

REGIONAL INNOVATION CULTURE IN AN AGE OF GLOBALISATION – TOWARDS CULTURE 2.0?

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Paul Benneworth*, Center for Higher Education Policy Studies (CHEPS), the University of Twente, the Netherlands.

Tiago Ratinho, Department of Business Administration, the University of Twente, the Netherlands.

* - corresponding author: p.benneworth@utwente.nl

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ABSTRACT

How can the issue of regional culture be used in analyses of territorial innovation in ways that are not self-evidently flawed? The persistent invocation of ‘culture’ as an explanatory or residual influence in explaining differential territorial outcomes suggests that there is likely to be some variables which should be accounted for. But at the same time, approaches tend to fail to precisely specify culture in ways that do not take it as being exogenous and fixed. This paper argues that this shortcoming results from trying to apply the concept regional culture to explain regions as a bounded systems, and that by relaxing this constraint, and thinking of culture within open and porous systems, it becomes possible to identify how culture might meaningfully operate around territorial innovation at the regional scale, through learning arenas linking local materialist practices with wider epistemic communities. Using a brief illustration drawn from the region of Twente in the Netherlands, focusing on the role of its university as a learning arena, the paper argues that more focus on how learning arenas create regional-scale networks will help to illuminate the influence of regional culture within territorial innovation models.

1. INTRODUCTION

The question of culture has represented an enduring challenge for regional development theories, and has had difficulties in progressing beyond Granovetter's overdetermination dilemma (1985). The issue in trying to talk about regional culture as a variable in economic development is that it is really an indirect way of referring to the characteristics and capacities of particular regional groups (Keating *et al.*, 2003; Kotey, 2006). At the same time, there is a risk in using it this way that it becomes reified into a regional capacity, automatically applicable and shaping the decisions and behaviours of individuals that are located in that region (*cf.* Saxenian, 1994).

Even in restricting 'culture' to characteristics that are related to economic behaviours (think of entrepreneurial cultures, innovative cultures, thrifty cultures), there are still calls made to broader ideas that these behavioural tendencies become woven into regional structure through structuration processes (Boschma 2005). New concepts have been developed such as social capital and absorptive capacity in attempting to explain how individual behaviours create middle-range institutions which represent regional collectivities which influence both culture but also economic development (Hansson *et al.* 2005; Kallio *et al.* 2010; Van Reine and Dankbaar 2011). But this risks reproducing very functional and materialist readings of culture in its role of economic development processes, assuming historical causality which in turns undermines the idea of 'culture' as a variable with predictive power.

Regional culture has been a particular weak point for territorial innovation models (Moulaert *et al.* 2003) and has often become residualised, a means of explaining things that cannot be otherwise explained, or instrumentalised as a set of factors that promote or hinder effective regional innovation (*cf.* Tödtling *et al.*, 2010). There is a tension between the ideas of corporate cultures in particular regions and more generalised regional cultures that are the basis for a wider shift in regions' economic development trajectories (Cooke and Rehfeld 2011)(Christopherson & Clark, 2007). This chapter begins from the premise that at least some of these problems arise because of an unnecessary emphasis and reification on the idea of regions as actors, rather than restricting their use as a means to talk about a particular scale of action.

The paper asks the question how can the idea of regional innovative cultures be reframed as a scale of action for particular innovative communities, and how do the dynamics of those communities evolve over time. The paper draws on the recent work of Rutten & Boekema who argue that there has been a category error in recent work on territorial learning, and that the quantitative changes in the scope and scale of extra-regional communications have driven a qualitative shift in the nature of territorial learning (Rutten and Boekema 2012). We here draw on their idea of the knowledge economy 2.0 to develop the idea of 'regional innovation culture 2.0', as a framing of the way that regional innovation culture now operates in the contemporary context. To provide further insight into this concept, we look at one institution of regional innovation culture forming, the university. We explore how its impact on regional innovation culture has been understood in both knowledge economies 1.0 and 2.0, and suggest a framework for the role of universities in regional innovation culture 2.0.

To empirically reflect on this conceptual framework, the chapter then turns to use a case study of the regional of Twente in the east of the Netherlands, an old textiles region with traditionally very low rates of innovation and entrepreneurship. Its regional university has since the 1970s been active in promoting innovation and entrepreneurship, and the region is now home to a range of dynamic, entrepreneurial and economic development networks leading to a steady stream of innovative outputs such as high-growth, high-technology

businesses. However, to date, the influence of the university on culture has been understood primarily through a set of generative, static contributions. The chapter instead looks at the how the communities associated with the university have emerged in Twente, their influence on the regional scale of activity, and their interaction with more vernacular business cultures and communities outside the university. This analysis provides the basis for a more general discussion seeking to specify more rigorously how culture can be conceptualised as a variable within regional territorial innovation models, and the relationships of culture to the social dynamics of innovation networks.

2. THE ROLE OF CULTURE IN REGIONAL ECONOMIC DEVELOPMENT

Although there is a long tradition of including cultural variables in political economic explanations of economic development (*inter alia* (Schumpeter 1934; Weber et al. 2002) the starting point for this paper is the issue of culture in neo-endogenous development (Bradshaw and Blakely 1999; Ray 2006). The concept of neo-endogenous development argues that understandings of economic development have followed three waves, , firstly endogenous, (driven by local factors), secondly exogenous (driven by external factors), and thirdly, neo-endogenous, driven by the way that local factors made places attractive to external investors. This neo-endogenous age has broadly coincided with the ‘rise’ of the idea of regions in economic development theory (Hardill et al. 2006) as a natural space for tacit knowledge exchange and transfer. There is clearly here an appealing heuristic that local culture however defined affects affects place-specific economic development capacity (Cooke and Rehfeld 2011).

Characterising culture in neo-endogenous regional economic development theory

Part of the problematic of regional culture is the fact that intrinsic theories of culture are difficult to connect with regional development activity (Huggins & Thompson, 2012). The more ‘cultural’ the explanation, the harder it is to directly connect to economic activity with anything more than a rhetorical flourish. A typical instrumental view is that of Westlund & Frane (2013), who argue that

“Culture is the invisible force behind the tangibles and observables in any organization, a social energy that moves people to act. Culture is to the organization what personality is to the individual—a hidden, yet unifying theme that provides meaning, direction, and mobilization.” (Killman,1985, cited in Carayannis & Campbell, 2012)

In this chapter, I argue that the concept of regional culture has to date been characterised by three problematics, *viz.*– it is essentialised, it is residualised and is unscalar. This is not to say that the way it has been used is necessarily problematic: it is rather that these characteristics arise from the way that explorations in regional economic development.

The first problem is of its essentialisation, as if it were a regional characteristic: this is point Granovetter makes regarding oversocialisation challenge (Granovetter 1985). Whilst regions as political constructs can be said to have a number of fixed attributes, including a delineated territory, symbols, institutions and a regional culture, this ignores the fact that these are multi-scalar processes of regional formation, rather than characteristics attributable to a region (Hospers 2006; Paasi 1991). Even the notion of ‘regional identity’, the

“natural and cultural features associated with given bounded spaces or to the identification of people with such entities” (Paasi 2012)

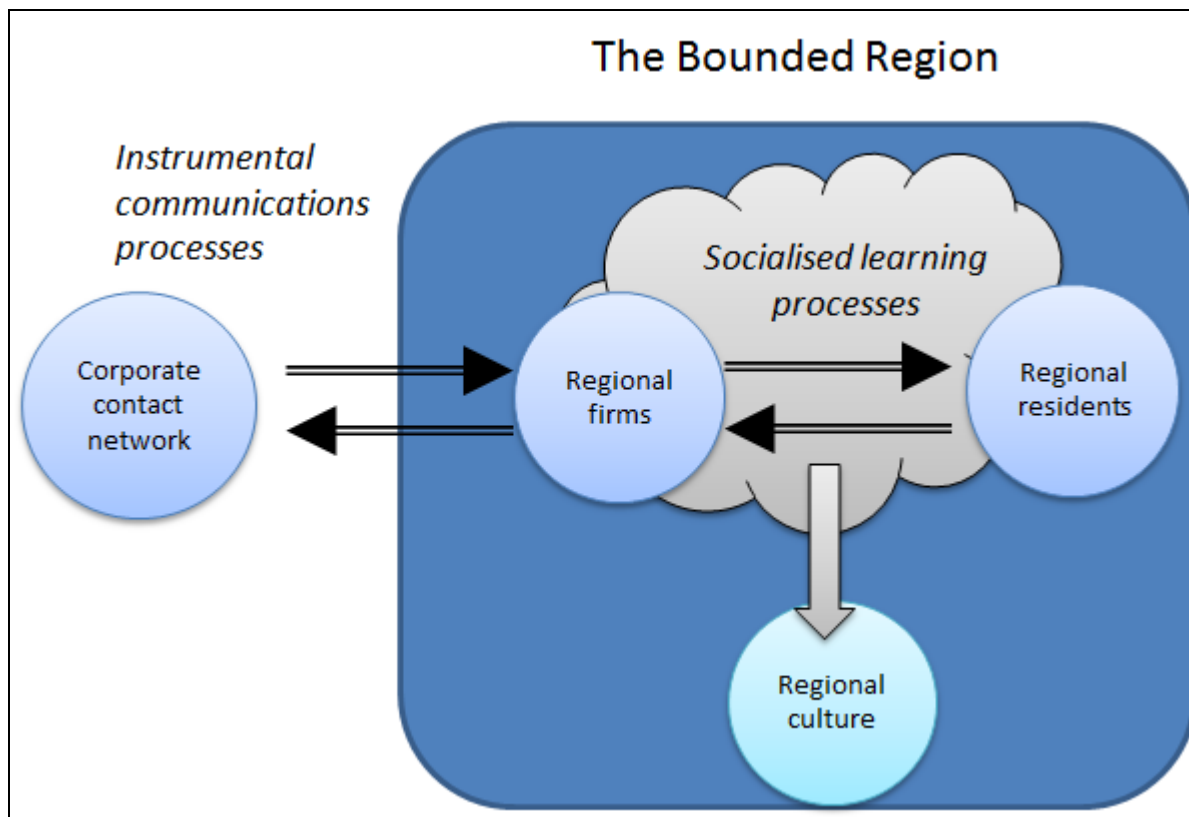
...runs the risk of reifying a fixed entity rather than something that is as Paasi says, dense, layered, complex, segmented and shifting. This in part comes about through a need to fix on immaterial aspects that can have material consequences attributed to them, but also has a reverse effect of fixing the 'regional culture' applicable to the subset of people engaged in those material practices.

The second problematic is the tendency to residualise regional culture in ways that render it as an explanation of the factors which cannot otherwise satisfactorily be explained (Beugelsdijk 2007; Iyer et al. 2005; Keating et al. 2003). The issue here is that it does not give an insight into what is important in creating the economic advantage. Thus, there has been a growth of explanations based around the idea of social capital – links between people that enable them to secure command over the goods and services of others (*cf.* (Bourdieu 2008; Putnam 1995). However, the challenge is then to get from that residual being an explanation of regional growth differences (Tabellini 2010) to convincingly claim that there is an underlying process, whether tacit knowledge or social capital underlying that residual (Hudson 1999; Storper 1997). The result has been some rather heroic claims made about the role of culture in regional development, with detailed process-based explanations which nevertheless are unable to attribute the regional growth differential performance to those processes.

The third problematic with the use of regional culture is a tendency to use a non-scalar use of culture in understanding its impacts on businesses located in particular regions. Although there is now a well-nuanced understanding of the different scales or levels at which 'regional culture' can impact on businesses, their competitiveness and innovative capacity (James 2007), there is a much weaker understanding of the multi-scalar processes by which culture is produced. As a result, there is a tendency to look at those material corporate practices which appear different in particular places and then consider the regional culture as those elements which might explain (Henry and Pinch 2000) (plus James 2012 not imported to Endnote).

The collective effect is to ignore the multiple scales in which the capacities which emerge in regional cultures are produced, and to 'flatten' and smoothen out the complex multi-scalar networks within which culture and identity are produced. This is illustrated in the figure below, which attempts to depict regional cultural formation processes as the result of the interaction of two spheres, of regional production undertaken by firms and reproduction undertaken by residents, linked by the socialised learning processes involved when residents work in regional firms. These socialised learning processes create knowledge capital between the actors which supports innovation processes, and helps to increase the attractiveness of the region to others, creating connections in the corporate contact network.

Figure 1 Regional cultural formation processes in the globalised knowledge economy



The regional innovation culture problem and knowledge economy 2.0?

My argument is here that regional culture is a specific example of a problem observed more generally in regional studies in coming to terms with the idea of the knowledge exchange and territorial innovation (*cf.* Rutten *et al.*, 2012). Our observation is that there is an increasing dissatisfaction with territorial innovation models (*cf.* (Moulaert and Sekia 2003) in regional studies, and an increasing emphasis on the relationality and contingent nature of the region (Harrison 2012; Lagendijk 2006; Lagendijk 2007). Varro & Lagendijk have recently critiqued the failure of these relational positions to deal with the enduring value of the region, or at least territory, as a space within which particular activities are fixed and take place. There have been substantial changes in the nature of communications that have profoundly changed the way that learning takes place within territories, and therefore the contribution that it makes to territorial innovation models.

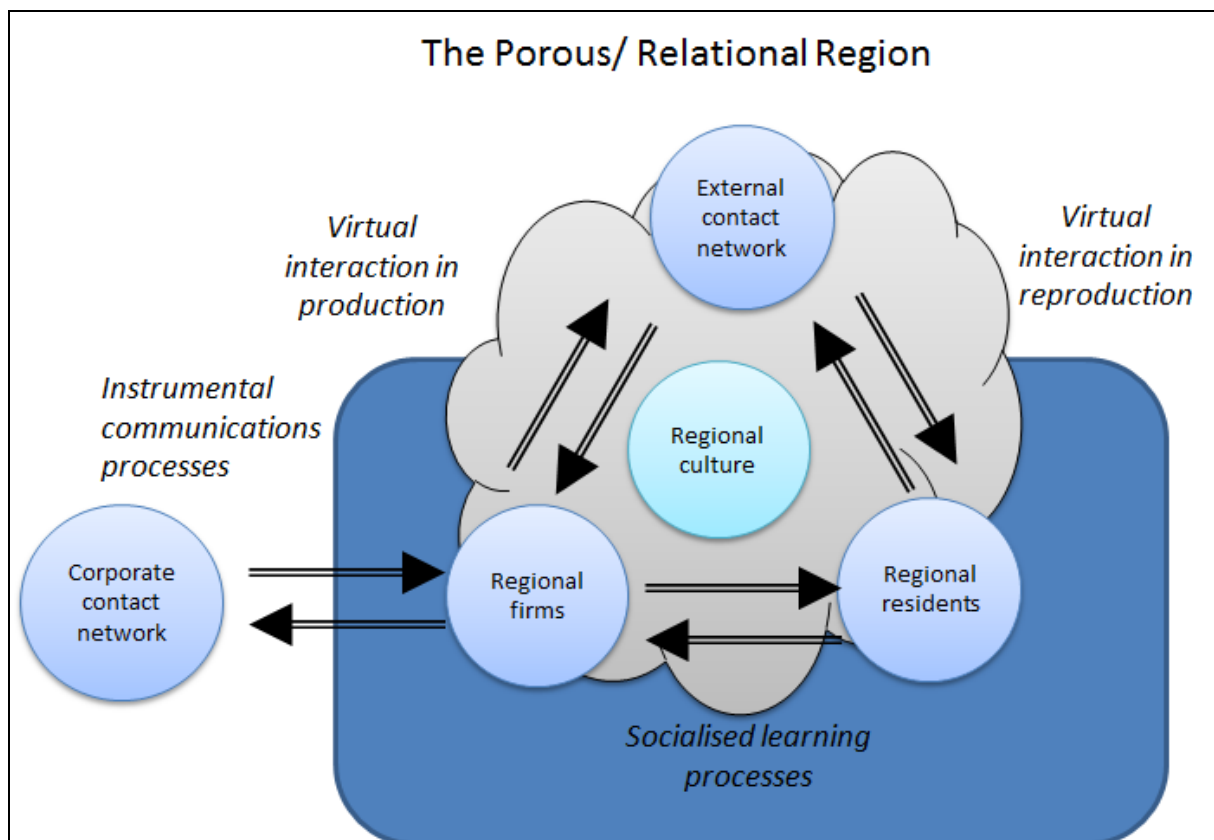
The nature of communications has changed, and whilst internationalisation and growing connectivity are often cited as an important driver of change, what is often missed is that there has been a qualitative shift in the nature of communications (Castells 2011). Whilst in the 1980s there was a substantial amount of data exchange, it took place primarily in bilateral transactions and formed a discrete element of activity separate from core production processes. By the 2010s, the things that we refer to as the 'cloud' and social media have driven a massive convergence of communications: ICT have evolved from being communications links to being spaces of activity with material value (witness the rise of digital economies based on virtual currencies *cf.* (Shin 2008) that are hence also spaces of production, with the effect that individuals' culture is influenced by these spaces.

The effects of that wider shift, in the way that communications technology have interacted with regional production, and shifted the territorial dynamics of regional culture, have to some extent been missing from this preceding debate between relationality and regionality. Whilst

previously external communications were primarily instrumental, around co-ordination tasks separate from material production tasks, they have increasingly become indivisible from these material production tasks, part of the social networks through which people organise and develop their own lives beyond the sphere of economic reproduction.

Therefore, regional cultural formation processes have clearly shifted as there has been a shift in the nature of the technology. In the original version of the knowledge economy, where communications technologies intermediated within production networks, and cultural formation operated within bounded spaces whose economic potential was shaped both the position of the region in these networks and the assets that these regional cultures conferred. One might suppose that in this changed version of the knowledge economy, inter-regional communications processes have penetrated into the heart of production and reproduction processes, and BUT at the same time, by being involved in material processes of production shape and constitute material assets which influence the development trajectory of the territory. This is shown in the figure below, which highlights how the knowledge capital base of a region is interdependent with a set of material practices (production and reproduction) within the region that themselves involve socialised learning processes drawing on actors located outside the region, and in principle, anywhere.

Figure 2 Regional cultural formation processes in the knowledge economy 2.0



In Rutten *et al.* (2012)'s analysis of this broad shift in the nature of economic development in response to these qualitative shifts in the knowledge economy, they stylise the changing concepts of regional learning in these different contexts. They highlight two areas of relevance to understanding regional culture, namely the shift in the determinants of social norms and values from a dominant regional culture to social and professional communities, as well as the shift of social capital from being based in regions to being based in communities (see table 2 below).

Table 1 Changing concepts of regional learning in the evolving knowledge economy

	Knowledge Economy 1.0	Knowledge Economy 2.0
Principal agents of learning	Firms	Individuals
Regions as actors	Territorial production systems	Places of opportunity in global space
Inter-regional relationships	Global hierarchy of regions	Spatially sticky individuals in global knowledge webs
Proximity	Co-location of firms	Cognitive, social proximity of individuals
Nature of networks	Inter-firm networks	Relations among individuals
Dynamics of Networks	Formal, organized, contracts	Informal, bottom up, trust and reciprocity
Social context (norms & values)	One dominant regional culture	Various social and professional communities
Social capital	Regional-based	Community-based

Source: Rutten *et al.*, 2012.

So the key question this chapter seeks to understand is, given the shifts in the nature of the knowledge economy set out above, what have been the implications for regional culture, and in particular, the way that regional cultures contributes to innovation-led economic development processes.

3. UNIVERSITIES AND REGIONAL (INNOVATION) CULTURES

It is important not to at this point evoke a naïve dematerialisation/ death of geography distance, and argue for the end of ‘regional culture’ on the grounds that it is shaped by a diversity of external drivers. We concur with Rutten *et al.* (2012) and Lagendijk & Varro (2012) that the reason that the region has remained an important unit of study is because it has a real significance as a scale of action. The problematic bounded versions of regions have only been persevered with for so long precisely because what they were able to capture outweighed what was lost if one argued that geography no longer mattered.

We contend that one way to understand the dynamics of these regional cultural formation processes in the context of a shift to knowledge economy 2.0 is to look at the dynamics of the regional learning processes. To get a first insight into how this cultural formation process operates in a regional context, we will focus on one of these kinds of institutions, namely the university, and consider both its traditional role in the formation of regional culture, as well how that evolved in the context of the emerging knowledge economy. This requires a further specification of our research question towards considering “how has the drive towards knowledge economy 2.0 changed the way that university contributions to regional innovation cultures can be understood”?

The carriers of regional learning cultures

Regional learning activities are processes of regional change in which groups of actors come together to try to realise new combinations of existing resources that change the regional economic structure and its capacities in some kind of purposive way. In the course of those efforts to drive change, relationships and networks build up, which gradually solidify in time into formal networks and informal cultural regularities. These formal and informal capacities in turn shape the resource base of the region and its future capacities. We choose to distinguish between three kinds of activity that might interact in these purpose change processes in the search for new kinds of combination. This in turn provides a basis for

classifying how universities might contribute to regional learning activities, and consequently their impacts on regional learning cultures.

The first area is in terms of new technological capacities, both in terms of new technologies but also novel uses and configurations of existing technologies. New technologies may have incremental or radical impacts on the economic structure of a region. New technologies may be easily assimilated into innovation processes and contribute to the evolution of a sector through stimulating innovation. New technologies might also cause problems for regional economic structures, with radical innovations threatening to disrupt existing business models and social capacities. Technological learning therefore involves not just simply the capacity to absorb technology into a place, but to identify potential future challenges and opportunities raised by technologies and ensure that there is an adaptation by knowledge users and producers to position the region as effectively as possible to benefit from the way technological change will affect the economic structure.

The second is in terms of the human capital base of the region: although firms may be highly footloose and able to move capital rapidly between locations, people have a great deal of stickiness. People are learning actors and engaged in the problem solving that generates new knowledge: human capital therefore has a partly self-reinforcing dimension in that current human capital stocks form the basis for the kinds of interesting learning activities that will produce knowledge capital useful in the future. A place's capacity to generate human capital therefore depends on its capacity to deploy its existing skills and competencies to learning activities that generate new knowledge which is useful in the future. The most successful places are able to make themselves into 'places to be' (*cf.* Gertler, 2006), a mix of promising human capital which endows the opportunity to address the most interesting and innovative future questions, therefore reinforcing the territorial advantage of those locations.

The third area is learning activity related to the reconfiguration of particular activities to respond to new opportunities, and to unleash a wave of creative destruction than benefits a territory more than it weakens it. This relates to the presence of entrepreneurs across public, private and the social sector who are able to identify emerging opportunities, develop constructive plans to meet those opportunities, assemble the resources to meet those needs, and create sustainable structures to deliver those new activities in a particular place. So the formation of new firms is a critical mechanism for driving regional learning activities, with entrepreneurs having to assemble the necessary financial, knowledge, technical and business resources to develop and deliver new combinations. Public and social entrepreneurs are also vital to both support business entrepreneurs in these activities, but also in addressing market failures, and stimulating positive externalities from business learning activities.

Universities and regional cultures in knowledge economy 1.0

The focus in understanding the relationship of universities and regional culture in the knowledge economy 1.0 focused almost exclusively on creating an 'associational' culture (Cooke & Morgan, 1998), is one in which people are willing to co-operate and work together, and are good at sharing knowledge and collective learning, which are valuable attributes oriented towards the promotion of innovation, research and development and competitiveness (Cooke et al. 1997). One of the most important contributions to be made by universities was seen as to be providing a bridge to 'knowledge' outside the region, so in helping firms who needed new knowledge in their innovation products to identify the best sources of knowledge, and hence to contribute to regional competitiveness.

A second element of the university impact came through the effects on the workforce, in terms of producing (and sometimes attracting, *cf.* Florida, 2002) a highly skilled workforce.

This sometimes had the effect of reifying a particular kind of qualitative shift, particularly associated with the arrival of a new university in a remote and economically problematic region. So the literature is rife with accounts which make a distinction in terms of the regional culture from before the arrival, of being uneducated and based around manual labour, whilst the university made possible the creation of an indigenous professional, white-collar skilled class. The problem with such accounts is that they ignored the high level of embedded knowledge, organisation, and social capital within working class communities (Beynon and Hudson 1993), and by their privileging of a particular type of ideal class-based cultural norms risked normatively framing universities' cultural impacts as benefits.

A third element can be seen around the idea of the entrepreneurial university (*cf.* Clark, 1998) highlighted the idea that universities could also promote an entrepreneurial culture within regions, by equipping students with the skills, mindsets and attitudes to exploit the 'globally-rooted' knowledge located within the universities. This would lead to the creation of new businesses and by implication a new regional cadre of business-owners – entrepreneurs – with a different mindset – the entrepreneurial mindset – by implication leading the regional culture to be more entrepreneurial. This views the relationship of the university towards entrepreneurship as being about promoting the creation of new businesses, identifying ideas and business models, bringing them together with potential entrepreneurs, and helping those entrepreneurs assemble the necessary resources to establish new businesses.

Universities and regional cultures in knowledge economy 2.0

If one conceptualises a regional learning arena as a place bringing together a range of actors embedded within their own extended socialised learning networks, and at the same time with local interactions and interdependencies, this then raises the question of the kinds of contribution that a university could make to a regional innovative culture. Rather than thinking of technology, human capital and entrepreneurs as particular 'stocks' of assets within a region which can be leveraged for regional advantage, when one considers these as communities then the linkages between the elements, the dynamics of the stocks and the role of the university becomes more evident.

Thus, with regard to technology, a knowledge economy 2.0 perspective does not simply think of the university as a conduit helping firms with their technology search processes related to particular innovation processes. Universities can be regarded as critical moments in the lives of the Communities of Practice within which generate knowledge for innovation (Gertner et al. 2011). At the same time, universities have multiple roles within these communities: their academics may contribute actively to the learning, they may be the source for employees for firms, they may host boundary spanning actors (like Gertner *et al.*, KTP associates). At the same time, as *inter alia* Klein Woolthuis (1999) and Whitehurst (2007) show, these Communities of Practice may build up their own social and cultural dynamic not entirely related to the business of creating knowledge and innovating (Whitehurst 2007)

Secondly, with regard to human capital, a knowledge economy 2.0 perspective stresses that social capital is community-based, and that the principle agents of learning are individuals rather than the firm. The key challenge for firms in in managing to secure the use of employees individuals' networks, contacts and social capital to create assets which can be privately owned within the firm. This is about much more than the university as a site of lifelong learning for individuals on portfolio career paths (Sultana 2012). An important element of what gives individuals coherence on these career paths are their collective identifications with a wider imagined community. What is important for universities here is as the site of the formation of these broader epistemic professional identities as well as mobilisation of the first-order networks within which these professional identities will be

exercised which can in turn have immediate effects on regional culture, (Bowles and Jensen 2012; Perkins 2012).

The third element of this were the (neo-Schumpeterian) entrepreneurs, the businesses owners who can also be regarded as the change agents for the evolving regional economy. A knowledge economy 2.0 perspective differs from the earlier version in not making a separation between the university and the entrepreneurship elements, but as regarding the university as a community in which entrepreneurs can participate and learn how to access the resources they might need. This would study the relationships – and critical the mutual interdependencies between entrepreneurs and the university, how that affects the entrepreneurial process, and the way that this leads to a building up of a more – or less regional entrepreneurial culture. These interdependencies are necessarily generated by the global-local situation both universities and entrepreneurs find themselves in, and culture arises in them working together to each solve their respective problems within a shared or proximate learning community.

Reframing university contributions to regional learning cultures

What this distinction does is provide a means for thinking about how we might want to reframe ideas of regional cultures in more practical terms to accommodate these differences between knowledge economy 1.0 and knowledge economy 2.0. One element of this is the shifting emphasis from static assets and stocks to considering dynamic learning processes; a second element is shifting the unit of analysis away from the formal institution, to individuals embedded within institutional and organisational settings that constrain, empower and shape their activity. However, these are general lessons which are also made by Rutten *et al.* (2012)

Table 2 The relationship between universities and regional innovation cultures

	Knowledge Economy 1.0	Knowledge economy 2.0
Universities as conduits of technology	Providing knowledge directly and assisting firms with technology search processes	Anchors of learning Communities of Practice creating knowledge capital used in corporate innovation
Universities as suppliers of highly skilled	Educating individuals with the capacities to work on firms’ innovation projects	Sites of professional identity formation creating individuals with local networks and epistemic attachments
Universities as mobilisers of entrepreneurs	Providing services to bring ideas together with entrepreneurs and the assets to create new firms.	Universities as spaces of interdependence with entrepreneurs in creating new firms and achieving scholarly excellence

This framework appears to offer a concrete mechanism for exploring the research question raised at the start of section 3, namely

“how has the drive towards knowledge economy 2.0 changed the contributions made by universities to regional innovation cultures”?

This framework suggests that the regional cultural contributions of universities are coming through their involvement in four kinds of global-local processes, innovation Communities of Practice, professional identity formation networks, innovative entrepreneurial business formation, and through their hosting of hybrid communities. To further explore this model, we now turn to reflect on the case study of one university, in which the contribution of the university to regional culture has never satisfactorily been explained. Using the framework

developed above, a set of secondary material is re-examined to see if this shift sheds additional light on the nature of Twente's regional innovation culture 'conundrum'.

4. THE CULTURAL ROLE OF THE UNIVERSITY OF TWENTE: A KNOWLEDGE ECONOMY 2.0 PERSPECTIVE

The transformation of the region of Twente is one that has been closely studied in association with the role played by its new technology university, and that university's role in creating high-technology spin-outs. The region of Twente is an old industrial region in the east of the Netherlands that went through a relatively severe post-war decline and limited re-industrialisation (Benneworth and Hospers 2007b). A university was established there in 1964 to try and halt the decline, but as the decline worsened, the university emphasis shifted towards trying to create businesses and support innovation in new sectors (*cf.* (Benneworth and Charles 2005; Benneworth et al. 2010; Benneworth and Hospers 2007a).

Embedded within these stories is the claim that the activity of the university has changed the 'regional culture', from poorly-educated knowledge workers with an employee mentality towards high-skilled knowledge workers with an entrepreneurial mentality. But at the same time, it is very hard to find compelling evidence that this has added up to a comprehensive change in culture. Looking at the aggregate regional statistics, Twente – although being described as a high-technology hotspot, still has below average GDP, education and R&D figures, whilst having above average levels of unemployment and employment in consumer services. This makes it hard to understand what precisely the role of the university has been because one either accepts a claim that there has been a clear cultural shift or not, and the university impact on culture is entirely dependent on whether one accepts that claim.

The issue is not whether there has been some change, as there clearly has, but what is the nature of that change and what is the role of the university in that process. To get beyond that blockage, our approach is to argue that the existing narratives have tended to frame the contribution in terms of a knowledge economy 1.0 model. In order to get a more realistic sense of the relationship of the university to the evolving regional innovation culture, it is necessary to consider those elements from the knowledge economy 2.0 model. These are presented in the following two sections.

The University of Twente as a source of assets and stocks

Existing narratives about the regional cultural impacts of the University of Twente have tended to be based around the presentation of sets of activities and then an argument that these have added up in some way to a broader process of change, possibly through invoking arguments about extended networks and institutionalisation. This has proven problematic in that it becomes very difficult to understand what the linkages are from the particular activities within the university to the broader changes at the level of the region that could have sufficient impact to warrant description as a regional culture shift, particularly given that the majority of the region – whether measured in terms of inhabitants, firms, entrepreneurs and culture - lies outside the direct sphere of the university, and even the extended networks by which these broader claims are sometimes justified (e.g. Benneworth *et al.*, 2009).

One set of arguments has related to the role the university has played in linking up regional firms with sources of knowledge and technology. The university has had since the late 1970s some kind of infrastructure geared towards dealing with external queries from firms (primarily regional firms), initially guiding them exclusively to regional contact points. This infrastructure has built up over time, and in 2007, there was a streamlining operation in which a single contact point was created which could refer inquiries onwards to a range of different

potential knowledge sources, of which the university was one. This kind of evolution was used by Benneworth & Hospers (2007a) to argue that there had been a knowledge network built around into the university, spanning across into policy-makers and innovation practitioners, and this could be regarded as a development in regional culture (Benneworth and Hospers 2007a).

A second set of arguments related to the role that the university has played in providing a source of highly skilled labour, of the sort not already present in the region of Twente. The claims around a different kind of culture related to the fact that there were new kinds of courses and trajectories created that focused on the kinds of business activities not traditionally done by Twente firms, and necessary for innovation, and high-value added performance, such as innovation, design, development, testing, experimentation and creativity. This has partly been promoted through the creation of new kinds of courses, such as Medical Technology and Advanced Technology, as well as through an enrichment of existing courses by working more closely with businesses involved in these high-value areas. This kind of argument has been mobilised in both Garlick *et al.* (2006) and Benneworth *et al.* (2006) as part of the OECD review of the regional contribution of the university of Twente, in arguing that these new employee competencies represent a new kind of regional culture.

A third set of results relate to the role of the university in promoting a new kind of entrepreneurial culture. This has been written at the most length about, and indeed for a time, the University (1987-2009) styled itself as the Entrepreneurial University (*cf.* Clark, 1988). The claims about a different kind of culture relate to the sense that there was not a strongly technologically-based entrepreneurship dynamic in the Twente region before the university began its own entrepreneurship experiments in the 1980s. The argument can be extended by pointing to the large numbers of firms created, their on-going levels of employment within the labour market, ambitions for future expansion and external recognition for Twente's entrepreneurial performance (e.g. Benneworth *et al.*, 2011). The argument is that even though the entrepreneurial culture is not totalising, it is of sufficient scale and sufficiently different to the previous entrepreneurial culture (small numbers of textiles entrepreneurs creating massive plants) to warrant a genuine shift in entrepreneurial culture.

These three areas are summarised in the table below.

Table 3 UT's contribution to regional innovation culture from a knowledge economy 1.0 perspective

	Knowledge Economy 1.0	Activities in the University of Twente
Universities as conduits of technology	Providing knowledge directly and assisting firms with technology search processes	Transferpunt, Liaison Group, Holding Technopolis Twente, Kennispark
Universities as suppliers of highly skilled employees	Educating individuals with the capacities to work on firms' innovation projects	The creation of the Advanced Technology courses
Universities as mobilisers of entrepreneurs	Providing services to bring ideas together with entrepreneurs and the assets to create new firms.	The Business Technology Centre, the TOP programme, other entrepreneurship programmes.

The University of Twente as a place of dynamic learning arenas

Although to our date to knowledge there has not been a comprehensive analysis of the way that the university of Twente has contributed to the four elements of cultural formation arenas in knowledge economy 2.0, it is possible to reflect on the basis of the study on how this process might take place. This provides a means for reflecting on the linkages between universities and regional culture, and more generally on the overarching research question of how does culture affect regional innovation processes.

In the first instance, a variety of the activities around the university could be considered as Communities of Practice in the way that they bring together hybrid communities of actors working on both commercial and scholarly problems in parallel. Even in the 1990s, there was a rush to create what became called ‘Valleys’ (based on the Silicon Valley nomenclature) of universities working together with firms. Benneworth *et al.* (2005) explore the dynamics of one of the learning communities around UT’s nanotechnology laboratory (MESA+), exploring the genealogies of both the academics and the entrepreneurs, as well as their enduring interactions. Whilst Zomer *et al.* (2010) problematized the extent that there was genuine co-dependence of the academics on their spin-offs (Zomer *et al.* 2010), there still appears to be evidence that there are Communities of Practice forming around the university in a range of areas. These could potentially be creating bridges into the difference spheres of the region which suggest new cultural elements emerging.

The second element of the model was in the creation of new kinds of professional identify formation activities, creating individuals with both local networks and epistemic attachments. Only recently, the university has announced a move towards a new education model in which there will be a much stronger emphasis on project work as well involving students in academics’ research activities. This builds on a number of successful areas where particular courses have by working closely with particular business partners been able to use their teaching to create networks within their students – both locally and more widely, which then carry forward into regional employment. The graduation model within MESA+, where students complete projects working on projects in contact with – if not in association with – firms could be conceived of as creating regional employees with these dual global (scholarly) and local (practical) networks.

The third element of the model was in the shifting nature of the entrepreneur process, from facilitating to engagement and interaction with entrepreneurs. One example of this was the Venturelab project, which sought to attract ambitious entrepreneurs to Twente to accelerate their business ideas through intensive mentoring and business support activity, a clearly difference model to the former entrepreneurship programme of using students to take discrete ideas out of the university and create businesses. There has also been a spatial reconfiguration of the campus, merging it into the adjacent business park, and refurbishing a building at the heart of the education zone for business usage. The rationale for this has been to create an co-located organic community of university and entrepreneurs rather than conceiving of the university’s role as creating, then ejecting, businesses into the regional environment. The broader cultural shift here could be claimed on the basis of in anchoring the regional business community much more strongly around the university, and internalising associative behaviour – through physical proximity – into regional business cultural repertoires.

The point of this example is not to demonstrate that the university of Twente is or is not having a positive or negative cultural effect on its surrounding region. Rather the aim is to start to think about some of the mechanisms and processes by which micro-processes and activities within universities and regional partners could potentially upscale and aggregate to

produce larger scale trends of regional change. These four areas are summarised in the table below.

Table 4 UT's contribution to regional innovation culture from a knowledge economy 2.0 perspective

	Knowledge economy 2.0	Activities in the University of Twente
Universities as conduits of technology	Anchors of learning Communities of Practice creating knowledge capital used in corporate innovation	“Valleys”, collaboratories, MESA+, High-technology Factory
Universities as suppliers of highly skilled employees	Sites of professional identity formation creating individuals with local networks and epistemic attachments	Twente as a place to build high-technology careers blending e’ship, working in start ups and established business.
Universities as mobilisers of entrepreneurs	Universities as spaces of interdependence with entrepreneurs in creating new firms and achieving scholarly excellence	Business accelerators, <i>Atelier</i> building, Venturelab programme

5. THE REGIONAL CULTURAL CONUNDRUM OF TWENTE: DISCUSSIONS AND CONCLUSION

In this paper, we have sought to explore how regional culture functions in the context of regional innovation activity. In this discussion and concluding section, we want to consider the three elements within our emerging heuristic of the case of the university of Twente, to consider how culture can better be conceptualised as a variable within regional territorial innovation models. The operational question asked in this paper

“how has the drive towards knowledge economy 2.0 changed the way that university contributions to regional innovation cultures can be understood”?

It is not possible on the basis of secondary meta-study of a single region to give a definitive answer to this question but what it does do is give an insight into the kinds of process by which regional innovation culture could be evident in the case. Table 6 below provides a summary of the knowledge economy 2.0 analysis of UT, highlighting the kinds of processes which might potentially be present and by which the university is influencing and shaping regional innovation culture. The table highlights three areas where these processes take place, including creating communities of bridging actors, a growing labour pool with stable dual identities, and shaping the physical frame of the knowledge exchange.

Table 5 UT's contribution to regional innovation culture from a knowledge economy 1.0 perspective

	Knowledge economy 2.0	Related process
Universities as conduits of technology	Anchors of learning Communities of Practice creating knowledge capital used in corporate innovation	Community of bridging actors linking different regional spheres
Universities as suppliers of highly skilled	Sites of professional identity formation creating individuals with local networks and epistemic	A growing labour pool with dual global-local networks and identities

employees	attachments	
Universities as mobilisers of entrepreneurs	Universities as spaces of interdependence with entrepreneurs in creating new firms and achieving scholarly excellence	Internalising associative/ co-operative behaviour into regional repertoires through physical proximity

The point of looking at universities was that they are one example of the kinds of arenas within which regional innovation culture is shaped, and as an arena, they have a range of different and distinct processes through which they operate. They have imminent aspects, forming identities and creating people with particular kinds of orientations. They also have more permanent aspects, creating the frames – spatial and organisational – within which regional culture and connectivity is enacted and by which socialised learning processes take place. These arenas are related to ‘regional culture’ in that they are partly institutionalised in creating ‘assets’ that can be used recurrently by others without having to build those networks up entirely from a zero-baseline. The kinds of external influence which are evidence in these arenas is very limited in the sense of being partly constrained by the functional purposes set by the university as an institution and an organisation.

Clearly in the case of the UT, one of the reason there is such a strong global-local hybridity suggested in activities is because the university set itself that goal, and that is not always the case for universities as an institutional form. This analysis provides a means of understanding the idea of regional innovation culture in a way that avoids the problems and dissatisfactions of the way that it is used. The question that we asked at the start was

“given the shifts in the nature of the knowledge economy set out above, what have been the implications for regional culture, and in particular, the way that regional cultures contributes to innovation-led economic development processes?”

We made the point at the outset that using ‘arenas’ appeared to be a way to conceptualise a particular kind of hybrid community, linking regional networks with wider epistemic communities. What is suggested in the analysis is that there is a third dimension to these learning communities. Alongside the imminent contact-based networks and the wider, imagined-epistemic networks, there might also be regional networks linking these imminent networks, and within which learning processes take place driving cultural formation process. Conceptually, this creates a link across the previously identified gulf of activity and totalising cultural change, with local-global learning activity having a wider orchestrated-directed network linking these imminent networks. This – if it existed – would have the characteristics of being regional culture in the sense of a regional scale of activity.

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