Different Argentine rural extensionists' mindsets and their practical implications

Abstract:
Purpose: this paper reflects upon the practice of Argentine rural extensionists working in the extension public system through the process of identifying different rural extensionists' types of mindsets and comparing them with transfer of technology extension approach, dialogical processes of horizontal knowledge exchange, participatory perspectives and innovation system approach.
Design/Methodology/approach: A quali-quantitative investigation was conducted. Surveys containing closed and open questions were sent via email to rural extensionists. This allowed the researcher to identify their beliefs about different issues connected to extension practice. The sample was incidental (n=219; 143 men, 76 women). Qualitative data was categorized and quantified. Finally, a two-steps cluster analysis was implemented.
Findings: Two types of rural extensionists' mindsets were identified, one of which relates to the transfer of technology approach and other to the dialogical/horizontal model, yet neither of them fitting the ideal of the most important extension institution of the country, which supports an innovation system approach.
Practical implications: Extensionists' practices and institutional ideals do not coincide. Reflexive training processes are required to make beliefs about rural extension explicit in order to build a contextually suitable extension proposal.
Originality/Value: Through a quali-quantitative approach to the issue of rural extensionists' mindsets, this paper contributes to a better understanding of Argentine rural extensionists' practices.
Key words: Rural extension; Extension models; Extension practices; Psychology; Typologies; Clusters; Argentina.

INTRODUCTION

Rural extension and innovation processes are tremendously complex (Kilelu, Klerkx and Leeuwis 2013; Leeuwis and Aarts 2011; Mapila, Kirsten and Meyer 2012), considering they involve multiple actors and diverse dynamics that take place at different levels. As a result, it is clear that a psychosocial approach can contribute to understanding them given that human agency is also shaped at a psychosocial level (Landini, Bianqui and Crespi 2013; Landini, Leeuwis, Long and Murtagh in press; Landini, Long, Leeuwis and Murtagh in press).
Despite not being a traditional area of research within this field, psychology has put forth different contributions to the study of rural development processes, many supported in a diffusion of innovations perspective (Murtagh and Landini 2011). In this vein, several factors were found to be related to higher productivity and to economic development, such as level of motivation (Sagar and Ray 1985a), intelligence (Singh and Ray 1980), management capacity (Bora and Ray 1986), and a positive attitude towards risk-taking (Sagar and Ray 1985b). Psychologists also pointed out that higher levels of adoption of technologies are associated with an internal locus of control (Abregana 1988), the existence of group norms aimed at adoption (Fielding, Terry, Masser and Hogg 2008) the perception that adoption is not imposed (Lynne, Casey, Hodges and Rahmani 1995).
In Latin America, the topics studied seem to be quite different. For instance, several authors have explored issues concerning social organization and participation. Canelón (2005) analyzed traditional forms of social organization deployed in Venezuela to distribute irrigation water, and Berrueta Soriano, Limón, Fernández and Soto (2003)

explored peasant participation in the design of technical tools. Regarding the evaluation of attitudes and beliefs, Moyano, Cornejo and Gallardo (2011) studied environmental beliefs and Guillén, Sánchez and Mercado (2004) approached the factors motivating weed control in Mexico. In Europe, there exist several investigations that study motivations and attitudes towards conservations practices (e.g. Lokhorst, Staats, Dijk, Dijk and Snoo 2011; Lokhorst, Werner, Staats, Dijk and Gale 2013; Mastrangelo, Gavin, Laterra, Linklater and Milfont in press).

Additionally, there is an interesting set of papers that address rural extension and innovation processes using concepts that contain a strong psychosocial component, but generally written by non-psychologists. For instance, scholars from Wageningen University have focused on the importance of social learning in the context of innovation processes (e.g. Leeuwis 2004a, Leeuwis and Aarts 2011; Leeuwis and Pyburn 2002), as well as in the capacities required by development agents to support horizontal knowledge exchange, facilitate network building and contribute to conflict management (Leeuwis 2004b). On the other hand, in Latin America, authors coming from the area of extension studies also have used psychosocial concepts to address rural innovation and extension practices, in this case pointing out the cultural sensibility and the interpersonal competencies required by rural extensionists (e.g. Landini, Murtagh and Lacanna 2009; Machado, de Hegedüs and Silveira 2006; Méndez 2006).

This review leads us to discuss the potential relevance of studying development agents'/rural extensions' beliefs, attitudes and knowledge as a way of understanding and analyzing their behaviours and social practices (Landini 2013). In this vein, Cees Leeuwis (2004a) had argued that "knowledge and action are two sides of the same coin" (p. 69). Within the field of sociology, Bourdieu's concept of 'habitus' (1996) addresses the articulation between the subjective schemas used to make sense of the world and social practices. Similarly, Norman Long (2007) focuses on knowledge processes in order to understand social dynamics in the context of his Actor-Oriented Approach.

Within social psychology, the tradition of social constructionism –which argues that 'reality' is a social construction (Aceros 2012; López Silva 2013)– also supports the articulation between beliefs and knowledge, and behaviours and social practices. In the context of social constructionism, social representations theory specifically argues that common sense knowledge organizes and guides human practices (Howarth 2006; Krause 1999). Nevertheless, it is important to add that beliefs do not guide practices directly, but rather shape action principles derived from them, which in turn become social practices that take into account material, institutional and social contexts (Landini 2011). This implies that the common sense knowledge possessed by a particular social group will guide their behaviour but in relation to specific contexts.

Having argued that beliefs and common sense knowledge are fundamental components of behaviours and social practices, in this paper I will describe Argentine rural extensionists' sets of beliefs about extension, as an indirect way of addressing extension practices. Given common sense knowledge is not composed of individual beliefs but instead are sets of related contents (Jodelet 1986), they will be considered as articulated sets of beliefs, which I will denominate 'mindsets'. Thus, the aim of this paper will be to identify and analyze Argentine rural extensionists' mindsets and the implication these have on practice.

In order to contextualize the results, a brief description of the history of Argentine rural extension will be presented, as well as the extension or development theories/ideologies that supported practices at different moments in time. Historically, many development organizations implemented extension practices in Argentina. However, the National Institute of Agrarian Technology (INTA in Spanish), is the most important national

reference (Alemany 2003; Carballo 2002). The INTA was created in 1956 and aimed at increasing production and productivity. At that moment, the system being implemented in the United States was adopted almost without changes (Schaller 2006). According to Tort (2008), between 1956 and 1976, an educational paradigm was put into practice in INTA, which focused on the diffusion of technologies through the education of rural families, who were considered traditionalist and resistant to new proposals. Between 1976 and 1990, the focus changed from the rural families to male farmers, and from the diffusion of technologies to the transference of specific technological packages tied to the 'green revolution'. During the nineties, in the context of neoliberal policies, the very existence of public rural extension was questioned, which led to the reduction of resources allocated to INTA. During the new century, the neoliberal paradigm was abandoned and a new model of extension practice arose. Its proposal is that of considering innovation and competitiveness to be systemic and localized processes involving multiple actors and institutions. Additionally, it is also important to note that these hegemonic development and extension models were not the only ones, given that there always existed a conflict between models focused on productivity and others on the education of the rural family (Tort 2008).

In this description, several extension models or paradigms were suggested. During the first two phases, from 1956 to 1990, the extension practice of INTA was based on a transfer of technology approach. This implies that extension practice was organized through a linear top-down strategy, in which communication and technical proposals flowed from researchers to farmers, the role of extensionists being that of persuading the latter to adopt specific technological packages or ideas (Landini, 2012; Leeuwis 2004b). In the seventies, many criticisms of this model arose that focused on the hierarchical relationship that it established between extensionists and farmers (Freire 1973; Schaller 2006). Instead, a horizontal relationship of cooperation was proposed, in which different kinds of knowledge could dialogue, finding together new alternatives and solutions (Machado, de Hegedüs and Silveira 2006; Landini, Murtagh and Lacanna 2009). From the seventies to the end of the last century, this extension model, at least at an institutional level, had a minor presence in the INTA, progressively merging with and enriching participatory and territorial approaches. During the nineties, neoliberal policies strived for a free market without the active presence of the State. During those years (in fact, from the mid-eighties on), the notion of 'participation' appeared on the scene as a relevant concept within the context of INTA's extension practice (Alemany 2003). Finally, the Argentine crisis of 2001-2002, which marked the end of the neoliberal period, opened the collective mindset to new ideas. Thus, during this new century, terms such as local and territorial development become new, key notions, development now emerging as an inter-actoral complex process heavily related to the diversity of local dynamics. In this context, the promotion of endogenous capabilities, the incorporation of sustainability and equity at the same level as productivity, the participation of beneficiaries in the different processes, and the promotion of systemic competitiveness and technological and organizational innovations capacities instead of transference/adoption of specific technologies, became the new guiding principles (Alemany 2003; Tort 2008), proposals that are in line with an innovation system approach (Klerkx and Leeuwis 2008; Schut, Rodenburg, Klerkx, Ast and Bastiaans, 2014). Concretely, in 2004, these values and guiding principles were incorporated to the institutional framework as part of the INTA's 2005-2015 strategic plan (INTA 2004). Said approach clearly appears in the text of the following document: "This new design to generate knowledge and manage innovation, highlights the role of the territories and the interactive, collective learning processes. A trans-disciplinary approach is

encouraged, as well as the integration of capacities though the articulation of public and private stakeholders […] in order to secure and deepen the impact of innovation" (p. 35-36). This new approach lead to an important institutional reshaping, which included the creation of a National Program of Support to Territorial Development (Tort 2008), and the territorial articulation and even rearrangement of the different intervention and research projects that were generated at a provincial or national level.

Besides de INTA, the other acknowledged national rural extension institution is the Undersecretariat of Family Agriculture (SsAF in Spanish). The SsAF, created much more recently than the INTA (in the 2008), is still highly dependant on the frequent changes of its political authorities, and thus does not have the long-term intervention guidelines that the INTA does. In consequence, it is possible to argue, as several scholars have pointed out (Alemany 2003; Carballo 2002; Tort 2008) that the INTA is the main reference used to identify the hegemonic conceptions of extension and rural development in Argentina.

METHODOLOGY

Aiming to reconstruct Argentine rural extensionists' different mindsets in terms of their beliefs regarding rural advisory practice, a quali-quantitative investigation was conducted. In terms of Montero and León's classification (2007), it was a cross-sectional descriptive study of populations based on a survey. Given the way in which qualitative data was quantified and that the sample was incidental (non probabilistic), results cannot claim to be representative of all Argentine rural extensionists. Nonetheless, these empirically based results are argued to be interesting indicators that could suggest new hypotheses, foster further investigations and help decision makers to elaborate new strategies for training practitioners and intervening in the field.

As was previously mentioned, there are two main national institutions doing rural extension in Argentina: the INTA, and the SsAF, both a part of the Ministry of Agriculture, Husbandry and Fisheries. Additionally, there is the ProHuerta, a program run by the INTA and funded by both the Ministry of Agriculture, Husbandry and Fisheries, and the Ministry of Social Development. In order to reconstruct Argentine rural extensionists' perspective on several areas relevant for rural development, extensionists of these institutions were surveyed via email. The survey was sent with the support of most provincial authorities of INTA (including ProHuerta) and SsAF, who forwarded the survey. 219 usable surveys were obtained, 143 men and 76 women, 106 from INTA (excluding ProHuerta), 72 from ProHuerta and 41 from SsAF. By the time of the survey (between July-2010 and March-2011), INTA and ProHuerta had 1567 extensionists and SsAF approximately 850. This makes up the sample accounts for the 9% of the Argentina rural extensionists working in the two most important national extension institutions.

The survey was divided into two parts, one including closed, general questions such as sex, age, educational level, degree, institution, province and years of experience in extension work, among others. The other included six open questions asking about small farmers' problems when trying to improve, difficulties when doing rural extension, potential contributions from psychology to solve them and (if this was the response) why it was not useful. Questions regarding psychology were included because of other specific objectives of the research.

To analyze the data, Atlas Ti software was used. During the reading of the surveys, contents or topics that emerged repeatedly were categorized. These categories were built based on both direct reading of the replies and topics resembling aspects highlighted by different development or extension theories. In doing so, general principles of Grounded

Theory were applied (Glaser and Strauss 1967; Leite, da Silva, Oliveira and Stipp, 2012). The categorization process involved several steps, from a first general categorization to a progressive delimitation/definition of each category. As a general procedure, fragments that did not clearly fit the category's definition were included anyway, until a final definition, as well as rules for including/excluding ambiguous fragments, was established. During the final revision of the fragments included in each category, those not fitting the definition were ruled out. 218 categories pertaining to four different thematic areas were built: problems faced by small farmers when trying to improve as well as by the rural extensionists when working with them; rural extensionists' social representation of small farmers; rural extensionists' conception of extension practice; and potential contributions from psychology to intervene in the area of rural extension.

These results, as well as the replies to the closed questions, were incorporated as variables to SPSS software. In general terms, Atlas Ti categories were translated into dichotomic nominal variables, and the existence of at least one quotation from a survey categorized within a specific category was taken as an indicator of the presence of that variable, and the lack of quotations as absence of the variable. At first, the possibility of using quantitative variables to take into account the number of times a category had been mentioned in each survey, as an indicator of its relevance, was analyzed. Nonetheless, in that case, the value of each variable came to depend highly on the length of the replies, which varied greatly, and not necessarily on their relevance. Thus, the use of nominal variables (presence or absence of the category) was preferred.

In order to reconstruct different types of rural extensionists' mindsets in terms of their beliefs regarding rural extension practice, a two-step cluster analysis was conducted using SPSS. To select the variables that would be included in the study out of the 218 identified, a criterion of relevance (both empirical and theoretical) and of pertinence for statistical analysis, was used. Due to the lack of empirical relevance, those variables mentioned by less than 10% of the sample were excluded. Additionally, absence of theoretical relevance led to the decision not to consider variables referring to the potential contributions of psychology. Finally, those having unclear including/excluding criteria were also ruled out of the cluster analysis because they could not be statistically analyzed. This led to the compilation of a set of the 72 most relevant variables in terms of differentiating between types of rural extensionists' mindsets with regards to their beliefs about extension practice.

In an effort to strengthen the analysis by not considering twice variables that were similar, those with similar content were grouped. In this merging process, variables mentioned by less than 10% of the sample also were associated with the 72 that met the criteria, in order not to lose relevant information. Thus, 43 variables were obtained. Once again using the criteria of empirical relevance, only those with more than 20% of references were kept, as well as variables located between 10% and 20% that refer to the different extension models present historically in Argentina rural extension (in this case fulfilling the theoretical relevance criteria). The final 31 variables can be seen in Table 1.

It could be argued that this process of dada reduction could have led to the loss of relevant empirical information. Nonetheless, if one takes into account the fact that the original 218 variables were not a 'description of reality' but only a possible interpretation/organization of the data (among other possible alternatives) (Ibáñez 2001), the data reduction process should be seen, on the contrary, as a way of focussing only on those variables with stronger empirical support (and thus less conditioned by the investigator's subjectivity). In consequence, epistemologically, the results of the

cluster analysis should not be considered as existing 'in the reality' but instead as an interesting analysis of the data supported both empirically and statistically.
The cluster analysis presented a two cluster solution. After that, the different profile of rural extensionists belonging to each cluster in terms of sex, age, level of education, degree, institution, region and experience in extension practice was analyzed through statistical procedures, using the chi-square test to relate the clusters to nominal variables, and the Mann Whitney U test to ordinal or scale variables. A non-parametric test was used in the second case because normal distributions could not be assumed for level of education, age and experience (Kolmogorov-Smirnov: $p < 0{,}001$ in all three cases).

RESULTS

The list of the 31 variables built to describe the surveyed rural extensionists' beliefs on different topics relating to rural extension practice is presented in Table 1. In each case, the quantity of extensionists mentioning the variable is stated as well as the percentage it represents within the total.

Table 1

In Table 1 there is an important level of diversity within the rural extensionists' beliefs, some seeming even contradictory. Some beliefs/ideas refer to ways of describing or perceiving the farmers (both positively and negatively), others highlight institutional, contextual or local issues that relate to rural development, and others mention ways of understanding key elements of rural extension.
The cluster analysis gave a two cluster solution. In Table 2, firstly, the differential presence of each belief within each cluster is highlighted through the presentation of the percentages present in each one. At first, this information seemed to be enough to compare both clusters. However, almost all percentages were higher in cluster 2 than in cluster 1. This led to acknowledge that it was not only that extensionists pertaining to both clusters have different opinions, but also that those included in cluster 1 have a clear tendency to mention the categories less than those of cluster 2. In fact, members of cluster 2 mentioned an average of 12.78 variables (out of 31), while those of cluster 1 only 6.53, which is statistically significant (Mann Whitney U test: $Z=-10.22$, $p<0.001$). This means 95.78% more, which implies that what extensionists from cluster 1 had said had a different value, in the sense that they have a tendency to make their point or present their ideas much less frequently. Thus, in order to compare the percentages of presence of each variable in each cluster, an adjustment in those values was considered necessary to balance the tendency to mention any category, this being the reason why percentages referring to cluster 1 were multiplied by 95.78%.
Secondly, the statistical relevance of each belief when differentiating between both clusters was tested using chi-square. The absence of statistical significance was considered as null relevance; a difference between 1% and 50% between the highest and the lowest percentage (considering cluster 1 adjusted percentage), low relevance; between 51% and 100%, moderate relevance; between 101 and 200%, high relevance; and a difference of more than 200%, very high relevance. Data is presented in Table 2.

Table 2

Table 3 shows the variables that presented differences in both clusters in a way that allows for a clearer reading. Each column is organized beginning with those variables in

which the difference in percentages between both clusters is higher followed by those in which it is lower. In this table, variables described as having Null or Low relevance are not included.

Table 3

Tables 2 and 3 show that there are two different kinds of rural extensionists within the sample in terms of their perceptions and beliefs with regards to key elements of their practice. Cluster 1 features different elements. Firstly, those included in this cluster tend to have a more critical attitude towards the small farmers: they are described more frequently as individualistic and lacking in enough trust to build farmers' organizations as well as having inappropriate productive knowledge and practices. Thus, they are more often seen as problems or barriers for the success of extension projects, instead of as resources or people with potentialities. Secondly, extensionists pertaining to cluster 1 tend to describe rural extension as a process of technology transfer, in which training of farmers is a key element, more frequently than in cluster 2. Thirdly, members of cluster 1 tend to focus more than those of cluster 2 on problems relating to lack of capital to invest or productive resources, such as land or water, which could improve technologies and productivity at farm level. Finally, these extensionists also seem to attend more to issues regarding local institutions and political practices, given that they highlight local clientelist practices and inter-institutional articulations as part of the extension activities. All in all, members of cluster 1 seem to be characterized by (a) being critical towards small farmers' knowledge and practices, which supports (b) a tendency to adopt a transfer of technology approach to rural extension, (c) focussing more on issues of technology and problems with natural resources, and (d) being more aware of the inter-actor nature of local development dynamics.

On the other hand, cluster 2 features rural extensionists with a higher tendency to be critical of extension institutions and development projects and interventions, of their own practice as rural extensionists (being able to look at their own limitations as practitioners), and, almost at a philosophical level, of the notions of development and extension. Secondly, those pertaining to cluster 2 also tend to recognize with more frequency that there is not only one way of thinking but, instead, that there exist different rationales, recognising the small farmers' rationale to be different from that of an extensionist, which leads them to believe in the necessity of properly understanding this different rationale. This acknowledgement relates to two other elements: the tendency to perceive extension practice as a horizontal relationship, a relationship among equals (supported also by a recognition of local knowledge), and the importance given to interdisciplinary work. In brief, cluster 2 seems to be characterized by (a) being critical with regards to the limitations of their own practice as extensionists, the institutions wherein they work and the instituted concepts that shape extension practices, (b) a recognition of the legitimacy of small farmers having their own point of view, their rationale, their 'otherness', which leads them to (c) an understanding of extension practice as an interaction between people with different (legitimate) ways of thinking, thus requiring this level of complexity (d) an interdisciplinary approach. Table 4 summarizes the differences between both clusters

Table 4

In Table 5, the statistical relations between cluster of membership and other relevant variables are analyzed.

Table 5

Table 5 shows that there is no relationship between the membership to both clusters and variables such as sex, age, institution in which extensionists work, region of the country where they live and years of experience in extension activities. The lack of statistical association between some of these variables is surprising. Firstly, many studies have pointed out the existence of multiple differences between different genders' beliefs. Secondly, age and experience have been argued to be related to extension orientation in Paraguay (Landini, Bianqui and Crespi 2013). Unlike that study, no evidence was found to argue that experience in extension could favour beliefs supporting the idea of farmers having valid local knowledge or more horizontal relationships.

The variables statistically related to the clusters are: maximum completed level of education and academic (university) degree. The level of education was quantified as follows: 1 primary school; 2 secondary school; 3 post secondary but not university studies; 4 university studies, 5 postgraduate courses; 6 academic specialization; 7 master degree; 8 PhD. The mean of cluster 1's members is 4.34 while for those pertaining to cluster 2 it is 4.77. This is, cluster 1's extensionists have a lower level of education, which suggests the more educated an extensionist is, the greater the probability of the appearance of the beliefs characterizing cluster 2. An interesting question for future studies is: are these results related to the level of education itself or to the specific post-graduate studies followed by extensionists in Argentina?

With regards to the respondents' university degree, while 56% of the sample is part of cluster 1 and 44% of cluster 2, specific degrees show a different profile. Agricultural engineers have the very same distribution as the clusters (56% of them pertain to cluster 1 and 44% to cluster 2). Those with no university degree have a higher presence in cluster 1 then expected (87%). On the other hand, veterinarians and social science practitioners belong more frequently to cluster 2 (63% and 69% respectively) than to cluster 1. The increased membership of respondents with no university degree in cluster 1 could be related to the level of education, something previously suggested. The higher presence in cluster 2 of practitioners coming from the area of social sciences is also an expected fact, given that their studies prepare them more for dealing with social diversity, interdisciplinary approaches and critical perspectives. However, what is unclear is the presence of more veterinarians in cluster 2 than in 1, perhaps due to potential statistical error, taking into account that there are only 16 in the sample.

DISCUSSION

These results show that there are two different types of Argentine rural extensionists working in the public system in our sample. However, none of them seem to fit the actual institutional proposal, which is more related to an innovation system approach. Cluster 1 is clearly related to a transfer of technology paradigm. Surprisingly, there is also a higher recognition of the inter-institutional nature of development dynamics, an element that is not part of the traditional transfer of technology approach. This perception does not include an acknowledgment of the systemic and complex dynamic of innovation processes and, consequently, cannot be considered as being a component of an innovation systems approach. On the other hand, cluster 2 features a more dialogical extension approach, focusing on horizontal learning processes between extensionists and farmers. It is also true that elements that could be characteristic of an innovation systems approach are present in this second cluster, such as the acknowledgement of the importance of interdisciplinary work and of horizontal

interexchange of knowledge. However, the valuing of farmers' rationale and knowledge, their critical attitude to the (traditional) transfer of technology approach to rural extension and the clear lack of acknowledgement of the multi-stakeholder nature of innovation processes, leads to the conclusion that cluster 2 mainly depicts a dialogical extension approach, as depicted in Freire's extension tradition. In fact, subjects pertaining to cluster 2 present their role only in terms of their working with farmers, perhaps as part of interdisciplinary extension teams, however they do not reference work with other stakeholders, which is a practice more characteristic of those pertaining to cluster 1. Thus, their perception of extension practice is limited to them interacting with farmers in a dialogical way, but does not include, as part of rural extension practice, the articulation/negotiation with other stakeholders in order to catalyze innovations. Additionally, it is also interesting to note that the value of participation in extension work seems to be present in both clusters but not as an element differentiating between them, which implies that participation is a shared value, however it remains unclear what participation means for extensionists pertaining to each one of said clusters.

All in all, the main conclusion of this study is the existence of an important gap between the institutional ideal in terms of extension practices and rural extensionists' mindsets. Changing institutional priorities and even institutional structures does not necessarily change people's mindsets and their related practices, a change which could require that they be targeted directly.

Two questions arise in this context. Firstly, what are the reasons for this gap? Secondly, what are the alternatives for updating rural extensionists' approach? Regarding the first, the persistence of old institutional models within new ones is something not only characteristic of this case but a more generalised problem (Malfé 1994). Clearly, changing a mindset is not as easy as modifying institutional documents (which many times have a discursive but not a practical impact) or organizational structures. Besides, the transfer of technology model gives a clear role to extensionists and allows them to project the responsibility of failures onto the beneficiaries (criticising them), while a more dialogical proposal appears to be more difficult to accept in psychological terms. This is because it requires greater self-confidence and self-esteem to cope with losing the position of authority (Landini, Murtagh and Lacanna 2009; Sánchez Vidal 1991), and an increased tolerance for ambiguity, caused by assuming the role of being just a facilitator and thus not being able to know where the process might lead. Irregardless, these arguments only explain the reasons for the predominance of a transfer of technology model and not for the lack of acknowledgment of the complex and systemic nature of innovation processes. Perhaps, this last alternative could radically question extensionists' role, which would imply putting in question their identity as practitioners, leading them to reject these new practices. What's more, building institutional capacities and supporting systemic competitiveness could be outside of extensionists' perceived capabilities, another argument to implicitly reject an alternative extension practice. And, finally, the argument regarding the need to have tolerance towards ambiguity can also be applied to this case.

With regards to how to solve this discrepancy, alternatives are unclear. However, what is certain is that rural extensionists and innovation agents nowadays require, in order to be effective at their jobs, more complex and diverse skills than those required by traditional extension models, which not only includes the technology transfer model, but also the one that focuses on horizontal knowledge exchange (Leeuwis 2004a, 2004b; Leeuwis and Aarts 2011). In any case, what should be avoided is repeating the traditional strategy of training extensionists by transferring conceptual or discursive

knowledge, given it does not seem to really change practices. On the contrary, a reflexive training process would be advisable, one that would allow for these suppositions/beliefs to become explicit while at the same time addressing the existing emotional barriers towards incorporating new models of extension practice (Landini, Bianqui and Russo in press). It is also possible that differentiated training proposals should be implemented for extensionists pertaining to each cluster, given their perceptions and beliefs are different. Also, the role of university education should be acknowledged. Higher levels of education and specific degrees showed an interesting potentiality towards inducing a more horizontal and flexible extension strategy. This implies both supporting post-graduate studies and hiring practitioners with more propensity for the desired extension models.

Finally, the most important limitations of this study have to be highlighted. Firstly, despite encompassing 9% of the total, the sample supporting this investigation is not necessarily representative of the whole population. This implies that these results have to be evaluated with caution. Additionally, the adjustment applied to cluster 1 so as to equal the propensity to mention any category in both subgroups, despite having been argued, also introduces doubts when analyzing the results, being that the reasons for these huge differences have not been clarified. Finally, the fact that the relationship between the rural extensionists' mindsets and their practices was only addressed theoretically but not empirically constitutes an additional source of concern. Thus, additional research will be needed to establish the nature and implications of these findings, which have opened the possibility for building interesting new hypotheses.

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Table 1. Argentine rural extensionists' beliefs on relevant topics

Extensionists' beliefs or ideas	n	%
1. Small farmers are neglected by the extension system. Lack of economic resources in extension institutions, practitioners not properly trained or inadequate extension strategies.	125	57.08 %
2. Small farmers are perceived as a problem for their own improvement and for extension activities.	123	56.16 %
3. Small farmers are individualistic and distrustful. Shortage of associations.	114	52.05 %
4. In extension practice it is important to form interdisciplinary rural extension teams.	96	43.84 %
5. Appreciation of participation and of the fact of taking into account peasants' perspective and local characteristics in extension interventions.	99	45.21 %
6. Lack of public support, small farmers left aside by the government.	94	42.92 %
7. Lack of economic and productive resources, more capital and investment are needed at farm level.	87	39.73 %
8. Small farmers have a passive or fatalistic attitude. There is a lack of participation and scarce appropriation of extension projects.	74	33.79 %
9. Practitioners, their actions and their limitations are perceived as problems for the impact of extension work.	74	33.79 %
10. Small farmers live under adverse market conditions. Problems to sell the produce.	73	33.33 %
11. Small farmers left aside in their interests, points of view, needs and priorities by projects or development interventions.	72	32.88 %
12. Ample or integral conception of rural extension and development, including not only productivity but also human and social issues.	67	30.59 %
13. Rural extension as transference and adoption of technologies. Resistance to change.	64	29.22 %
14. Techniques and proper methodologies are needed to perform extension work.	64	29.22 %
15. Lack of water or land, tenure problems, degradation of natural resources.	62	28.31 %
16. High poverty and vulnerability in rural communities, low profitability of farming activity.	62	28.31 %
17. Small farmers posses a rationale, a logic, that is their own, which does not in turn coincide with that of rural extensionists.	55	25.11 %
18. Inter-institutional articulation as part of extension work.	54	24.66 %
19. Reflection and critical attitude about what development and rural extension are.	54	24.66 %
20. Undervaluation or critical perception of small farmers' knowledge and productive practices.	53	24.20 %
21. Farmers with an entrepreneurial perspective are required.	51	23.29 %
22. Understanding farmers is necessary; sometimes their perspective seems to make no sense.	50	22.83 %
23. Lack of financing and credits for farming activities.	47	21.46 %
24. Need for projects, extension policies and development initiatives with long-term continuity or at	46	21.00 %

least longer duration.		
25. Training farmers is part of the extension work.	45	20.55 %
26. Importance of communication and the capacity to 'reach' small farmers, as well as having a good relationship with them.	45	20.55 %
27. Patronage or paternalistic local practices as a problem for rural development.	42	19.18 %
28. Lack of appropriate laws for family farming.	42	19.18 %
29. Extension seen as a horizontal relationship, as a collaborative process or as a space of interaction between different but equal kinds of knowledge.	36	16.44 %
30. Acknowledgement and valuing of peasants' knowledge, practices and capabilities.	31	14.16 %
31. Small farmers have potentiality for development or for being the actors of transformation processes.	29	13.24 %

Table 2. Differential presence of relevant variables in clusters 1 and 2

Ideas	Presence in %			χ^2	Level of relevance
	Cluster 1 (n=123)		Cluster 2 (n=96)		
	Not adjusted	Adjusted			
1	26,02 %	50,94	96,88 %	54,85(1)***	Moderate
2	58,54 %	100 %	53,13 %	72,57(1)***	Moderate
3	52,03 %	100 %	52,08 %	74,61(1)***	Moderate
4	17,07 %	33,42 %	81,25 %	49,89(1)***	High
5	32,52 %	63,67 %	58,33 %	0,59(1)	Null
6	34,15 %	66,86 %	54,17 %	3,55(1)	Null
7	37,4 %	73,22 %	42,71 %	20,82(1)***	Moderate
8	29,27 %	57,30 %	39,58 %	6,48(1)*	Low
9	13,01 %	25,47 %	60,42 %	27,71(1)***	High
10	24,39 %	47,75 %	44,79 %	0,22(1)	Null
11	3,25 %	6,36 %	70,83 %	98,47(1)***	Very high
12	18,7 %	36,61 %	45,83 %	1,91(1)	Null
13	33,33 %	65,25 %	23,96 %	36,53(1)***	High
14	21,95 %	42,97 %	38,54 %	0,46(1)	Null
15	28,46 %	55,72 %	28,13 %	17,14(1)***	Moderate
16	20,33 %	39,80 %	38,54 %	0,04(1)	Null
17	8,13 %	15,92 %	46,88 %	24,21(1)***	High
18	21,95 %	42,97 %	28,13 %	5,21(1)*	Moderate
19	6,5 %	12,73 %	47,92 %	32,37(1)***	Very high
20	21,95 %	42,97 %	27,08 %	5,99(1)*	Moderate
21	20,33 %	39,80 %	27,08 %	3,89(1)*	Low
22	11,38 %	22,28 %	37,50 %	6,36(1)*	Moderate
23	15,45 %	30,25 %	29,17 %	0,02(1)	Null
24	14,63 %	28,64 %	29,17 %	0,01(1)	Null
25	18,7 %	36,61 %	22,92 %	4,74(1)*	Moderate
26	14,63 %	28,64 %	28,13 %	0,00(1)	Null
27	17,89 %	35,02 %	20,83 %	5,25(1)*	Moderate
28	11,38 %	22,28 %	29,17 %	1,49(1)	Null
29	2,44 %	4,78 %	34,38 %	32,05(1)***	Very high
30	6,5 %	12,73 %	23,96 %	4,42(1)*	Moderate
31	10,57 %	20,69 %	16,67 %	0,47(1)	Null

Note: ***: $p < .001$; **: $p < .01$; *: $p < .05$; χ^2: Chi-square

Table 3. Beliefs of the rural extensionists pertaining to both clusters

	Cluster 1	Cluster 2
Very high relevance		11. Small farmers left aside in their views and priorities by development projects.
		29. Extension as a horizontal relationship.
		19. Critical attitude about what development and rural extension are.
High relevance	13. Rural extension as transference and adoption of technologies. Resistance to change.	17. Small farmers posses a rationale, a logic, that is their own, which does not coincide with that of rural extensionists.
		4. In extension practice it is important to form interdisciplinary rural extension teams.
		9. Practitioners, their actions and their limitations are perceived as problems for the impact of extension work.
Moderate relevance	15. Lack of water or land, tenure problems, degradation of natural resources.	1. Small farmers are neglected by the extension system. Lack of economic resources in extension institutions, practitioners not properly trained or inadequate extension strategies.
	3. Small farmers are individualistic and distrustful. Shortage of associations.	30. Acknowledgement and valuing of peasants' knowledge, practices and capabilities.
	2. Small farmers are perceived as a problem for their own improvement and for extension activities.	22. Understanding farmers is necessary, sometimes their perspective seems to make no sense.
	7. Lack of economic and productive resources, more capital and investment are needed at farm level.	
	27. Patronage or paternalistic local practices as a problem for rural development	
	25. Training farmers is part of extension work.	
	20. Undervaluation or a critical perception of small farmers' knowledge and productive practices.	
	18. Inter-institutional articulation as part of extension work.	

Table 4. Summary of differences between Cluster 1 and Cluster 2

Characteristics of the rural extensionists pertaining to both clusters	
Cluster 1	Cluster 2
a. Critical towards farmers' knowledge and practices	a. Critical attitude towards themselves, their institutions and instituted notions relating to rural development
b. Support transfer of technology model of rural extension	b. Recognition of small farmers' rationale as legitimate
c. Focus on issues relating to technology and natural resources	c. Support a dialogical and horizontal way of doing rural extension
d. Recognition of the inter-actor nature of development dynamics	d. Look for an interdisciplinary approach

Table 5. Clusters' membership and statistical relations with other variables

Variables	Statistical associations
a. Sex	χ^2=1.11(1)
b. Age	MW: Z=-1.61
c. Level of education	MW: Z=-3.02**
d. Degree	χ^2=19.38(4)**
e. Working institution	χ^2=4.97(2)
f. Region	χ^2=6.47(4)
g. Experience as rural extensionists (in years)	MW: Z=-1.49

Note: **: $p < .01$; χ^2: Chi-square; MW: Mann–Whitney U test