valenzuela (2016) which treats scientific knowledge as a public commodity, here the transformative university is nominated as the responsible facilitator to exercise power through knowledge resources for capitalization and knowledge workers, enhancing the capacity for innovation, standards and compliance, negotiations, internationalization.

As Markkula & Kune (2015) addressed in their paper, “Universities are an important instrument for codifying the lessons learned and helping other actors take the learning to the next level of practice” in a regional innovation ecosystem by connecting different learning groups, people to processes, knowledge to processes and connecting ecosystem partners to each other. Moreover, they can possess anticipatory activities for potential challenges that the regions can face in a definite period. In the sense of “Entrepreneurial Discovery Process” of Smart Specialisation, these anticipatory activities can transform into the “granularity” as an activity based approach to prioritizing

technology or innovation applications instead of sectoral or firm level change (Carayannis & Grigoroudis, 2016). Calza, Carayannis, Panetti, & Parmentola (2019) summarized the universities role in regional smart specialisation as generative, absorptive, collaborative and leadership roles. This model refers to a regional innovation context where the university generates knowledge and network opportunities, facilitates absorptive capacity building of business and public, and collaborates more smoothly with different stakeholders as they are less vulnerable to political and commercial pressures. The leadership role coordinates the sustainable learning environment for the partnerships.

Research Question: How is Duzce University leading the regional transformation with its entrepreneurial mission within the context of Smart Specialisation Strategy?

3. Methodology

The paper adopted single holistic case study with inductively analysing primary and secondary data. Evidence to illustrate the case study has been gathered from multiple data sources including university strategic plans, performance reports, archival records, observation, primary and secondary interviews, media coverage and policy websites.

4. Findings

Resulting Conceptual Framework: Duzce University has become the regional institutional leader for delivering smart specialization outputs through managing quadruple helix ecosystem through the conceptual pattern (see Figure 1.)

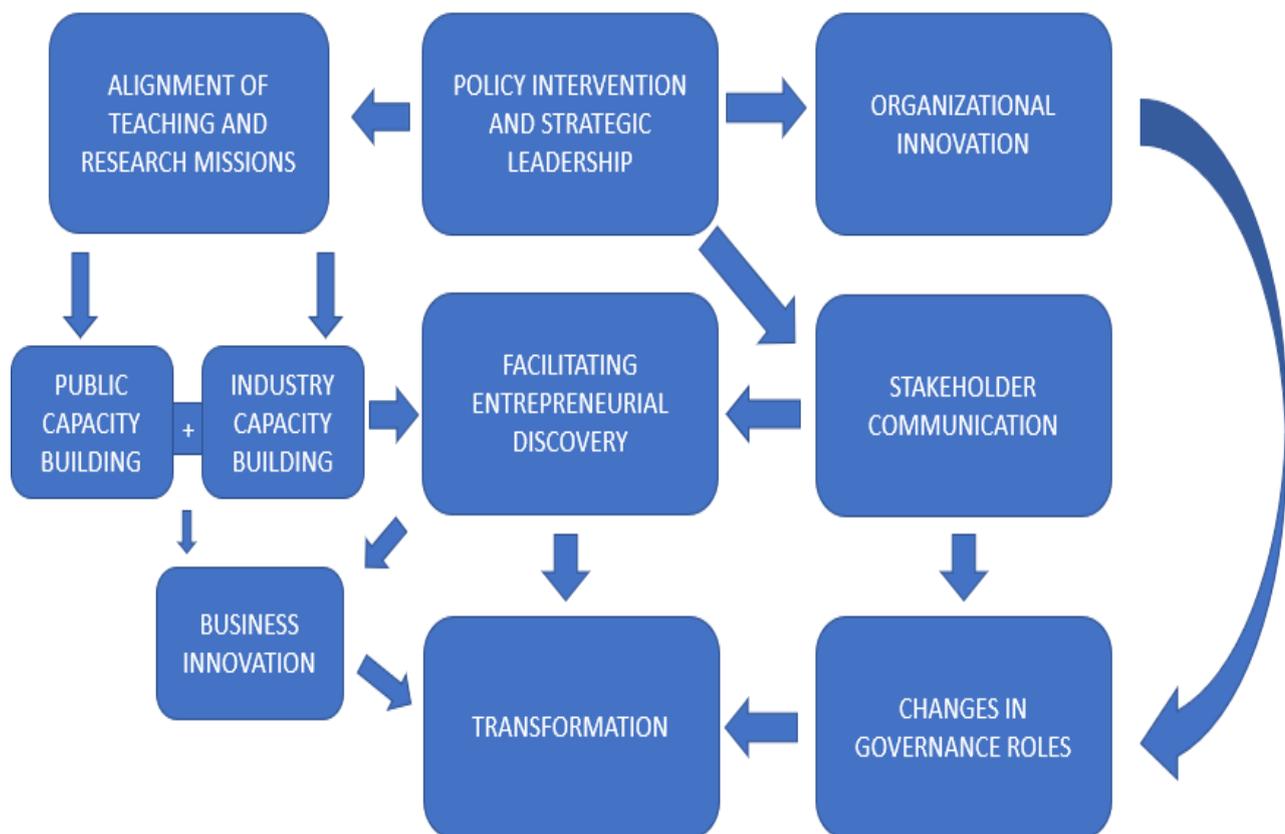


Figure 1. Transformative University Model of Duzce University Specialisation



4.1. Policy Intervention and Strategic Leadership

Coordinating S3 process reflects some potential conflict between institutional autonomy of the universities and a regional development agenda limiting this autonomy (Kempton et al., 2013). According to (Foray, 2020), this logic of top-down intervention for the essentiality of thematic prioritization combined with bottom-up leadership for choosing a specialization domain which will host *ex-post* entrepreneurial discovery are complementary and in the nature of Smart Specialisation Strategy.

Higher Education Council of Turkey introduced a program for Regional Development Oriented Mission Diversified and Specialized Universities and announced the call for submitting a letter of intention from the universities for the selection of the first cohort in 2015. Duzce University achieved to propose a self-assessment report and was granted the mission university role to introduce a specialization program in Health and Environmental Technologies in 2016. As a strategic turn, Duzce University opted for transforming into a brand in health and environmental technologies in 2015 expressing the strategic objective in their strategic plan for 2015-2019 and defined a set of performance indicators in this domain to be followed up on a regular basis.

DÜ has founded the Coordinatorship for Specialisation in Environmental and Health Technologies following the YÖK decision bringing together the stakeholders of municipality, governorship, provincial council, NGOs, regional industrial firms etc. The specialisation mission in Traditional and Complementary Medicine (TDM) was built on the historical, geographical, and industrial strengths of the region in addition to the teaching, research, and technology capacity of the university. Duzce is known for its natural tourism opportunities as well as agricultural diversity and natural resources. Material production for GTT applications had already been adopted within local community, and Duzce has been located between two metropolitan cities of Istanbul and Ankara which positioned the university as an entrepreneurial institution within the region.

4.2. Alignment of Teaching and Research Missions with Specialisation

Universities are essential actors of research networks around the world, connecting and activating networks in global scene. Moreover, the universities enhance the skills and knowledge levels of regional human capital through degree, lifelong learning and orofessional development programmes (Rinaldi et al., 2018). Duzce University dedicated the specialisation efforts to raising qualified human resources and contribute to the employment levels at the region by investing in high value added activities such as medicinal herbs growth, extraction and production for health industry. Education and diffusion of the practice has been one of the four building blocks of the specialisation in the field. Most of the pharmaceutical companies in Turkey are settled in or around Duzce making the university mission critical for delivering human capital qualified in pre-clinical and clinical research, pharmaceutical production, licensing and standardization the medicinal herbs based products. The major intellectual output of the specilisation has been new formulations, new extraction processes, new materials, new test and analysis methods, new tools which can be considered for intellectual property applications.

4.3. Business Innovation and Commercialisation

Duzce University contributed to the business innovation in the region which can be linked to the research function of the university through the commercialisation strategy; as a trade secret IP protection or as a registry IP protection. Trade secret IP protection involves production and marketing with university infrastructures, and R&D partnerships under non-dsiclosure agreements.



Registry IP protection involves IP transfer, licensing, or spin-offs. Duzce University was positioned as a knowledge creating institution in the knowledge triangle framework (Cervantes, 2017) representing an integrated approach to education, research and innovation creating knowledge flows between the three core elements of knowledge building process (See Table 2).

Table 2. Performance Metrics of Duzce University Specialisation

No	Metrics	2017	2018
RESEARCH			
1	Number of masters' theses in specialization field	33	76
2	Number of PhD dissertations in specializatio field	3	5
3	Number of patent applications	2	7
4	Number of utility model applications	0	0
5	Number of academic staff	89	96
6	Number of indexed publications	4	7
7	Number of SCI, SCI-Exp, SSCI, AHCI indexed publications	18	11
8	Number of co authoredSCI, SCI-Exp, SSCI, AHCI publications with other universities	10	10
10	Number of university scientific projects (BAP) and budget	13 PROJECTS 337.634,90 TL	18 PROJECTS 1.283.307,98 TL
11	Number of TÜBİTAK projects and budget	1 PROJECT 54.383,00 TL	1 PROJECT 947.706,15 TL
12	Number of foreign funded projects and budget	0	0
13	Number of conferences, workshops, semposiums	3	3
14	Number of training, seminars, courses	3	6
15	Number of YÖK 100/2000 PhD Scholarship Program students	5	3
16	Number of TÜBİTAK 2244 Industry PhD Students (position granted, yet not filled)	0*	
No	Göstergeler	2017	2018
EDUCATION			
1	Number of upper secondary education courses	275	199+1
2	Number of undergraduate courses	186	196+6
3	Number of masters and PhD level courses	178	192
4	Number of upper secondary education programs	19	19
5	Number of undergraduate programs	14	14
6	Number of graduate programs	13	14
No	Göstergeler	2017	2018
COOPERATION WITH STAKEHOLDERS			
1	Number of projects in cooperation with other governmental bodies	0	0
2	Number of projects in cooperation with regional incentive bodies (Development Agency, KOSGEB,TKDK)	1 MARKA PROJECT 995.807,00 TL	1 MARKA PROJECT 995.807,00 TL
3	Number of projects in cooperation with industry	0	2
4	Number of projects in cooperation with NGOs	0	0
5	Number of projects in cooperation with international parties	0	0
6	Number of cooperation/network structures with stakeholders in the region (advisory boards, industrial chambers etc.)	1	1
7	Number of cooperation with advisory boards and industrial chambers	0	0
8	Number of beneficiaries of the university activities	47	483
9	Number of people/institutions using university research infrastructure	938	1287
10	Number of university spin-offs	0	5
11	Number of patent certification through university-industry relations	0	0
12	Number of contracted consultancy and businesses.	1	7
13	Number of commercialized products/services (trademark registration, utility	0	4
14	Number of working population of alumni employed in the region	0	0
No	Metrics	2017	2018

4.4. Organizational Innovation, Change in Governance Roles and Stakeholder Communication

As an institutional leader, universities can enhance the governance capability in the region by specialized training, and consultancy services for public leaders and staff preventing suboptimal local decisions to take place which limits international competitiveness (Calza, Carayannis, Panetti, & Parmentola, 2019). Through new organizational forms, and interfaces such as Public-University-Industry platforms, universities lead building and increasing social relations, therefore contributing to the institutional leadership (Rinaldi et al., 2018). Universities possess the capacity to engage regional actors to the innovation system (Marinelli & Elena-Perez, 2017). This notion is majorly reflected in Duzce University direct involvement in medicinal herbs growth in rural districts. The university is conducting informing sessions in villages cooperating with neighbourhood representatives (muhtarlık), chambers of agriculture, and provincial and district directorates of



agriculture. The university is directly involved in soil analysis for the production of specific plants and plantation trials with voluntary habitants.

4.5. Facilitating Entrepreneurial Discovery and Transformation

Universities are central to developing the regional entrepreneurial capacity by facilitating new business formation, human capital, and new products/services (Calza et al., 2019). They also represent an international profile (Kempton et al., 2013) which can attract more focused policy thinking for encouraging entrepreneurship in the region (Culkin, 2016). The education and research priorities are informed by the historical, environmental, economical, and cultural history leading the facilitation of place-based innovation (Edwards, Marinelli, Arregui, & Kempton, 2017). The entrepreneurial discovery relies on experimentalism to allow for captivating the success or failure factors in a particular context (Carayannis & Grigoroudis, 2016).

5. Conclusion

Smart specialisation strategy of Duzce University raises the question: Will Duzce be an innovation hub for medicinal herbs industry? In order to answer this question, one should further investigate whether Duzce meets the four universal factors of an innovation hub (Markkula & Kune, 2015):

- 1) Globally valued special expertise and related corporate activities
- 2) Globally applied knowledge
- 3) Attracting international expertise, competence driven businesses and investments.
- 4) Locally and globally operating companies of excellence.

For such a transformation take place, incentives must be designed accordingly such as public policy support for tax incentives, and regional innovation programmes. To the author's best knowledge, Duzce is not one of the regions chosen for Agriculture and Rural Development Support Institution (ARDSI) / IPARD programme for rural development which limits the incentives for investment in agricultural production. Moreover, the industrial policy supports the production of chemical materials and products in the region excluding the herbal products for the pharmaceutical and medicinal industries. This creates an obvious conflict between policy networks and the university for regional institutional leadership. Another point is the development of metrics about the transformative performance of the specialisation including data-intensive and timely view of progress in university activities (Foray, 2019). Those metrics should be designed in a sense that exclusively builds on the institutional leadership role of the university in the region such as the total employment created as a result of foreign direct investments led by university efforts.

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