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Next generation entrepreneur: innovation strategy through Web 2.0 technologies in SMEs

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This essay studies the diffusion/adoption of Web 2.0 technologies in small and medium sized enterprises (SMEs)' innovation strategies and particularly in research, development, design and other innovation activities. It looks at the effects of these technologies on the evolution and the dynamics of firm's innovation capabilities and the implications of entrepreneurial turnover on the adoption of said technologies. The study is based on original fieldwork with some 130 SMEs. The author finds that a consistent share of SMEs is actively trying to fill the knowledge gap and integrate Web 2.0 technologies in their innovation strategies. SMEs are managing this integration by progressively adjusting their behaviour in reaction to the opportunities offered by the technology and balancing the dependence of the business from the web. Barriers to the adoption of such technologies are also discussed.

Keywords: SMEs; R&D and innovation; Web 2.0 technologies; Web 2.0 innovation strategy; collaborative innovation; digital natives

1. Introduction

The changing nature of innovation – embedded ever steeper in scientific and technological knowledge – and its increasing pace – shortening of the time to market and turnover of new products and services – have put businesses in a position whereby they cannot anymore sustain the continuous level of investment necessary to generate, internalise and translate knowledge into a continuous stream of new products and services. Tapping in a wider-than-the-company's pool of knowledge, ideas and, generally, brain power has become a mantra in the last few decades so that open innovation strategies (Chesbrough 2003; Gassmann, Enkel, and Chesbrough 2010), outsourcing (Hagedoorn 2002; Howells, Gagliardi, and Malik 2008) or offshoring (Manning 2008; Lewin, Massini, and Peeters 2009), collaborations and networks (Tether 2002; Leiponen and Byma 2009) are seen as the 'Holy Grail' of a fast and effective – yet not risk-free – innovation strategy. A role of catalyst of innovation has been somehow assigned to a family of technologies known as Web 2.0. These have been put forward as a new technological platform or support structure onto which reorganise innovation activities (in the sense of Consoli and Patrucco 2008). As a consequence,

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Information and Communication Technology (ICT)-based platforms have begun to emerge and are currently developing in this direction, although smooth progresses are only occasionally confirmed.¹

Studies on the diffusion of ICT in the organisation's information system and eventually its integration in the business process and practices have shown crucial aspects pertinent to the adoption of Web 2.0 technologies (Markus 2004; Adebajo and Michaelides 2010; Wirtz, Schilke, and Ullrich 2010). The thesis brought forward is that the adoption of Web 2.0 technologies and the change in management practices are contextual and dependent on the commitment of resources available to the firm, its capabilities in managing the change and the behaviour of entrepreneurs towards the technology. The aim of the essay is to investigate how innovative entrepreneurs manage their ICT strategy; in particular, the integration of Web 2.0 in the company and how the drive to innovate and the entrepreneurial evolutionary trends contribute to Web 2.0 technologies adoption dynamics. The unit of analysis is the SME; more precisely those higher value functions of research, development, design and innovation (RDD&I) activities having strong implications on business' capability creation. The approach is that of considering the two aspects of the same phenomenon as complementary elements of the same co-evolutionary dynamics; these are the adoption of Web 2.0 technologies and the emergence of a 'next generation' of entrepreneurs operating in SMEs 2.0.

The essay is organised as follows. Section 2 provides a definition of Web 2.0 and presents a brief excursus of the factors that made possible the emergence of Web 2.0 and its state of adoption by businesses. This is followed by the articulation of the concepts related to Enterprise 2.0 and its characteristics and concludes with the introduction of the next generation of entrepreneurs belonging to the digital native generation. In Section 3 is described the methodology implemented in conducting the research work, while Section 4 presents the results of the fieldwork. Finally, the essay concludes with a discussion of the findings and highlights the areas where further research on the subject is needed.

2. Web 2.0 and the pervasiveness of Web 2.0 technologies in the firm's environment

'Web 2.0' was coined by O'Reilly and the related features have been discussed in a series of conferences the first of which was in 2004. The definition of this family of technologies is continually expanding in scope and scale in order to accommodate newer trends and functionalities (O'Reilly 2005, 2007). Nonetheless, Web 2.0 can be defined by its characteristics. It is a web-based technological platform that:

- (1) is set out to harness collective intelligence;
- (2) has, as core competence, operations and not hardware/software;
- (3) employs lightweight programming techniques and
- (4) has multiplatform functionalities.

For a definition of Web 2.0 that is more engaged with the process of social digitisation, Beer and Burrows (2007) talk of 'a cluster of contemporary networked technologies' wherein users and contributors take shared responsibilities of the generation and accumulation of knowledge. The technology can be represented by a set of dynamic matrices of information through which people interact actively with other users and contributors in creating, mashing up, cataloguing (tagging) and using the content generated. Moreover, Rosen and Nelson (2008) highlight a further important trend: online communities creating around specific content.

For the purposes of this essay, Web 2.0 can be thought of as a web-based technological platform constituting an integrated space where software applications, user-generated content and web services are co-produced and available to the final user (Thomas and Sheth 2011). The technology includes collaborative platforms, social and professional networking sites, integrated databases, rating/voting systems, blogging and rich site summary (RSS) features and wikis.

This new industry set-up and the affirmation of Web 2.0 technological paradigm has brought on the scene and fostered to success concepts like software as a service (Turner, Budgen, and Brereton 2003), floating licenses, mash-ups (Weiss and Gangadharan 2010) and cloud computing (Buyya et al. 2009) that are not only expression of Web 2.0 paradigm, but represent a nexus where innovation in information and communication technologies and the service-oriented vision of such technologies become indistinguishable and the application to other industrial settings is only limited by the imagination (Blum, Magedanz, and Stein 2007; Blinn et al. 2009). Empirical evidence of this last point is the diffusion of Web 2.0 in the medical and healthcare sector (Giustini 2006) or in government – eGovernment (Mergel, Schweik, and Fountain 2009; European Commission, Directorate General INFSO 2010).

Many large-scale surveys have probed into the adoption of Web 2.0 technologies in corporations around the world publishing interesting results. In particular, Bughin and Manyika (2007), Bughin and Chui (2010) and Bughin, Byers, and Chui (2011) conducted large-scale surveys focusing on firms' Web 2.0 investments and the degree to which these investments have been advantageous to the firm. The surveys inquire into the trends in Web 2.0 technologies adoption, their current and future use and include extended discussions on incentives and barriers to adoption as well as how these investments are changing the organisation and the performance of large companies.

In brief, these surveys show that the diffusion of Web 2.0 technologies is driven by companies operating in ICT-related sectors pointing out that investments in these technologies are growing at increasing rates in non-ICT related sectors. Also, Web 2.0 mediated collaborations are progressively seen as a channel to integrate innovative activities. However, before these technologies can be part of the core of companies' innovation activities' routines, more steps are necessary: the surveys show that the adoption process continues to be mainly bottom-up and ring-fenced within companies' functions with the consequence that the number of fully networked organisations is still limited and the returns to 'full networking' are slim.

However advanced is the understanding of Web 2.0 diffusion in larger firms, the analysis of the same phenomenon in SMEs is still uncharted.² The dominant narrative is that SMEs have relatively limited financial means to invest in the process and the pool of human resources upon which build a Web 2.0 business strategy is restricted to a fraction of an already low number of employees limiting the scope for internal networking and leaving only the route to collaborative networking external to firm. On the other hand, the characteristics of Web 2.0 technologies – described as easily affordable, flexible and effectively specialised – would not cut off SMEs from the trend.

2.1. *The pervasiveness of Web 2.0 technologies: Enterprise 2.0*

With the diffusion of digital technologies and their ever increasing pervasiveness in the every-day life, many researchers, academics and practitioners have taken an interest in understanding how doing business is evolving and what are the consequences for the firm (Gilchrist 2007; Wirtz, Schilke, and Ullrich 2010; Wijaya et al. 2011). In addition, interest is shown in whether the digital native generation has, or it is bound to have, an impact on the ways business is conducted and how and to what extent Web 2.0 will be incorporated into business

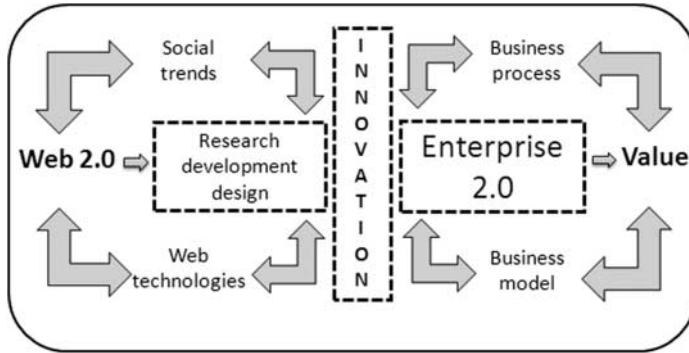


Figure 1. Added value creation in Enterprise 2.0.
 Source: Own elaboration on Stocker et al. (2007, 88).

processes and plans (Hodgkinson 2007; Mason, Barzilai-Nahon, and Lou 2008; Lindermann et al. 2009).

Wirtz, Schilke, and Ullrich (2010) among others highlight how the business models of firms adapt and evolve driven by the application of new ICTs and also how the firms' strategies can be tuned or redesigned following the deployment of such technologies in order to add value for the customers through marketing (i.e. targeted marketing), in building and developing customers care and relations with suppliers. This approach draws attention to the strategic dimension rather than the intrinsic characteristics of the company. The strategic aspects of deploying Web 2.0 technologies do not account for the characteristics of small- and medium-sized firms whose activities are not rooted in the ICT sector. In fact, what defines Enterprise 2.0 is a host of factors rooted deeper in the economics of innovative firms and the modelling of a successful business strategy able to capitalise on the evolution of the underlying technological platform upon which it is likely to be based. Stocker et al. (2007) provide a clear and concise definition of what a Web 2.0 company means: '[Enterprise 2.0] can be defined as transformation of the social and technological aspects of the new internet into business, leading to a redesign of existing business processes or even to an evolution of new business models' (88).

Adapted from Stocker et al. (2007, 88), we can summarise this conceptualisation in Figure 1.

While the approach to designing the new business strategy leverages both the social and the technological aspects of Web 2.0, the business processes and the business models behind the enterprise draw concurrently from the social aspects of Web 2.0 technological framework and from the firm's own resources and capabilities (McAfee 2009). In particular, recurring to networking technologies to improve on the efficiency and effectiveness of carrying out RDD&I – reaching out to new markets, new sources of knowledge, the design and introduction of new production techniques, innovative products and services – means that the firm needs to re-think its innovation activities to operating in a system of relations that integrates internal capabilities with resources that are scattered outside the boundaries of the firm (Wijaya et al. 2011).

The first hypothesis we are examining is that the realisation of the innovation strategy – based on harnessing the benefits of Web 2.0 – relies on the involvement of a growing number of collaborators including customers, suppliers, consultants, the general public of potential customers or even competitors in the RDD&I activities. These participate to the creation and the development of new social knowledge which, though does not carry an immediate monetary value, bears a great economic value for the company. This process increases significantly the possibilities available to

the entrepreneur in harnessing the collective intelligence and boost RDD&I outcome at a limited cost (Surowiecki 2005; Brabham 2008).

2.2. Next generation entrepreneurs: digital natives and Enterprise 2.0

The second hypothesis explored is that SMEs will gradually base their innovation strategies on Web 2.0 technologies due to the generational turnover of entrepreneurs (Down and Reveley 2004). Here we are investigating the proposition that the adoption of such technologies is driven by newcomer entrepreneurs belonging to the digital natives’ generation (Figure 2).

Who are the digital natives and why are they important for innovation?

Prensky (2001) coined the phrase ‘digital natives’ identifying the natives as those born in or after 1980s and grown up in a digitised environment. His subsequent research highlights how digital natives developed out of intensive and pervasive use of digital technologies changing their learning patterns which become interlinked with the technologies used (Prensky 2008).

The hype around digital natives, aka Net generation or generation Y, has produced only a limited number of academic studies inquiring into its implications for the next generation of entrepreneurs and the organisation of business (Mason, Barzilai-Nahon, and Lou 2008). In particular, the characteristics of the digital natives are not only limited to their proficiency in the use of digital technologies but have repercussions on the performance on the workplace and on the organisation of work. In this respect, Mason, Barzilai-Nahon, and Lou (2008) highlight characteristics of digital natives that have a knock-on effect on the organisation of work and on the innovation effort; these can be traced back to high propensity to act collaboratively, with a proclivity to explore ideas and intuitions from sources other than the company’s. According to Bennett, Maton, and Kervin (2008), the Net generation is still not involved in the sharing or in the collective generation of knowledge as the conceptualisation is suggesting. Nonetheless, digital natives’ use of Web

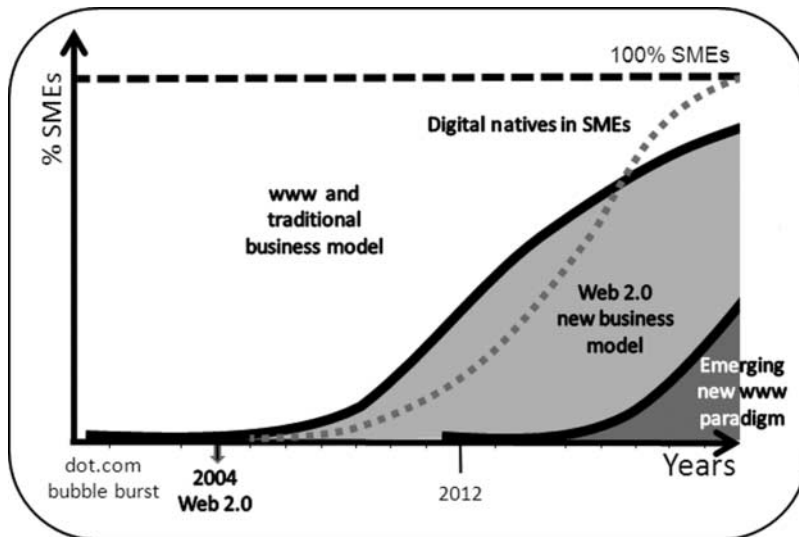


Figure 2. Diffusion of Web 2.0 technologies and the rise of the digital natives.

Source: Own elaboration based on the hypotheses of (1) logistic growth of Web 2.0 adoption and (2) demographic turnover of entrepreneurs.

2.0 technologies is growing exponentially yet their applications are limited to tasks and scope oriented functions (professional networks, wikis, blackboards, Google and other database search) and/or for entertainment (social networks, media application and sharing platforms).

3. Methodology and description of the sample

The methodology adopted in this explorative enquiry centres on the pillars of capabilities, resource commitment and behaviour of SMEs with respect to Web 2.0 technologies. Dictated by the characteristics of the unit of research – SMEs consisting in some 99.8% of the total number of companies in the EU – and the objectives of the study, the methodology employed is necessarily composite. It includes a structured survey, two workshops and separate one-to-one interviews with innovative SMEs (Meredith 1998; Voss, Tskiriktsis, and Frohlich 2002; Yin 2003; Eisenhardt and Graebner 2007).

Given the average size of the organisations, the figure of the entrepreneur has been identified with the executive team; research and development activities have been defined accordingly to Organization for Economic Co-operation and Development (2002) and design activities have been added to the set of innovation activities for the importance they have in the innovation process of the SMEs. For the purpose of this study, innovation has been defined according to the Community Innovation Survey meaning that innovation is considered as product, service and process innovation as well as innovation new to the market and/or new to the firm.

The survey was deployed in order to understand key quantitative and qualitative variables linked to firm's capabilities and resource commitment: the employee base, the propensity to collaborate and their innovation performance. Information on decision-making practices followed in setting up, manage and internalise the results of collaborations, and the resources employed in the adoption and uses of Web 2.0 technologies were also collected through the survey. Finally, the questionnaire looked at collecting information on strategy setting and planning activities, enquiring into the time horizon of business strategies, motivations and practices. The survey was administered online; invitations were sent by SME associations to their more innovative associates in France, Italy, Poland and Spain in the period between September and November 2010; 85 completed questionnaires were returned.

The workshops were set up with the aim of gaining necessary understanding into behavioural routines linked to the capabilities of the firms. Particular regard was given to companies' policy in the use of Web 2.0 tools to facilitate and/or mediate collaborative activities. We focused on eliciting information on the companies' perceived value of professional and social networking tools in the area of decision-making/strategy-setting, creative input into the company's process and for new product/service development. The workshops are also used in order to gain a better understanding of the behavioural aspects of SMEs towards the use and application of Web 2.0 technologies within the companies and their integration in the day-to-day activities. The workshops were carried out in Poland on 10 September 2010 and in France on 15 September 2010. The attendance to the workshops has been as follows: Poland: 32 representatives of 24 organisations; France: 20 representatives of 13 organisations. The same proforma was used in both workshops.

Further interviews were carried out independently with a restricted group of innovative companies (i.e. companies that had successfully introduced at least one innovative product, service or process in the three years previous to the interview) in order to discuss the findings of the previous phases and validate the narrative emerging from the study. The interviews were carried out with SMEs in Belgium (2), France (1), Italy (4) and the UK (6) in the period between December 2010 and May 2011.

The survey, workshops and interviews elicited information from 150 executives representing some 130 SMEs and constitute the basis for the case-study analysis.

4. Findings

The 85 questionnaires returned comprise companies operating in 14 sectors of economic activities spanning manufacturing, high-technology industries, health and education, media, marketing and financial, insurance and other services; 25% of the companies declared of being engaged also in a secondary activity (predominantly in the service sectors).

The respondents are mostly executives of the company with the exception of one senior administrator and one respondent by proxy (personal assistant to the CEO). Of the 83 executives, 64 are either CEO or managing directors; the remaining are departmental executives including production, R&D, knowledge management, business development, marketing and creative executives.

The companies of the sample are classified against the fourth Community Innovation Survey in order to discern their involvement in RDD&I activities and categorise their performance in terms of RDD&I intensiveness. In fact, some 80% of the companies surveyed carry out RDD&I activities against 51% of the 2008 Community Innovation Survey (CIS) sample. These data allow us label the surveyed companies as *heavily involved in innovation activities* (Table 1).

The average size of the companies in the sample was 28 employees in 2009. The same sample shows growth in the employment during the period 2006–2009 (about three staff unit) bucking the downward trend of European SMEs in the same period.

Companies’ effort on RDD&I activities is calculated as a share of the employees involved in such activities. The sample shows that 15.2% of the companies’ R&D budget is invested in collaborative RDD&I activities in 2009 while four years earlier it was just 9.6%. Also, at least 13.36% of the staff employed is involved in RDD&I activities and the trend is ascendant compared to some 9% in 2006. This datum confirms that, given the limited number of RDD&I employees, mediated collaborative innovation activities are necessarily outward-bound (Table 2).

Innovation activities are equally distributed along products, services and processes; also, concerning the introduction of novel and new to the firm innovation, the companies are highly

Table 1. Employment, resources and collaboration in RRD&I.

	Employees 2006	Employees 2009	% RDD&I employees 2006	% RDD&I employees 2009	% RDD&I collaborations 2006	% RDD&I collaborations 2009
Mean	25.27	28.01	8.97	13.36	9.59	15.2
SD	57.43	51.05	19.72	23.27	18.75	23.60

Table 2. Type of innovations in the period 2008–2010.

	Products new to market	Products new to firm	Services new to market	Services new to firm	Processes new to market	Processes new to firm
Mean	0.435	0.376	0.329	0.494	0.259	0.412
SD	0.499	0.487	0.473	0.503	0.441	0.495

Table 3. Pearson's correlation between size of the companies, commitment to RDD&I and collaborations.

	1	2	3
Employed_2009 (1)	1		
Share of RDD&I employees 2009 (2)	-0.049	1	
% RDD&I collaboration_2009 (3)	-0.004	0.378**	1

**Correlation is significant at the 0.01 level (two-tailed).

innovative: on average, some 40% of the companies produced some form of innovation and, to a similar extent, successfully introduced it to the market. Companies have been on average innovative in novel innovation in product, services and processes in the 43%, 33% and 26% of cases, respectively; while new to the firm innovation has registered 38% (in products), 49% (in services) and 41% (in processes). This datum refers to innovations introduced by the firm in the period 2008–2010.

The firms were asked what percentage of their sales derives directly from these innovations. For the majority, innovations contributed only less than 20% to their sales. However, at a more disaggregate level, the contribution of new to the market products and services has been of 50% or more of the total turnover for a large minority of firms.

Before probing into the collaborative innovation practices, we have asked the respondents to address the most important collaborative project and justify the choice. This assures that the study is able to capture issues at the forefront of the companies' innovation boundaries. The respondents have attributed a higher degree of importance to forward looking and strategic collaborative innovation projects. The average propensity to collaborate of the companies was of about 50%.

In order to characterise the companies involved in collaborations, Table 3 reports over simple associations drawn between the size of the companies (number of employees in 2009) and their effort on RDD&I (measured as a share of employees engaged in RDD&I activities in 2009). Also, size of the companies and their RDD&I effort are measured up against the percentage of the RDD&I budget spent on collaborative venture in the same year.

The only statistically significant correlation is between the RDD&I effort of companies and the percentage of RDD&I collaborations, showing how companies employing a higher percentage of their workforce on RDD&I are more likely to be engaged in collaborative venture – independently by the size (χ^2 test also confirm such independence).

Moreover, there is a statistically significant association between these companies and their innovation performance.

Table 4 shows how companies with a higher commitment on RDD&I and collaborative ventures achieve consistently higher degree of novel innovation (products and services new to market) and are more likely to introduces changes in management and in the production processes (new to the firm).

Probing deeper in the relations between the use of Web 2.0 technologies and innovativeness, some correlation between the employment of Web 2.0 management tools and the absolute size of the company was found. In fact, larger and more innovative companies tend to use Web 2.0 technologies more than their smaller counterparts (Spearman's Rho = 0.44 and statistically significant at 1%). Similar results, yet less statistically significant, were obtained for traditional and Web 2.0-based tools (Spearman's Rho = 0.42 and statistically significant at 5%).

Table 4. Spearman’s rho correlation between RDD&I effort and innovation performance.

	1	2	3	4	5	6
% RDD&I collaboration (1)	1					
Share of RDDI employees (2)	0.456**	1				
Products new to market (3)	0.331**	0.411**	1			
Products new to firm (4)	0.132	0.213	0.444**	1		
Processes new to market (5)	0.286*	0.047	0.348**	-0.016	1	
Processes new to firm (6)	0.335**	0.336**	0.278*	0.287**	0.379**	1

**Correlation is significant at the .01 level (two-tailed).

*Correlation is significant at the .05 level (two-tailed).

4.1. Collaboration decisions and the use of Web 2.0 technologies

In analysing the decision-making process in collaborative ventures at the phases of initiation, leading/managing the activities and integrating the outcome, we found that, in the majority of cases, the decisions are taken at the highest level of the company hierarchy. Usually, RDD&I collaborations are initiated by the CEO and led/managed by a senior manager. The outcome is then integrated within the company’s processes by a senior employee with recognised specialist expertise. Only in 4% of the cases any such decisions are undertaken by an external expert.

Communication between the company and its external collaborators happens in the overwhelmingly majority of cases directly and without the intermediation of third parties – consultants or other intermediaries. The preferred way of working with partners is ‘in remote’ with frequent face-to-face meetings (21%). Internet-mediated communication procedures are used in about 15% of cases and email communication is still the preferred method. Exploring further on the means of communication, Web 2.0 technologies and emails are the means of choice for communicating between partners only for discussing preliminary results or updates on the current state/development of the collaborative project.

The phases of initiation, management and evaluation of collaborations are carried out exclusively through a Web 2.0 platform, or mediated through other Web 2.0 technologies only in less than 6% of the cases.

4.2. Digital natives, company’s innovativeness and the use of Web 2.0 technologies

The average age of the executives is quite high (41–45 years of age), and the distribution is rather skewed towards the highest interval of 50+; only a fraction (some 8%) is 30 years of age or under – belonging to the digital natives generation.

The association between the age of the executives of the companies and the innovation activities performed by the companies shows some weak correlation with the introduction of process innovation new to the firm, that is: the younger the executive, the higher the chances of introducing process innovation new to the firm (0.236 at 5% significance). Correlation between the age of the respondents, other indicators of innovativeness and the use of Web 2.0 technologies are recorded; however, their level of significance is too low to assume that the associations are not due to chance only. For this reason, the enquiry is taken further into analysing SMEs’ policies on the use of Web 2.0 technologies, their strategic approach and the barriers to the use of such technologies in their collaborative ventures.

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4.3. *SMEs behaviour towards Web 2.0 technologies and collaborative innovation*

From the workshops held emerged that the majority of companies involved had an implicit policy towards the use of Web 2.0 technologies. Though most companies declared that no policy was in place, answers like: ‘employees are allowed but not encouraged’; ‘only the management is allowed to access external Web 2.0 portals’ and ‘some tools are internal to the company’ were the most frequent qualifications offered to the probing signifying that, after all, even if only implicitly, policies on the use of Web 2.0 technologies were in place. With particular regard to the RDD&I functions of the company, employees’ use of Web 2.0 technologies for about 10–15% of their time were considered inadequate. Ideally, RDD&I staff involved in collaborative projects should spend up to 40% of their time in order to optimise research and networking activities.

However, it appears interesting that, though Web 2.0 technologies are commonly used, their integration into decision-making, strategic planning, creative activities and design are left to individuals. Relying on these technologies to inform decision-making in one of the highest value functions of companies is seen with a certain caution: the introduction of networking tools is mostly gradual, based on a heuristic process, and before becoming common practice, Web 2.0 technologies co-exist within the company’s standard routines.

To qualify further, many internet-based tools are commonly used in the day-to-day operations. These tools, though classifiable as Web 2.0 technologies, are mainly used in support of well-defined company’s procedures. These are internal fora and communication tools that are kept ring-fenced due to data security or confidentiality concerns. In fact in many companies there are procedures in place to limit or monitor ‘public’ fora and relations with external partners carried out by the staff. Project management tools, VoIP and shared repositories are also used but the principle that to each application corresponds one ‘stand-alone’ tool is generally applied even though the tool in question might be part of a wider Web 2.0 platform.

Networked and fully integrated Web 2.0 tools are in most cases cause for concern. While it also emerged a particular interest in Web 2.0 technologies, particularly those integrated on dedicated innovation/collaboration platforms, such interest seems to translate into a timid attempt at joining in. This aspect can be summarised by the following quote: ‘we are very interested in [using] such tools as they clearly offer potential benefits, but we are currently not equipped to fully exploit the potential or manage the processes’.

The participants have highlighted that they are ill-equipped in many aspects of the innovation process: while innovation in large companies spurs from heavy investments in infrastructure, resources such as capabilities, time and dedicated personnel, in SMEs innovation usually happens as ‘a smart way to solve problems’. In this particular case, there is a certain degree of uncertainty to whether the outcome might have longer term effects on the firm’s performance and to what the strategy for capitalising on this might entail.

There is widespread concern among SMEs involving the nature of innovation through Web 2.0. The main barriers to adoption and integration of these technologies in their RDD&I activities are linked to Intellectual Property Rights (IPR) issues. In particular, the main SMEs’ concern is the potential predatory behaviour of larger companies during interactions with SMEs.

Nonetheless, most SMEs have spotted, and reported of, a potential source of advantages in adopting Web 2.0. In fact, the networking capacity provided by Web 2.0 technologies increases products and services potential value added by providing a springboard to the firms so that wider markets can be reached at a relatively lower cost.

5. Discussion and conclusions

Two hypotheses for the realisation of the business's 'innovation strategy 2.0' have been analysed in this work. The first looks at SMEs and how they fare in reaping the benefits of Web 2.0 technologies and the second looks at how entrepreneurs gradually base their innovation strategies on Web 2.0 technologies as the generational turnover progressed and increasingly more digital natives take on enterprise.

The use of Web 2.0 technologies for collective knowledge-harnessing and crowd-sourcing does not yet have a determinant role to play in the SMEs' innovation strategies as both business processes and plans rely on more traditional management and organisational forms. However, SMEs evolution to a next generation of SMEs 2.0 is playing out in the background gaining increasingly important portions of innovation activities.

From the study emerges that SMEs are more innovative when they commit more resources to RDD&I activities in terms of monetary investments and staff dedication and the effort to innovate is carried out collaboratively with external partners. Nothing new here; however, the adoption of Web 2.0 technologies as networking and collaboration tools used for extending scale and scope of RDD&I collaborative ventures is recognised to have positive effects on enhancing the innovation potential by increasing benefits from collaborations beyond the 1-to-1 or 1-to-few model of relationships. The employment of Web 2.0 technologies opens up a model of relationship of the type 1-to-many, where here 'many' implies a number of potential collaborators that could hardly be reached by personal and un-mediated relationships. This is in fact the case of larger and more innovative SMEs employing more extensively Web 2.0 technologies.

Regarding the effect of the age of the entrepreneurs on the adoption of Web 2.0 technologies: these technologies can have higher chances of being integrated in the RDD&I activities the younger the management team, though the process is still at its inception and the number of entrepreneurs belonging to the digital native generation is still relatively low.

What also emerges from the study is that SMEs not operating in the ICT sector have to come face to face with a growing web-based and non-co-located architecture which not only is distributed but provides non-specific feature applications and tools to the core business activities. Of the several approaches to the introduction of Web 2.0 technologies besides the grass-root early adoption and pilot, the strategy followed by entrepreneurs is such that the starting costs are kept to the lowest and the potential cognitive loss from integrating them in new routines within the company is limited to the employees introducing the technology.

In other words, Web 2.0 technologies cannot be seamlessly and promptly integrated in the business strategy: integrating Web 2.0 technologies within RDD&I activities means that the design of new innovation strategies able to enhance the current processes and routines becomes intrinsically linked with the technology.

Barriers to the adoption of Web 2.0 technologies are very much presents and effective in delaying or steering Web 2.0 implementations in SMEs. Probably, the main obstacle is linked to the ubiquitous nature of the technology and the lack of control over the content. This aspect creates strong concerns regarding the IPR and the ownership of innovation.

The role played by these technologies in reflecting the image that the entrepreneur wishes to projects to the external world (through wikis, professional and social networks, blogs, RSS, fora and podcasts) and their ability to complement traditional ways to communicate with customers, suppliers, partners and even competitors, while potentially advantageous, are barely exploited by SMEs. Furthermore, the intermediation of third parties is: (a) maintained to the extent to which the company's strategy is open to the external environment, (b) the immediacy of use of the

technology and (c) the possibility of higher than average return on investments. In the same way, the potential outreach of such technologies is not exploited due to the implementation costs of a large-scale adoption and the de-location of applications external to the business' boundaries.

5.1. Limitations and further research

Our contribution relates into exploring the unfolding dynamics of Web 2.0 technologies adoption into some aspects of business strategy – namely RDD&I – and entrepreneurial turnover in a restricted sample of SMEs. The dynamics described is in fact based on the analysis of capabilities, resource commitment and behaviour of some 130 innovative SMEs based in a handful of European countries. Smaller businesses constitute the largest share of the structure of business activities in the EU, generalising these findings to the entire population of enterprises would certainly be misleading. More substantial research work is necessary to fully understand the phenomenon and be able to draw more general theoretical insight into the adoption of Web 2.0 technologies for collaborative innovation activities. In particular, the level of analysis needs to step up from exploration of the dynamics to larger scale national and sectoral enquiries drawing insight from cross-sections and panel analysis. Eventually proceeding towards the study of more interesting productive enclaves such as agglomerations, milieus, districts or networks of enterprises would certainly enrich our knowledge and understanding of Enterprise 2.0.

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Notes

1. Initiatives like InnoCentive by Ely Lilly (innocentive.com) or Connect + Develop (pgconnectdevelop.com) by Procter and Gamble are examples of this strategy.
2. In particular in those SMEs operating in sectors of economic activities other than the ICT.

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