

Rvolta, a case for open innovation. How can a SME be innovative in a competitive industrial environment

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EXECUTIVE SUMMARY

Rvolta has been working in waste management industry for 16 years now. This SME (Small and Medium Enterprise) from Portugal is taken as a focus point for the case study addressing a network of partners working in various activities which became related, so as to disclose the underlying innovative spirit, strategy and partnership structure. Objectives of the present chapter are to portray and analyze a SME success case in open innovation (through various innovation practices), and clarify how knowledge creation and collaboration amongst different players in a network takes place. An exemplary collaboration episode is told. Framing issues are addressed so as to understand how they affect open innovation in SMEs. The study finds interactions, networking, and partnership connections, are important issues and indeed make a difference, thus enabling SMEs to innovate. This case evolved from an exploratory phase of an Information Systems PhD qualitative research, addressing open and crowdsourcing innovation.

KEYWORDS: OPEN INNOVATION, SME, PILOT ENTERPRISES, NETWORKS, BUSINESS MANAGEMENT, INTERACTIONS, IT AND WORK PROCESSES, WASTE MANAGEMENT INDUSTRY

CASE ORGANIZATION

Rvolta is a SME working in the waste management industry. Its main business partner is Multirecolha, which collects waste edible oil to produce biodiesel to both firms' truck fleet. These firms have established partnership with Agro Ideia, an agricultural consultancy firm, and Hora H, which does energetic efficiency consultancy. Rvolta is taken as a focus point to the present case study addressing this network of partners working in different activities but who found ways to relate and innovate together. Case shows open innovation as common and shared practices which seem to be based on a set of relational aspects including trust, collaboration and interchangeable benefit. Evidence on how open innovation works and how this particular network implements it has been retrieved through four interviews: two interviews with Mr. Luís Nunes, Rvolta and MultiRecolha manager (referred to as LPN_1 and LPN_2); one interview with Mrs. Cristina Pinto, Agro Ideia manager (referred to as CRP); one interview with Mr. João Mendes, Hora H manager (referred to as JFM) and finally, an e-mail questionnaire to Rvolta IT Expert which for editorial reasons remains anonymous. Case presentation starts with the network background, and a descriptive review about the partners involved, including their activities within the Portuguese business context. Afterwards, the stage is set for a series of open innovation practices among the mentioned firms and other institutions. Issues addressed include business management, context, interactions, and IT and work processes; after that, one innovative collaboration episode is portrayed, and the chapter ends up with some challenges facing these network-type collaboration and SMEs, including some recommendations.

Methodology

This case is based on research made through a case study approach (Yin, 2003), subject to the following questions: *how relevant and complementary are different collaboration processes aiming at open innovation practices*; and *how does an SME recur to open innovation practices to improve its business activities?* The complete case is exploratory in nature and serves purposes for a PhD research on open and crowdsourcing innovation and SMEs; sampling method chosen was theoretical sampling (Flick, 2005; Gobo, 2008). Case includes four semi-structured interviews (Gobo, 2008), recorded, transcribed with F4 3.1.0 and analyzed through discourse analysis, interpretative repertoires (Talja, 1999), with CmapTools 5.04 and MindManager Pro7. The research also included document and artifact analysis; and one e-mail questionnaire. Discourse translation (Portuguese to English) was validated by interviewees.

NETWORK BACKGROUND: THREE MAIN PARTNERS

Established in 1994, Rvoltaⁱ anticipates the beginning of an economic affluence cycle in Portugal between 1995 and 2000 (Amaral, 2010), a cycle followed by a ten year period of economic restraint and more recently financial and deep economic crisis. One of the interviewees, Mrs. Cristina Pinto, refers to that cycle exactly: *I earned more between 1995 and 2000 (...) there's a set of customers who got thrilled with my work (...) my market is stabilized...* (CRP). If by 1990 SMEs were 8% of the economical enterprise panorama in the country, when we come to 2008 we have just 4% of it: micro-firms are prevailing (Rosa & Chitas, 2010). By 2009, non-financial enterprises on the whole decrease, due to economic crisis: manufacturing industries have a year-on-year fall of 15% (INE, 2010).

Rvolta works in the waste management industry in a wide-range of residues, and was innovative in Portugal when it was established, exactly because of that. The firm introduced several innovative patented products, intended to reutilize (so adding value) some of the residues the firm works with. Being a SME, almost all innovation was outsourced, meaning open and through organizational out-limits, and was brought in through partnerships formally developed with universities and work with one State Laboratory (for R&D and endorsement purposes too). In the process, Rvolta joined forces with some partner firms - subsequently producing some patents.

Though being a SME, it works with more than 200 industrial and commercial customers (chemical industry, food and beverage, automotive industry, logistics and distribution, energy production, food industry and health care). Residues include glass, paper and card, plastics, rubber, wood, metal junk, residue from landfill, waste edible oil, and other food residues. Activity comprises partial or complete waste management processes, including diagnosis of customer needs, placement of work force on customer facilities, truck transportation fleet, and heavy gear rental. Rvolta owns MultiRecolhaⁱⁱ, a firm that makes the waste oil collection (mostly from restaurants).

Information on Rvolta annual sales is available for 2007 (€2.423.031,00) and 2008 (€2.586.479,00). The firm works mostly with industrial and commercial organizations, and undertakes *one-stop-shop* solutions, meaning the integration of the whole waste management process, as Rvolta's manager Mr. Luís Nunes says:

We sell our customers a complete solution, one-stop-shop: whatever there is to buy, you buy here... and we also work in an open-book fashion...(LPN_1).

As it is, the process, increased by PHCⁱⁱⁱ (a Portuguese ERP system) with a specific web-accessible module developed internally, gives support to the use of *open book* transparency during the whole waste processing: for instances, residue deposit can be pictured and images uploaded in the site customer area, so as to demonstrate the adequacy of waste management finals. Information on these firms was given by their manager (and public financial outputs). Specific information on the ERP module development and all IT infrastructure was provided by Rvolta's IT expert.

Up till now, Rvolta collaborates with two other firms. First one is an agricultural consultancy firm, Agro Ideia^{iv}, whose activity, described by its manager's own words, Mrs. Cristina Pinto (CRP), is unique in the country. The firm starts as one family research expedition throughout the USA: *I had this dream to go to the*

USA or Australia and make a reconnaissance tour, research work... (CRP). After 3 months travelling, coast to coast, return to Portugal allows for the establishment of Agro Ideia, which work

Is all about analyses [of soil, leaves...], I send the samples to these labs (...) one for chemical and physical... and the other for disease control. The first is in Indiana State, near Chicago (3 hours) and the second is in Florida (...). With this one we have not so much business. (CRP).

Partnership between Rvolta and Agro Ideia comes to develop an organic farming product for soil correction, based on residues.

As for partner Mr. João Mendes (JFM)^v, he starts his entrepreneurship narrative by something not business-related, but instead telling his first experiences on education environmental grounds, as he's been once a voluntary for an environmental defense association.

The thing is that from an environmental worry comes up something that is an issue... what worries me the most is, really, several [environmental problems] rising from automotive and aeronautical industry... forests, soil use... cement industry... and automotive industry are [big polluters]... (JFM).

Later he becomes business associate to a firm leading the way to biodiesel business in Portugal. JFM discourse strengthens a more personal and less business-like perspective on these innovative activities. This seems to reinforce his particular intervention as an innovation *practitioner*, almost a broker (Ahonen, 2007) meaning someone who captures good ideas, passes them to those who can work with them and improve context transference, by testing concepts (Hargadon, 1997). After an exemplary collaboration process, JFM is nowadays doing R&D together with Rvolta, through his firm Hora H.

Partnership with Rvolta and the Engineering Institute - and its trainees' research work -, allows for the development of biodiesel based on waste edible oil, which has been for some time now the actual fuel for the firms' truck fleet, namely Rvolta and Multirecolha. Nowadays, partners are working on a device to decrease fuel consumption, adequate to auto engines. Again, collaboration with the same Engineering Institute was agreed, and a patent process is on the track.

SETTING THE STAGE

Rvolta and its partners give us information on four main areas that set their stage, meaning not only market and socio-economical conditions, but also other conditions that lead them to be innovative and to collaborate. These four main areas of concern are; a) Business management, b) Context, c) Interactions, and d) IT and Work processes.

a) Business management

Regarding business management, these firms tell us about the typical R&D nature of their launch, and the way activity is developed based on it. Activity starts out of research projects. In the beginning,

... though Rvolta was already participating it was still a partnered initiative... we were starting our business activity at the same time research was proceeding at the University [Chemical Department of the Engineering institute in Lisbon]. We even had a trainee... and after him we had some more. (JFM).

In a way, these SMEs all work as pilot enterprises: Rvolta develops a comprehensive waste management service for their clients, the first one to come up at country level as so; Agro Ideia delivers (up to these days) an original consultancy service to farmers, also based on research, and the third partner is mostly an innovation broker (Ahonen & Lietsala, 2007) who connects innovative sources and firms, some of them as a business associate, others not. This innovator's activity starts out of the entrepreneurial system, as he collaborates with an environmental defense association. But as JFM becomes interested in doing business, he leaves the association (see Figure 1):

It is an end in itself... it's an organization working with firms... it has a pact for detachment, meaning: when I was an associate, all my work had no business relation... one day I told them "I'm interested on working commercially" ... so I got out of it. (JFM).

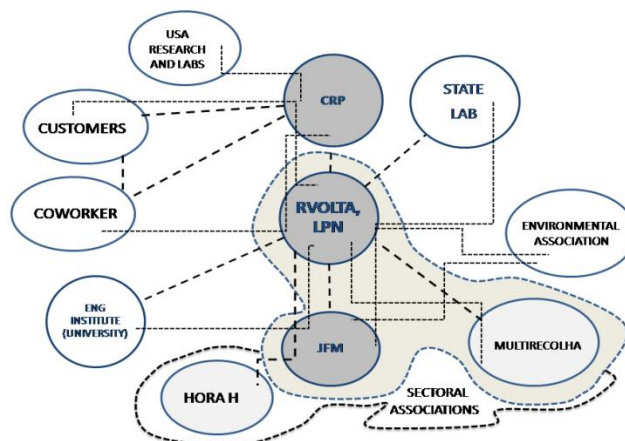


Figure 1. RVOLTA Network

In fact, even if some business associations among these partners never came to happen, business develops anyway, profiting from patents that aren't subject to protection anymore:

It's biodiesel... the patent has twenty something years, was invented by this Brazilian [scientist] named Parente, so the patent is not protected anymore, anyone can do it... So I thought that [waste edible oil] was the problem, how to collect it... that would be the critical factor... we bought MultiRecolha (...) [JFM could be a partner too... but it never happened]. (LPN_2)

They consider each other partners for joint R&D, too, as it clearly shows from the following statements. More than a research platform, they seem to think about each other's firms as the continuance of a R&D success:

Rvolta works as a research platform... trucks use biodiesel made from waste oil, my partnership to LPN, [Rvolta], allows us to use the fleet to test this new... device... MultiRecolha came up from this process and is still in the market ... (JFM).

Taking the interviewees' discourse as an informative basis, one always gets positive information on R&D experiments and processes, like in this case, the process of developing a soil correction product. Upon a municipality request, Rvolta and Agro Ideia come together to work out a solution for a pollution problem. A local industry is depositing residues and the idea is to convert those residues into one useful soil correction substance. And so customers get involved too:

[My work with Rvolta was on soil correction, profiting from its residue compounds]... we did a test in a [famous Portuguese agricultural state company], we had two blocks of soil, one as a witness... and results were good (...). And afterwards he delivered his product on some farmers I suggested... (CRP).

So partnership works also for business purposes, and not only for research.

Some issues defining an open strategy seem clearly show up on this case, like the ingoing/ outgoing information flows, though not exactly to work over internal innovation but, instead, to establish common and profitable partnered grounds for it, simultaneously developing and expanding markets (Chesbrough, 2003) and eventually became a coupled process (Gassmann & Enkel, 2004). Authors commonly introduce the globalization factor on the way (Petit, 2009), but if it clearly weights on the Intellectual Property Rights (IPR) side (e.g. the waste oil patent release), internationalization is not the reason, so far, to introduce innovative practices and strategies. Moreover, deregulation surely is an issue, as Rvolta manager tells that, on the matter of soil fertilizer, best practices help to replace inexistent legal framework.

In this aspect, dispersion of scientific and technological knowledge (Chesbrough, 2003) introduces the other partners in the network:

We had the support of a professor at the Engineering Institute, in the Chemical department (...) and we had this trainee (...) it was a long lasting job (...) progressing due to our trainees, one after the other... PF, a trainee, did some of the R&D, after that was, CP, a trainee too... (JFM).

However, statements like these don't seem to substantiate an incidence of a shorter innovation cycle (Gassmann & Enkel, 2004), but the growing involvement of expert knowledge centers and choice for shared patents (OECD, 2008), as it is the case for the fuel decrease consumption device. The OECD report on open innovation and global networks (2008) states that not only companies keep on searching for places where market proximity and lead users are favorable, but also where technology sourcing is useful for business purposes. Report mentions this prevalence on global grounds, but one could say accordingly that these SMEs found these settings indoors, first of all. The freshness of the open innovation concept lies in that now firms integrate these practices in their business strategy so, for all that matters, innovation itself implies also collaboration: related to globalization and deregulation, technological convergence and disappearance of intermediation, and becomes part of any organization's strategy (Berends, Vanhaverbeke & Kirschbaum, 2007):

Of course we don't have the ability to do it all^{vi}... so that's why I tell this is a relatively open activity, because we have to have partners, and interfaces with experts... our positioning is as a waste management firm (...) sometimes we cannot reutilize 100%... but if we merge it with some raw material, say 80%, and manufacture something like another raw material... this is the reasoning, you see? Some residues we did accomplish to reabsorb completely, as in agriculture...(LPN_1).

Underlying all these, there's a rather strict business orientation. Processes must be profitable and logic, as CRP tells:

I always thought that one can spend little and well and this way being ecologically friendly... Nature is being attacked with too many discarded packages, and the real problem to environment is mostly inorganic waste... farmers' goal is to make their crops more rewarding, also by spending less and that will save on containers (...)(CRP).

Rvolta manager corroborates the same business perspective,

So we have this project 50/50 with the Engineering Institute, we have some good financial support... non-refundable subvention, we're now launching it... so what do we want? We want to manufacture a high-quality fuel... we make use of it already [though yet not perfect] because it's cheaper, we don't have to rely on others, we're sheltered from oil rising prices... (LPN_1).

This protection from important increasing costs seems indispensable as a competitive issue^{vii} in a crisis environment, influencing strategic options, but that seems not to hinder innovation. As one will see, this partnership keeps on looking for internal and external opportunities (West & Galagher, 2006), preserving the porosity of their boundaries (Chesbrough, 2003; Gassman & Enkel, 2004).

b) Context

Crisis seems to change speeches from a business perspective to a more broad analysis. Indeed, all partners give information on crucial issues to economic environment such as land and production abandonment (because of demographic decline) or foreign disinvestment. Furthermore, economic and market disturbances affect a series of different players whom end up suffering several impacts, especially those visible in Portuguese economy:

[Some foreign farmers in Portugal]... their properties are almost all for sale... their crisis came up (real estate crisis)... listen, they bought a property as long as it had irrigation viability (just water access)... no matter if it was worth 5000€/ ha, they would pay 15000€/ ha for it... then they planted olive trees (more or less 2500€/ ha) and after that they would sell it for 30000€/ ha... but the crash came and now some are for sale for the original buying price..." (CRP).

This gives one a clue on some de-industrialization of the country (issue raised by interviewees):

... many business enterprises came out of nothing, for example real estate developers who bought properties, previous brokers, travel agencies, people who had nothing to do with agriculture felt attracted because they thought that even without EU support everything worth money... most of them are gone [by now]... (CRP).

Context analysis discusses financial difficulties for Portuguese business in general: on European money that should but does not show up, as stated by an important farmer's association, CAP^{viii} administrator, on TV: *since 2005 to 2009 none but 20% of the environmental support measures were paid to Portuguese farmers (CRP)*; on the banking system, less collaborative than it probably should, and the inexistence of venture capital useful to innovation needs (Chesbrough, 2003),

There's a problem with risk capital in Portugal, risk capital and seed capital are different things... so these things are always too difficult to get financed... to establish a firm is something complicated, almost impossible, because there's no seed capital... risk capital on the other hand has specific goals, either to buy or takeover established firms... but no way they invest on start-ups... well it seems there is some, but where? (JFM).

And some funding opportunities wind up unused although reasons remain indefinite (or, unknown):

EU issued a financial support to produce renewable energy based on methane... to apply on animal farm production such as pig farms... methane can produce heat, so it is useful to warm up water and facilities too (...). [Other countries] applied for it and some even profited up to 100% of the amount they could get... we didn't have a single application (JFM).

But other issues are relevant for business framing, and they start by the political structure. Political discourse cannot be taken literally, and this leads to the fact that some of the players' work never came out:

We need... Portugal imports diesel, meaning we produce gasoline at refineries, but still need diesel. So we had a diesel deficit... if we could obtain a 100% rate of collection and transformation... it would be great for us, but that wouldn't be possible this way... but it would be great for our country... [but then], we planned a coordinated system and up to now there is none... (JFM).

Indeed not only politics, but also law and paperwork seem to create a complicated environment for innovation development: beside deregulation where law was needed, there's also some regulation overload:

[They decide]... "let's make this law"... they take some three or four years to do it... discussing I don't know what... then law comes out without any consideration for the players... but is Europe's best!... (JFM).

Though *Europe's best*, is said to have some occasional inconsistencies, compels to intricate licensing processes and includes strict production limits deriving from taxation requirements.

c) Interaction

Chesbrough, Vanhaverbeke & West (2006) refer to open innovation not only as a set of search-for-profit practices, but also as a new frame of mind, a cognitive model for creation and research: "According to its proponents, open innovation involves a qualitative shift in the way the firm creates, exploits, and organizes knowledge." (Scarborough & Amaeshi, 2009, p. 220). Pénin (2008) reinforces the importance of access to knowledge to the open innovation concept, introducing a more sustainable one: voluntary release of knowledge (at least some knowledge) by firms; availability of knowledge to all interested parties; dynamic interactions maintaining and increasing their knowledge base (Pénin, 2008). So these dynamic interactions become undoubtedly the question here, as Rvolta manager puts it:

JFM... well, [with him] it's also a matter of trust... you know, we're not a multinational firm (...), the fact that we're a firm working in Portugal, with specific problems, means we had to make contact with other organizations in the same sector... well it would be expected that I would know people... so I met this guy from this Environmental Defense Association..., we often asked their help... they made an agreement with us, we became a conventioned firm... it was him who introduced us (...) then JFM had those ideas about biodiesel and left the association. (LPN_2).

Interactions and *small world* awareness and reliance (Kleinberg, 2008) might become necessary to win over a certain context attitude: trust becomes crucial, as innovation seems to be seen distrustfully:

People here do not accept innovation, they oppose it, and they're conservative in their core... innovation not only frightens them but they antagonize it... they look at it and say "mmm, these guys..." (JFM);

This interviewee complains about the fact that most of the times value and respect are attributed not to ideas but, instead, to professional experience beside those ideas. As Innerarity says, "Knowledge society probably means the kind of society where one learns to manage the risk to trust others knowledge" (Innerarity, 2009, p. 43; free transl.). Indeed, as Rvolta manager says (for instances about CRP), professional competence is a must:

She must always be up-to-date... because her customers demand it... they're farmers... we're not "betting on beans"... we're talking about people who depend on this for their living, it's their life... so things must be all right... when she says something she must be sure of it, and if she doesn't know, then she has to explain why." (LPN_2)

Gassmann & Enkel (2004), like Tuomi (2002) call for attention upon the importance of competences as a share of human contribution to the resources needed for innovation... and they are "sticky", as Tuomi states (p. 101): they address schooling, but not forgetting relevant business information. And this trust and way of interacting is acknowledged by relations with customers, while this special friendship is meant for business activities:

I have a very close relation with my customers... some because we've been working for such a long time now (...) well, friendship has several levels and probably there's a specific friendship for negotiation activities... or even more than that... real friendship... (CRP).

So being built up on a relational basis, framing not only organizations but also individuals, open innovation has implications on the notion and practices of groups (Ren, Kraut & Kiesler, 2007):

Professionally I trust her (CRP), personally too (...) she's a righteous person, she solves every problem that shows up, never leaves it unsettled... (...) every issue we discuss she looks after a solution, does research on it... (LPN_2).

Social networks (Granovetter, 1973; Granovetter, 2004), and value creation through it (Becker and Zirpoli, 2007; Lin, 2001), are based amongst other things, on mutual trust (Ahonen and Lietsala, 2007) particularly when surpassing the boundaries of the organization (Gassmann and Enkel, 2004; Gassmann and Enkel, 2005; Phelps, 2007): partnerships as the one with CRP or JFM last for long now, with occasional business association mutual proposals, and the continuance of collaboration throughout the years.

Authors Ren, Kraut & Kiesler (2007) say that there are three main causes for identity attachment to the group: social categorization, interdependence and intergroup comparisons. Social categorization means those social similarities one finds when comparing to group members, should this be recognized objectively or subjectively (Postmes and Spears, 2000). The degree of interdependence influences commitment and intergroup comparisons mean the relevance of out-group, or rather the fact that identity boundaries must be defined mostly through differences (Postmes et al., 2001; Rogers and Lea, 2005), like those established for instances between insiders and outsiders:

Nowadays agriculture is held up by traditional farmers... whose father and grandfather were already farmers... foreign farmers who bought land in Alentejo [Portuguese region] went off with the stock exchange crash of 2008 ... when Brussels [European Commission] started paying for non-production this came down ... crisis penetrates the market and production in different ways... (CRP).

Marsh et al. (2007) refer to the importance of the sense of place as a part of a more broad sense of belonging. Authors of this case also speak about an important change, not only in one's sense of being in the right place, but more than that on the things one tends to connect to, when establishing one's belonging. Marsh et al. (2007) refer factors that condition sense of belonging as being family (despite changes in form and structure):

I tried to handle other businesses, parallel to this one, but I just couldn't... I have my daughters, I have my life... when they were smaller I went to Alentejo, I went to work while they stayed with a nanny... but then they grew up and I had to stay at home more often... (CRP).

Friendship; life choices, which include not only friendship and social networks but also conditions to explore social capital - “social status, shared values, cultural practices” (Marsh et al., 2007, p. 5) – become important:

It's a trust relation... I knew her [CRP], since we were kids; her parents were friends of my parents, my grandparents. [But it's not a family issue]... if she didn't have these skills and I didn't have this business (...) she even has a coworker at Oporto [Portuguese city], working part-time, who now works for me too... so we keep on collaborating, [though not directly]... (LPN_2).

Authors of this study, also refer to nationality, professional identity – something we announce when introducing ourselves; team spirit and interests we share with others, as those factors we also include in our identity determinants:

I would go to a given customer, asked him to tell me the phone numbers of other farmers... they got informed with each other... (...) I went to a given place, I called previously to each and one of my customers and told them I'd be there the next day to get their samples... I went there and just waited for them, after having given individual instructions for the sampling procedure... I just opened my car trunk and waited for their deposit. Many times I came with my car completely loaded with samples...(CRP).

However, it seems professional identity clearly surpasses innovative capacity: *Being valued as an entrepreneur, innovator, inventive (...) never had any influence in this project. (JFM)...* even if in some contexts this changes, as when Rvolta manager refers to the specific attention and respect paid to JFM ideas by other R&D partners.

The way Rvolta and their partners work seem to accomplish the advantages of connected people (Burt, 2001) and so being, requiring trust, support, interdependence and exchange. This clearly substantiates open innovation concept as defined by Pénin (2008), based on open and voluntary shared knowledge, and dynamic and continuous interactions.

d) Work Processes and IT

Rvolta IT infrastructure is mostly based on open source software. It also works with an ERP system, Portuguese PHC, based on Microsoft SQL Server. The firm used it for accounting and invoicing, but some time ago Rvolta IT expert looked for more total process integration and at the same time introduced a module that allows for the customers to make online check of the whole work process using the transportation guide number. In IT expert's own words, *change was thought previously*, so as to allow access through a “customer area” in Rvolta site, where customers would be able to retrieve electronic invoices, attachments and so on, besides all *open-book* information on their residues.

In fact, eventually the firm comes to realize that this strategy is not only a market necessity but a legal requisite:

Now ruling forces us to do so [to work in an open-book fashion]... because of some [bureaucratic issues], producers have to know where the residue goes and finishes up, given that its final destination will be not only a Rvolta responsibility... but the customer's too (LPN_1).

To address this specific need and accomplish a response strategy implying their work processes, Rvolta develops the new PHC ERP module, this time in-house: it's a typical situation where an information system is mastered as a “tool” so processes can be controlled (Botta-Genoulaz & Millet, 2005). Work processes undergo a significant change because of this innovative activity... *so reporting is something we've been aiming to do better, we're at the top, no doubt... but yes, this is R&D, because no one else has this service (LPN_2)*. Real time information on business processes and reporting to customers are some of the needs leading to this internal innovation. Reporting, namely, integrates the bureaucratic course of events each client has to follow to dispose of residues:

Our customers don't work with paper, they have lots of stuff... there's a map that is an "awful" thing, huge... the system of residue registration for Portuguese National Environmental Agency (SIRAPA)... we would have to give annual information, but the system allows you to retrieve information at any time...(LPN_2).

Changes on PHC were anticipated so later this would and did become possible. Main objective was to make possible information management in cooperation; a sort of paperless circuit both to Rvolta and customers, and this is nowadays one of the competitive issues advertised by Rvolta as exclusive in the Portuguese waste management industry.

Innovation in information systems was completely internal, and included training for the IT expert on PHC software, implying a specific contribution to the firm strategy (Botta-Genoulaz & Millet, 2005) and, to some extent, work processes redesign (Truex, 2001). It was kept up by several critical success factors: top management support, technical training and business knowledge, clear goals, focus and scope, among others (Colmenares, 2009). Rvolta manager feels glad to have developed the tool internally, so by now it became an exclusive competitive issue (see Box 1).

On IT Innovation

“One day people at Rvolta noticed one unused phone line, back in a facility that was more or less closed... they decided it should be wise, on a cut-expenses basis, to turn the phone line off. *My God*, said the IT Expert, *You've just turned off the server line...* and so we connected it again in a hurry... so this site comes up for obvious reasons; previously the process was boring, with lots of paper, including printing, organizing, sending by mail, etc. Nowadays everything is online (LPN_2).

Some four years ago, Rvolta found out it was too difficult to rely just on one man to handle information systems issues: “Every solution was controlled only by him, and I wanted it to be less dependent on outside intervention” (LPN_2). Rvolta had a coworker, an IT expert, who controlled their network and handled systems needs altogether. He wasn't just a collaborator, he had his own firm. Sometimes he wasn't available to meetings, or he just couldn't meet but in his hometown, far from Lisbon.

Connection between Rvolta and their coworkers is usually pretty direct. As Rvolta is a SME, it has no more than one IT expert, and systems have to be handled by non-experts in an efficient way whenever he's out. With the previous IT Pro that became somehow difficult. “We needed a safe and robust system, but handled from the inside, meaning we didn't have to rely just on the technician availability. While the first specialist had an IT business of his own, and worked the systems already installed, the new IT Expert is working with us. We gave him time to learn and train his skills in PHC” (LPN_2). This was the ERP already in use by Rvolta, for account and invoicing. *What I did was to change the software so it could accept the production/ invoices, all sorts of papers like those dedicated to the shipping process. I had a specific goal with this kind of change: to integrate it with a customer's site with all sorts of documents available and downloadable (IT Expert).*

The IT Expert came to develop significant proficiency on the ERP, being able to work on it inside Rvolta. “Previously the system wasn't so customized, and we couldn't expect it to accomplish all the clients' needs. We had to spend some money, of course, because the IT Pro had some specific training in PHC. But it was worth the cost! Because the training and practice, and also the whole development, was made indoors, we're now sure we can provide our clients with a specific service and way of communication no one else can”. (LPN_2)

Box 1. On IT innovation

But this IT development process isn't unique, and one of Rvolta partners is working in the open way, giving testimony for a vivid knowledge sharing process (Barret & Osborn, 2007).

Well, there's a dutchman who's an irrigation expert... who's been living here for the last 15-20 years, he's young, 41... I've known him for long, we worked together and made publicity of each other, talking to farmers, experimenting... he did the same as I but on irrigation matters... he tries to make water use rational... [He's been developing a fertirrigation^{ix} support software and asked for my collaboration], he asked me to work together with him, he does the irrigation job, I do the fertilization job... they have software programmers who send me changes and I analyze them and tell them the necessary corrections, improvements, [pattern observation based on my practical knowledge] ... he also calls me to work with his customers on the fertilization job (CRP).

A CASE FOR AN INNOVATOR

This description was chosen as a testimony of the work of Rvolta and its partners, including JFM, who later becomes manager of Hora H. But it was also chosen as a narrative of an open innovation process, driving to specific accomplished results.

Vegetable oil to be used as fuel isn't exactly something new, as *when Mr. Diesel invented the diesel engine, it worked with peanut oil...* (JFM). But JFM gets information in the source of the modern patent, *I learned about biodiesel from the promoter (owner of IPR) Mr. Parente, a Brazilian... it's his patent... this starts in Brazil... when Brazil moves forward to alcohol it also starts working with the biodiesel...* (JFM).

From 2000 on and still as a member of the Environmental Defense Association, JFM works in an environmental strategy for waste edible oil management while participating in successful local educational activities for children, related to waste edible oil domestic collection. Environmental advantages for using this kind of biodiesel are, among other things, that this biodiesel implies fuel production based on a residue. That should be significant, first, because residues are best if reabsorbed, and also because on pure vegetable oil... *Portuguese productive capacity is weak, olive is much appreciated, and there's no soil aptitude, no soil area to produce like the German colza...* (JFM). Also, *more and more people abandon agriculture* (JFM). For residue management purposes, is sure worth mentioning that this residue makes serious damage on sewage and residual water treatment stations filters.

Other environmental issues matter, like the fact that CO₂ release is better compensated than that produced by pure vegetable oil and allows for a considerable reutilization of the residue used in its production. Collection seems to be the most problematic issue, because either there are not enough oil containers, or the way public collection works for domestic consumers is difficult, does not guarantee the oil quality and causes dirt. On the contrary, collection from restaurants seems easier and more profitable, but control over the correct disposal of the residue is still missing. To improve the scenario several associations related to waste management become involved in the process:

[Through the association], we achieved just what was possible to do... nowadays restaurants are compelled to manage the residue, [waste oil], and there must be an evidence-based circuit showing the residue isn't back into the food chain... but still restaurants have no penalty whatsoever, if they don't do it. (LPN).

But, the political decision-makers worry about much more than residue management: *I draw the whole approach to biodiesel and vegetable (waste) oil assuming political speech was aligned with intentions... and then I understood it's not that way* (JFM). Indeed, taxation and big producers are also part of the problem:

We got nowhere... you see big importers have a totally different perspective, they want to build up big units, dealing with 200 thousand tons (pure vegetable oil), importing this from Brazil, and this is by now competing directly with other soil use, including for food production... and that is a problem...for instances there is a firm, [a Portuguese multinational] that has recently given up on their project... exactly because of this [environmental issue](JFM).

After a long period of debate two legal documents come out, 62/2006 and 66/2006, first one transposing a legal EU 2003 directive on biodiesel, and the second one establishing the market for biodiesel and tax exemption rates^x. As a result, Portuguese government issues regulation for the apportionment of firms and 19 firms are licensed to produce a limit of 3000 tons per year: *... this legal apportionment... we aren't polluting but instead cleansing... but they have to address tax exemption... so for the State this is an income loss.* (JFM)

Among those firms is MultiRecolha, that

Was already collecting waste edible oil from restaurants [before I bought it]... and they didn't do much more than filter it, it was a "slim" business, almost no added value... practically none indeed. I got there and the main goal was to start manufacturing biodiesel, but soon we figured that it made no sense... because to produce biodiesel we've got to make a chemical reaction and lose 25% to 1/3 of the product, and in the end you got a result worse than [waste oil], with less warming power, so... now that

might be nonsense, don't you think? So I mean, you have to spend money, and what you get is a second rate product when you began with a first rate one? ... It makes no sense. (LPN).

Oil needed to make up standards for being used as fuel, so partners made the first move to R&D:

I got in touch with the Engineering Institute... through JFM, I made contact with their Chemical Department... and we began hosting master students as trainees... we still do... and put up a project to fabricate non-biodiesel fuel, [based on waste instead of pure vegetable oil], that's what I use nowadays [in all my trucks]. (LPN).

In fact,

Rvolta applied for a QREN project [EU funding managed by Portuguese Government] to get financial support to make the waste oil up to its standards (Weihestephan norm), so it could be used as fuel in combustion engines... (JFM).

Collaboration and contacts are frequent also with the State Lab, among other purposes for official recognition/certification of the products:

I met Mrs. FR, in several occasions, because she's the researcher for biodiesel... at that State Lab, so it works as a certification laboratory. (JFM).

Specific knowledge for car engine adaptation comes to Portugal and engine conversions take place:

Elsbett came to Portugal and I converted a series of cars... it was by then that Rvolta changed their trucks... they acquire MultiRecolha and start developing the logistics, oil collection logistics... (JFM).

Nowadays, all trucks involved in Rvolta and Multirecolha business use biodiesel.

CURRENT CHALLENGES FACING PARTNERS

At the present time, partners face mostly the same challenges all SMEs face in Europe and USA, related to external factors and the economic crisis. Besides their current business, they're all devoted either to recent innovation challenges, like Hora H on the device to decrease fuel consumption or Agro Ideia with the fertirrigation software or on the way like Rvolta with new IT service described.

But some contextual elements wouldn't be favorable to these SMEs nowadays unless some preventive choices have been made: for example, changing fuel on Rvolta and MultiRecolha has been, due to oil cost boost, probably a condition for its continued existence (see Box 2).

An unexpected assembly line

"I had this customer, a dairy milk industrial unit... this stuff has a lot to do with our set of connections, and the managing director was a cousin of a friend of mine... their firm was sold to another firm... by that time we bought Multirecolha to collect the waste edible oil on restaurants and well... collection points. My friend JFM taught us how to make a biodiesel assembly line (for waste oils, of course)... but we had no gear to do it. So I was telling you, one day we went there and I just asked my friend if he was selling the whole assembly line. Yes... he even said he preferred to sell me than to someone else... I got the whole line for a ridiculous price, and you know... though they're for milk production I ended up using almost everything... engines, reactors, pumps... what if it didn't worked, if I haven't had the opportunity? Well... I would have to put up my assembly line much more expensively... the difference it makes? Well, having low and mostly controlled fuel costs is crucial for my business and this assembly line was just for that, to build up my factory and become able to produce fuel from waste edible oil... oh, and you know, I didn't pay, because they owed me some stuff and we just met our accounts. If I didn't buy it I wouldn't have Rvolta nowadays!" (LPN_2).

Box 2. An unexpected assembly line

Another issue that still seems in need of some changes is surely related to banking and financial system, as it shows no adaptation to needs concerning the innovative SMEs, namely venture capital.

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KEY TERMS & DEFINITIONS

Open innovation: Development of risk-taking knowledge share among firms, so dynamic interactions based on mutual trust allow for shared innovation.

Business Friendship for R&D: Business-customer relation that allows for an R&D user-driven test on innovative issue.

Innovation practitioner: a player who introduces ideas, shares knowledge, risk, transfers contexts and occasionally earns business profits in open innovation grounds.

Innovative interactions: Dynamic interactions between open minded business players, leading to an R&D process.

Competitive industrial environment: environment where SME success is based on open innovation consortia.

Pilot enterprise: partner firm working as R&D platform.

Internalization: switching a conventional service to an indoor innovative R&D process.

ⁱ Rvolta – Valorização de Resíduos, S.A. (residue valorization); Manager Mr. Luís Nunes.

ⁱⁱ MultiRecolha - Recolha de Resíduos Industriais p/ Reciclagem, Lda. (retrieval of industrial residues for recycling); Manager Mr. Luís Nunes.

ⁱⁱⁱ Official site: PHC Software, Software de Gestão, Lda. (management software); Retrieved on September, 21 2010, <http://www.phc.pt/portal/programs/cindex.aspx>

^{iv} Agro Ideia – Prestação de Serviços e Assistência à Agricultura, A.C.E. (agricultural assistance and consultancy); Manager Mrs. Cristina Pinto.

^v Hora H – Consultoria em Eficiência Energética, Lda. (energetic efficiency consultancy); Manager Mr. João Mendes.

^{vi} Though Mr. Stefan Lindegaard said provocatively that open innovation... just isn't for small companies, we couldn't agree less: probably they need it exactly because of their size (see <http://www.15inno.com/2010/11/09/notforsmallcompanies/>). Retrieved 4.1.2011).

^{vii} Competitive information such as this cannot be disclosed.

^{viii} CAP stands for *Confederação dos Agricultores de Portugal/ Association of Portuguese Farmers*; see this statement at the CAP site, in a small piece of information called “PAC – Portugal não utiliza todo o dinheiro dos fundos comunitários [The Common Agricultural Policy - Portugal does not make use of all the EU funds]”, issued 7, March, 2008. From http://www.cap.pt/index.php?option=com_content&task=view&id=96&Itemid=124, Retrieved September, 21, 2010).

^{ix} Fertirrigation means “*fertilization plus irrigation, either applying liquid or solid soluble fertilizer*” (CRP).

^x Tax exemption on biodiesel in Portugal is supposed to be finished in 2011.