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Innovation Culture in small Tunisian ICT firms¹

Introduction

Innovation is a major source of regional economic growth, (Ernst, 2002; Demirbas et al, 2011; Laforet, 2013). Indeed, Sternberg (2000) argues that the long term growth of businesses and regions stems from their ability to continually develop innovative products, whilst Sternberg and Tamasy (1999) propose that small firms are the agents for such innovation (Gardet and Mothe, 2012; Wynarczyk, 2013). Moreover, technology in general, but especially ICT (Harbi et al, 2013) is seen as a key mechanism. But Coronado et al (2008) caution that technology firms operating in less developed regions have particular problems, and that these problems are common in these regions (Hadjimanolis, 2000). Moreover, Boschma and ter Wal (2007) argue that key technological advances only take place in a limited number of regions.

Nonetheless, Sepulveda (2008) notes how developing countries have sought to replicate the experiences of more advanced economies. Yet in developing countries the innovation structure is weak, the local market is small and there is a limited demand for their products. Hence as Forbes and Weild (2008) suggest, the process of innovation in catch-up countries is fundamentally different from that of developed countries. Moreover, the industrial structure is dominated by small firms (Coronado et al, 2008). All of these points are certainly the case in Tunisia (Chaabouni, 2008), but it also has the competitive advantage of an increasing well educated technical work force, a European cultural affinity and some policy support (Harbi et al, 2009). Notwithstanding, a successful high-technology sector plays an important role in national economic welfare (McQuaid, 2002). James (2005) explains that innovative firms employ more workers, demand higher skills, pay higher wages and offer more stable

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employment. Furthermore, McQuaid (2002) sees ICT as a leading edge of the knowledge economy. In terms of “catching up” in the post Fordist learning economy, Lundvall and Johnston (1994) consider ICT plays a dominant role.

An innovative culture facilitates innovation (Malecki 1995) and a regional manifestation is the existence of an innovative milieu, where (Campagni, 1995) widespread regional synergies promote innovation. Such milieux are exceptional; Tunisia for example, lacks a geography of innovation, there are no synergic clusters of high tech firms necessary for a national innovative culture (Harbi et al, 2011). Yet it has small successful ICT firms, who have, but may not share, similar problems, similar techniques and often common methods and markets. This raises our research problematic; can an innovative small firm have an internal innovative culture in the absence of an innovative milieu? If so, what are the implications; what prevents a milieu forming? Although Moulaert and Sekia (2003) explain how the innovative milieu model plays down the firm as an isolated innovative agent, there is increasing recognition that entrepreneurship itself is a social process (Anderson and Lee, 2008; Anderson and Starnawska, 2008). Nonaka (1994) explains how interaction between individuals develops new ideas (Ngugi et al, 2010), whilst Nonaka and Teece (2001) talk of interactions between the firm and its environment (Rejeb-Khachlouf, 2011). Fitjar et al (2013) describe innovation processes as complex social phenomena, including extensive tacit knowledge that is hard to capture. Moreover, James (2005) suggests the nature of milieu is not fully understood; a “mysterious” process (Stroper, 1997). Furthermore, James argues that regional culture is made up from industrial culture and individual corporate cultures. This final component, the firm’s innovative culture interests us, especially relationships with the broader environment. Although externalities play a significant role, internal attitudes and behaviours are also important (Coronado et al, 2008).

We examine innovative culture by employing four case studies of small ICT firms in Tunisia. If innovation culture exists, we expect this to be initially enacted by such entrepreneurial firms. Aoyama (2009) explains that institutions (in the Northian sense) set the context for entrepreneurship which is itself, an expression and summation of a region’s institutional attributes. Indeed, Anderson (2000) describes entrepreneurship as the combination of self and circumstance. Moreover, Nijkamp (2003) sees innovation as the *modus operandi* of

entrepreneurship, so that innovation culture within small firms may not only be a prerequisite, but a harbinger of some broader culture. Nonetheless, Brooke Dobni (2008) argues that much of the extant literature points to culture as the lynchpin. Accordingly, we investigate whether an innovative culture exists in Tunisian ICT firms and, if so, we examine its nature. Because of the breadth of the concept, we were concerned that any method that required us to specify and limit the characteristics of innovative culture in advance might miss out on important, but unrecognised, elements of practices, process or content. This seemed important, especially in the context of a developing country, because most previous work has been carried out in developed contexts. Our multiple case study method allows us to use the existing literature to frame our research, but should not inhibit us from detecting any unique characteristics in our Tunisian context. This we see as important, because of the variety of ways of being entrepreneurial (Anderson and Jack, 2008)

The paper continues from our outlining the research problematic to examine the relevant literature. We use this review to identify what the literature has to say about the critical components of innovative practices and to frame our research questions. Our research design is then described and justified. We follow this by a descriptive account of our case studies, each of which is analysed in terms of the components of an innovative culture. Finally we discuss what our case findings mean for the nature of innovation culture in Tunisian ICT firms. We conclude that an internal innovative culture exists, but that it faces inwards and hence lacks an external dynamic. Finally, the implications of our findings are discussed.

Culture and Innovation

Blumentritt et al, (2005) argue the processes through which entrepreneurial firms realise innovation reflect a complex set of internal organisational challenges and opportunities. High tech firms seem to require a set of competences (Hyland and Beckett, 2005) and capabilities, including strategy (Angel, 2006) and a culture for fostering innovation. Innovation culture is a "firm's social and cognitive environment, the shared view of reality, and the collective belief and value systems reflected in a consistent pattern of behaviors among participants" (Jassawalla and Sashittal, 2002:43). Khazanchi et al (2007) and Scaffold (1988) argue that organisational culture manages innovation and contributes to firm performance. Yet similar arguments are made at different levels of analysis (Morgan, 1997); James (2005) made a similar case for innovative regional culture. We also note the similarity, albeit at different levels, of the suggested content of innovation culture. Thus the major difference in these

theoretical accounts may lie in the range and scope, the reach of the culture and the connections therein.

Sepulveda (2008) notes how the “spatial turn” in the nature of industrial policies in developing countries has placed SMEs at the forefront of development. This spatial turn is based on two broad traditions. First, an emphasis on clusters (Porter, 1994; 1998; Krugman, 1998) and secondly, on the socio-economics of co-location (Amin and Thrift, 1994; Storer, 1997). Broadly described, clusters are geographic concentrations of interconnected and interrelated firms that co-operate as well as compete. The concept of clusters thus extends the traditional agglomeration concept of a Marshallian industrial district. In contrast, the socio-economics of co-location emphasise less tangible, non-market relationships; so culture, history and socio-institutional factors are employed to prioritise embedding (Granovetter, 1985; Jack and Anderson, 2002) of economic activity in the institutional milieu. Moulaert and Sekia (2003) talk about such theories as coming through the Marshallian “backdoor”. In such circumstances, tacit and explicit knowledge are developed and exchanged (Hardie, 2010) to create regional advantage (Maskell et al, 1998). Gordon and McCann (2000) suggest these sociological and geographical themes have become somewhat entwined under the umbrella notion of ‘innovative milieu’. Arguably, both concepts depend on proximity as either a physical quality or as cultural affinity to create the effects that help form an innovative culture (Morrison, 2008).

It may be conceptually useful to examine milieu and culture; as McQuaid (2002) argues, the relationships between entrepreneurship, ICT and local and regional economies are intertwined.

Innovative milieu; scope, scale and synergy

Morgan (1997) talks about the new “associative” or “network” paradigm that goes beyond markets and hierarchies to mobilise resources. For Campagni (1995) the concept of innovative milieu developed from successful new industrial regions where district economies and wide synergies gave rise to fast innovation processes. Ritsila (1999) explains that innovative milieu extend the idea of a milieu to concentrate on innovation, representing a convergence of economic geography and innovation studies (Morgan, 1997) which helps to explain uneven development. Indeed, Campagni notes that such elements exist only as potential in lagging regions. Innovative milieu are characterised by an interaction logic

based on cooperation and a learning dynamic where specialisation and a collective learning process couple with a strong sense of identity to produce a strong interactive and synergic atmosphere (Ritsila, 1999). Visser (2009) stresses the openness and connectedness of local areas to the outside world. Milieux have two dimensions; a management structure that reduces transaction costs and, a cognitive dimension (Maillat, 1995) prioritising learning, know how and technical culture. Interestingly, Damanpour's (1991) meta-literature analysis on firm level innovation found associations between innovation and managerial attitude towards change, technical knowledge resources and internal and external communication. This similarity indicates that elements of the milieu concept are also common to firm level culture.

Moulaert and Sekia (2003) note how local business culture varies according to the particular socio-political discourse and the institutional capability of the endogenous institutional dynamics of localities. They talk about scale; nation, region and firm as unit of analysis, asking how far should we reach? Furthermore, organizational culture is influenced by national culture (Gamage, 2006; Avny and Anderson, 2008). Hofstede et al (1990) demonstrated a relationship between national culture values and organizational practices, whilst Lau and Ngo (1996) argue that firms' organizational culture reflects the parent company's home culture. It would seem then that the nature of any innovative culture may be moderated by local influences.

There is some consensus that organizational culture is based on shared principles, "philosophies, ideologies, values, assumptions, expectations, perceptions, norms, sayings, behaviour, heroes, and traditions" (Lau and Ngo, 1996:470). Hofstede et al (1990) argue similarly, but emphasise how "culture" embodies practices. Indeed, some authors consider organizational culture to be a control and exchange mechanism (Jones; 1983, Wilkins and Ouchi, 1983). But Deal (1985) succinctly summarises linking values and practices rather well as - the way we do things around here (Schein, 1992).

Innovation culture

An innovation culture represents an intangible resource that contributes to increased levels of innovation (Higgins and Allstar, 2002). Thus, an innovation culture provides a way of thinking and a way of acting that aids innovation. In contrast, McDermott and O'Dell (2001:77) found that innovative processes had failed because “culture is stronger.” Szulansk (1996) emphasised the benefits of a supportive culture for cooperation. This reduced competition among employees and increased their willingness to share critical information. It appears that a sharing and learning culture is associated with positive knowledge-related outcomes. The leadership role becomes less focused on control and more on facilitating ideas and transforming creativity into innovation. Frohman (1998) suggests that an innovative climate can be maintained by:

- Encouraging horizontal communication by holding frequent meetings.
- Establishing heroes: leaders must respect and credit the people who produce new ideas.
- Encouraging feed-back
- Establishing metrics for learning
- Celebrating mistakes: mistakes must be considered as opportunities to learn.

Nonetheless, extolling such virtues presents a somewhat idealised picture, with numerous normative assertions. It may be useful to examine what the literature has to tell us about actual practices. Weiss and Delbecq (1987) found that culture was characterized by the open, fluid internal organizational environment. Miron et al (2004) found cultural values that supported- a high degree of autonomy, risk taking, tolerance of mistakes and low levels of bureaucracy. Managers talked about their highly cooperative behaviour and how they shared knowledge and insights. Studying high tech Chinese firms, Chow and Liu (2007) found that these companies were characterized by informality, the importance of communication and openness about the transfer of learning and knowledge absorption.

In identifying the firm level qualities and characteristics of an innovative culture, we note a remarkable similarity to a “milieux”, albeit couched at different levels. Equipped with this list of the anticipated qualities as our conceptual framework, we now explain how we addressed our research questions.

Research design and methodology

Our objective was to establish if an innovative culture existed in small Tunisian ICT firms and, if so, to examine the nature and scope. Although the literature guided us, the research question called for an exploratory approach. We were not developing or testing theory, but trying to assess the explanatory power and relevance of existing concepts in a different context. On this basis, we gathered data as case studies. Flyvbjerg (2011) points out that the case studies are “intensive”, in that they comprise more detail, richness, and completeness. Moreover, case studies stress “developmental factors,” and focus on “relation to environment”. Yin (1994) recommends this method when boundaries between phenomenon and context are not clearly evident. To build the case studies we collected detailed background of the national and local environment, the companies, their products and process, these were used to shape and contextualise the interview data. We adopt an exploratory multiple case study approach (Eisenhardt, 1989) but are guided by the propositions discussed earlier as “loose theory”. Markusen (2003) is very critical of what she describes as fuzzy concepts, but we believe that the characteristics identified provide a focus for the enquiry; enabling systematic collection of data (Mintzberg, 1979) but are not deterministic. Moreover this helps to avoid seeing only what we are looking for!

Given the healthy scepticism about *measuring* culture (Dennison and Mishra, 1995; Morgan, 1997), we adopt a phenomenological approach by asking, what is going on here? We sought data about processes and practices, providing individual accounts for within case analysis (Stake, 1995), but also useful for our across case (constant) comparative analysis (Dodd et al, 2013).

Sample

We selected a purposeful sample, “theoretical” cases (Anderson and Smith, 2007) that had the characteristics that interested us. Jack et al (2008) argue that whilst conclusions are not generalizable to a wider population, they may be generalizable at a conceptual level. The cases, Table 1, are small Tunisian high technology companies working in ICT development.

Insert table 1 about here please

Context setting

We collected secondary data from the local administration, executive bodies, press reports, company websites and publicity material to familiarize ourselves with the firms and industry. We then conducted 15 face to face extended interviews; four with the owner/entrepreneurs and 11 with employees.

Interviews

We operationalised our enquiry by asking questions about the organisational culture and asking for examples of practices. Employing an open interview schedule, we asked, for example: *“What happens when a mistake is made?”*; *“What are the most important knowledge resources that you use?”*; *“What happens when an engineer or technician successfully or unsuccessfully applies a new idea or a new software solution?”*; *“Tell us about any collaboration or cooperation”*. Many new questions arose during the interviews, these allowed us to glean details and refine our themes. We now present our cases.

The cases

Offshore Box:

Offshore Box is a software development company specialising in web solutions and software projects. Interestingly, their website advertises their “cultural and geographic proximity”. The entrepreneur (Sami) explained how he prepares a technical study for a new project then passes his recommendations to the technicians to begin the development process. The work atmosphere is characterized by extensive horizontal communication that promotes internal knowledge exchange. Sami does not give detailed instructions, but allows staff autonomy to use their own knowledge and experience. Nonetheless, Sami gets involved with difficult technical problems and suggests solutions or demonstrates new procedures. He explained *“when a technician faces a technical problem, we try to resolve the problem together. I suppose that I have a tendency to assist and provide the right procedures”*.

Sami enthusiastically declared *"I trust them and I really have confidence"*, explaining that showing confidence in his employees encourages them to be more productive and creative. He pays a productivity bonus; offers a sophisticated workplace and even provides attractive accommodation for his workers. *"I try to motivate them by providing privileges, especially when they are working on a tricky project."* New ideas and opinions are welcomed, especially when working on a complicated project. When an employee makes a useful suggestion, the solution is praised. Although Offshore Box has no current partnerships, Sami is creating a cooperation agreement with a foreign partner. The purpose is to share knowledge and to improve the talents, skill and knowledge of the technicians.

Leadership and managerial style in Offshore Box

The leadership style appears broadly cooperative. At the operational level, Sami promotes a climate of confidence and facilitates knowledge exchange. Nevertheless, collaboration appears to be a combination of responsible self-control for the employees and the direct authority of the manager. Sami is convinced that a successful working climate requires balancing self-control with authority to sustain trust and self-reliance for all the team.

Knowledge exchange process

Sami holds meetings to discuss new software solutions, application processes or to resolve technical problems. The style is informal and all offer ideas. To improve the capability and knowledge of the technicians, Offshore Box has developed a knowledge acquisition process based on self-learning. Staff are encouraged to access the electronic platforms of computer system journals. To increase levels of background knowledge, manuals about new software applications and programs are provided. Sami told us, *"I search around to produce a self training process. I acquire professional books, explore new themes about web resolution and new software systems and I have subscriptions to specialized journals"*. He added, *"the technicians are always searching for new programs and new software technologies in open sources as well as specialized web sites, forums and electronic books."* Sami is very proud of the successful software applications derived from these electronic sources.

Employees' perceptions of their working climate:

The team work together on projects but each deals with a specific task. Development consists of several interrelated phases; analysis, development, integration, maintenance and improvement. One employee explained their work sharing as “we have what we can call responsible autonomy but with a little bit of control”. All employees held a similar appreciation of their collaborative style. They share new ideas, knowledge and try to resolve problems together. They believed that this atmosphere supports innovation by promoting a quality oriented culture. Mistakes should be avoided, but mistakes are also opportunities to learn. If a software application is not approved by a client, the team discuss what they could have done differently and how they could do it better next time. One employee said *"The most important thing is to have an idea about the mistake and to avoid repeating it."*

The engineers regularly search for information by accessing open sources of software solutions. We were told how solutions could be found in electronic sources such as the Forum. These sites have techniques and tools for designing, developing and maintaining websites and web-based applications, but team members also send questions and suggestions to these websites. Electronic software journals are also an important knowledge source for new solutions and up-to-date technical information. Overall, considerable effort is made to stimulate talented workers and encourage initiative.

Relationships

Sami explained they have no university collaborations, *"our relationship with the university is restricted to supervising students' final projects"*. Exchange of knowledge and information with the technology parks is rare. However, when Offshore Box was located in the Cyberparc, Sami was occasionally invited to meetings and workshops in El-Gazala Technology Park. He now believes that information flows are restricted to ICT firms located within the Technopole. When discussing peer to peer exchanges, Sami was more positive; he exchanges knowledge with other ICT firms when there is mutual benefit. Moreover, Offshore Box envisages building technological partnership, *"we will cooperate with our competitors if they are able to add something new"*

Ciel Informatique:

Ciel Informatique is a software development company which builds web sites and provides software solutions, specialising in accountancy and stock management. Its market is local and its most important customers are public authorities. Hichem's (the founder) primary role is sales, whilst the engineers and technicians develop the software. Hichem declared satisfaction and confidence about his employees, *"Although I am very satisfied with all the team members output, one is especially talented, so, I very rarely control his work"*.

Leadership and managerial style

Tasks are based on team-work. Hichem usually takes the role of adviser, particularly when working on a complex project, but decision making is shared amongst the team. Hichem emphasised how employee relationships are based on mutual respect. He encourages initiative, promotes new ideas and involves staff in the learning process, *"I give my employees the chance to express themselves and the freedom to test their capability in developing applications"*. Hichem was convinced that cooperation promotes competencies, explaining how employees discuss and share information. He is emphatic that project success is directly related to the extent of coordination and the degree of horizontal communication between employees. Hichem argues that the working atmosphere is characterised by high autonomy with freedom and flexibility.

Knowledge exchange process

Hichem explained that during meetings, all team members can ask questions and make proposals. There is, however, no formalised method for acquiring new knowledge.

Employees' perception of their working climate:

Staff share the view that the working style is team based. Although individuals are responsible for specific tasks, team members help each other; *"Everyone has his specific working field, but we work together too"* (Engineer). There is considerable idea exchange and they believe this is important for developing skills and for the firm's success; *"we cannot progress without exchanging ideas, opinions and points of view"*. A technician reported,

“when one of us faces a technical problem, we all discuss the issue, often through access to open sources, or via the specialized electronic forum where we report our problem.”

Relationships

Hichem reported that he had some informal cooperation with competitors, generally about knowledge transfer. Nevertheless, he wishes that this could develop further. Although sometimes invited to technical seminars or conferences at the Technopole, he regrets that these have a very limited impact. The most useful collaboration is students' final projects, but only for recruitment. Hichem explained: *“we take students preparing their final project and like to recruit the most talented”*. To date, they have recruited one student, but have adopted some of the projects. Hichem also encourages his employees to continue their formal education.

THY Data Center:

THY Data Center is a Gold Certified partner of Microsoft and specialises in the conception and integration of Enterprise Resource Planning software solutions, Microsoft Dynamics AX and Microsoft Dynamics CRM. THY was established as an autonomous subsidiary of a larger Danish software company to capitalise on the high ICT education levels in Tunisia.

Leadership and managerial style:

The leadership style in THY is democratic, but structured. Raouf, the CEO, encourages participation in decision making, team work and cooperation. He has a relaxed way with employees, but controls many activities. Raouf adopts a coaching style when an engineer encounters technical problem, so that mistakes and technical problems become opportunities to learn. *“I let them find a way out of difficulties, but I help them to move forward”*. The general manager stressed how software engineering companies need to foster adaptation and integration into technology development, to the extent that the adaptability of new technologies is more important than the quantity of products. Raouf explained, *“The culture I try to foster is one that adapts to change and makes the team organise itself around a project”*. He tries to show confidence in his employees to encourage them to be more creative and productive.

Working climate:

In spite of the discipline, relationships between colleagues are good-natured with considerable mutual help. Organisation is based around a team-work system "Scroom" to foster creativity. Scroom is a Japanese approach employing daily briefings about goals, achievements, preparation of technical reports, talking about problems, proposing solutions and discussing new ideas and applications. These practices are inspired by the partnership with Microsoft. THY considers employees as the source of its creative ingenuity and success. Everyone is empowered to take initiative in solving problems, coming up with new ideas and improving the organisation. The working climate is flexible, based on management by objectives and team-work system.

Responsibility is enabled by target setting. If achieved, the most creative worker "*will be rewarded by publicity in international software journals, thus generating cachet for his achievement*". Control is, nonetheless, constant. Raouf noted how THY is dependent on Microsoft for technology, knowledge development and strategic decisions. This influence may be mirrored in how employees play sport together and dine together. Raouf is very clear about goals, values and agenda and holds regular meetings about this topic. Capabilities are enhanced by participation in technical workshops organized by Microsoft. The most talented employees are rewarded by international conferences, productivity bonuses and shares in the firm and are seen to be a means of developing technological capabilities. Through the Microsoft link, THY has good access to information about new products and competitors.

Relationships

THY has developed some local relationships, but collaboration with universities and research institutes remains limited. There is some information exchange with competitors and the company is willing to build networks with local ICT firms. THY acknowledges the advantages of access to Microsoft expertise, but laments the small size of the local market and the extensive bureaucracy.

Meca-Precis:

Meca-Precis started out at the Sousse Technopole, but moved in 2005. The firm specialises in tools for 3D computer-aided design. The firm mainly exports to European markets.

Leadership style

Compared to the other cases, the leadership style in Meca-Precis is paternalistic; Moncif, the founder, provides employees with a comfortable working climate. He looks after them well and employees respect their superiors, in part this is explained by being a family firm. Nonetheless the working climate is based on team-work; all employees have to cooperate and share ideas. Mistakes and technical problems are well treated. Moncif believes that employees must develop their own capabilities by learning. He expresses confidence in his staff and encourages responsibility and innovation.

Working climate and knowledge exchange process

Meca-Precis is team-based with widespread cooperation, extensive informal communication and coordination. Moncif believes that everyone contributes to the production process and take part in technical decisions. Team agreement is the key factor of firm innovation. *“Whilst we work as a team, we give workers the chance to develop their own models... When a mistake is made everyone treats this as a learning opportunity”*. New ideas are honoured.

The firm has limited technological and financial resources, but everyone does their best to innovate and develop new products. Learning is by idea exchange, especially with the highly qualified developers and by access to open sources. The company has international technical cooperation with tool makers in Germany and developers regularly visit. This collaboration has opened up opportunities for resource sharing and access to new markets.

Relationships

Moncif is dissatisfied with the extent of collaboration. He has never been invited to workshops but believes that interaction between all the high tech milieu components is necessary. He argues that in Sousse *“the Technopole was simply to get a room, we had no*

technological support". After leaving the Technopole, Meca-Precis wanted to become more innovative, but lacked the financial and technological resources to access R&D.

Like the other companies, Meca-Precis has a very limited relationship with universities, essentially student projects. Nonetheless, Moncif desires cooperation with competitors to improve their innovative capacity and to access knowledge.

Findings and discussion

We first address the preliminary research question about the existence of an innovation culture in the small firms. We found that in terms of the indicators in the literature all of our cases practiced an innovation culture, but one which has specific features. We found that horizontal communication was well established, importantly in terms of sharing knowledge, but also upward communication of ideas. In each case, mistakes were accepted as part of the game and were used as experiential learning. Management is by co-ordination, not authoritarian and focused on facilitation rather than control. We noted that THY was more structured, but the structure was enabling rather than constrictive. In all firms, work allocation emphasized responsibility with self reliance, but with some variation in freedom and autonomy. Nonetheless, the team took responsibility for successful completion, but individuals were rewarded for effort and success. These innovative processes combine with the specific local advantages of a highly skilled workforce and low costs to produce an innovative culture.

Learning was encouraged, but in our analysis we became very aware of the limited channels for learning. We felt that that the systems of learning shed some light on questions about the nature, scale and scope of the environment. Table 2 attempts to summarise "learning" in our cases.

Insert Table 2 about here please

There is evidence of a learning environment within the firms and a good fit with the idea of an innovative culture. Internal knowledge sharing is evident in all the companies. However, we note how learning from others operates in very narrow channels and there is no evidence of learning with others. There is limited evidence of what Visser (2009:168) call the non-local aspect, the “global pipeline”. Moreover, all companies, save THY, are highly dependent on knowledge in the public domain. Hence the scope for tapping into external tacit knowledge seems shaped by their limited external linkages. Only Meca-Precis has much opportunity for collaborative learning and the development of new knowledge. THY is an interesting case. On one hand they have access to a wider range of material, but on the other, their relationship with Microsoft determines their scope for innovative processes and products. We note how they emphasized new applications, adaptability, for existing software. In general, there was a lack of social connectedness of people in networks (Breschi and Lissoni, 2001).

The typical nodes for knowledge exchange and development, universities and the Technopole, are neglected because they don't seem to function as knowledge exchange forums. As Cooke (1985) had pointed out, mere presence is not enough. In many ways this illustrates Visser's (2009) critical point that clusters, in the sense of geographic proximity, are not the same as active networks. Moreover, information generally only flows one way, with limited giving of knowledge by any of the firms. We saw few examples of informal exchange or of untraded interdependencies. Where knowledge exchange or interaction was sought, the rational appears to be transactional. The entrepreneurs talked about collaboration, but only if there was obvious direct benefit for them. We note too how they focus on problems and learn from codified knowledge derived from the technical arena.

This seems to have implications for the scope, both potential and realised, for a creative dynamic where tacit and codified knowledge combine (Becattini and Rullani 1996). In particular the potential for innovation, the application of new knowledge, is reduced. As Casson (1990) puts it, imitation rather than innovation prevails. Moreover, Malecki (2000) points out how the ubiquity of codified knowledge drains it of competitive advantage. Thus content, scale, scope and style of learning are constrained; restricted because the firms' innovation culture faces inwards.

This notion of facing inwards drew our attention to what seemed to be missing in the range of innovation culture. We noted the lack of fora, formal or informal, for knowledge or even social interaction and exchange (Morrison, 2008). Thus there was no collective learning, no spillover and thus no opportunity to combine local tacit knowledges; what Malecki (2000) describes as the knowledge that “is in the air” and Andersson (1985) called free flowing knowledge. We note too, the negligible investment in time and finance for both social capital and collective learning. It seems that if culture faces inwards, opportunities to scale up are lost.

Conclusions

Standing back from the detail of the findings, we want to consider what all this means for the scale and scope of innovation culture in Tunisia and for developing regions more generally. The concept of an innovative culture, like its conceptual bedfellows, clusters and milieux have a number of dimensions. Nonetheless, at a firm level of analysis, we found that culture appears to be relatively disconnected from other dimensions. From our analysis some explanatory themes emerged.

Independence and isolation

Andersson (1985) had argued that creative regions became creative because of their links to other places and because they were centres of communication. Similarly, Becattini and Rullani (1996) see the district (or milieu, Morgan, 1997) as a system of local interaction and external connectedness. These interactive elements are missing in our cases because of the disconnectedness of the Tunisian firms. Obviously some conduits exist, but they are narrow with restricted and primarily inward flows. Interaction was instrumental, functional and transactional. Thus they lacked any of the “local-buzz” caused by being there (Asheim et al, 2009). Furthermore, we saw no investment in social capital, or indeed even an awareness of the utility of social capital. This leads us to argue that interactive processes are defensive, working to maintain a local competitive advantage. When firms reached outside their boundaries they did so in search of advantage. If this is the case, the social climate becomes sterile rather than munificent. Instrumentality squeezes out the potential for rich interdependences. There is no first mover advantage in being the first to be vulnerable to

exploitation of altruistic sharing. Firm boundaries absorb and deflect rather than enhance the connectedness (Anderson et al, 2012) that could magnify know what and know how.

Structure may also contribute to this poverty of interaction. We were struck by how often we were told about the “burdens of bureaucracy” (and accountability) in public administration and how this inhibits fertile exchanges and discourages involvement. We were also told how universities, even the Technopole, seemed out of tune with the pace of ICT activities. We may be seeing the consequences of a restricted functionalism, as these institutions pursue their own objectives and in so doing become remote from others. So the unintended consequence of attitudes and practices in public bodies may produce a structural level of disconnection that inhibits a regional innovative milieu.

The socialization of knowledge and learning

A critical characteristic of innovation culture is the socialization of knowledge. We noted this process within the case firms. But on a wider scale, the literature demonstrates how the flux of tacit and codified knowledge (Dodd et al, 2010) recombines in such a way as to amplify benefits (Anderson et al, 2007) as streams of different types of knowledge converge in social networks where that are deployed for innovation (Hardwick et al, 2013). This process, connecting and deploying is founded in complex webs that rely on social contacts (Malecki, 2000). It is intensely social, but this external socialization of knowledge is missing in Tunisia.

Finally, there is potential for extending innovation culture from this firm level, inward facing, culture to one that engages in the wider flows of knowledge and opportunity. The firm owners were well aware of possibilities, and some had tentatively begun reaching beyond their own boundaries. Ironically, it seems that the practices associated with local competitive advantage have worked to constrain the forging of connections. The firms are islands in a socially barren sea, but this sea could become fertilized by social capital. As Malecki (1994) proposed some 15 years ago, institutions cannot create contacts, or indeed socialize knowledge. They can however facilitate connections by making space and creating events that bring people together. In the Tunisian case, and in other developing countries, some sense of common purpose might catalyze productive interactions.

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Table 1. The case companies

	Offshore Box	Ciel Informatique	THY Data Centre	Meca-Precis
Location in Tunisia	Cyberparc, Monastir	Sousse	Sousse	Sousse
Company formed	2004	1997	2003	2001
Number of staff	4	4	6	8
	Entrepreneur	Entrepreneur	Entrepreneur	Entrepreneur
	3 technicians	1 developer	4 developers	2 developers
		2 technicians	1 technician	5 technicians
Products	Web design, software development, integration	web site creation and software solutions	E-learning: Enterprise Resource Planning and software programmes	Tools 3D and software programmes
Export Markets	France	National only	Europe	Europe

Table 2. Learning and Knowledge

	Process- Sources	Process- Methods	Practices-	Content and scope
Offshore Box	Journals, books, open sources and forums; occasional firm level exchanges	Problem sharing internally and seeking solutions externally	Knowledge and idea sharing; collective and team based but led by entrepreneur; “self training”	Technical, Problem solving. Codified, explicit knowledge; existing knowledge
Ciel Informati que	Open sources, electronic forum; rare inter firm exchange	No formal method, ad hoc sharing	Internal problem sharing	Technical and problem based. existing knowledge
THY Data Centre	Employees and Microsoft. Some local interaction	Heavily influenced by Microsoft link	Structured internal collaborations modeled on Microsoft	Transfer of existing knowledge, some may be more tacit
Meca- Precis	Open sources and one international Collaborator	Internal idea exchange and increasingly with one collaborator	Largely dependent on internal expertise	Transfer of existing knowledge but some implicit exchange with partner.

