The Identification and Influence of Social Roles in a Social Media Product Community

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This research focuses on the identification of social roles and an investigation of their influence in online context. Relying on a systemic approach for role conceptualization, we investigate member's activity, shared content and position in the network within a consumer to consumer social media-based community (SMC) around a product. This investigation led to the identification of ten core roles, based on three key elements: object of interest *(product, practice, and community),* main contribution type *(sharing information and seeking information),* individual orientation *(factual, emotional). We propose an explanation about how these roles, through their positioning, participate in the community dynamics and how they contribute to the creation and diffusion of cookery as a social practice, shaping the periphery around this practice.*

Introduction

Researchers' infatuation with online communities and social networks has given rise to a rich vein of publications on members' online behaviors, focusing on members' characteristics (Kozinets, 1999), motivation analyses (Ridings & Gefen, 2004), or dynamic flow of resources (Faraj et al., 2011). One main conclusion in the literature highlights members' heterogeneity in terms of their orientation toward the community and the way in which they enact roles, and the meanings they construct, so that the comprehension and integration of the different groups remain a challenge for research (Thomas et al., 2013).

One of the key concepts used by researchers to investigate these members' groups is social role, which has a positive effect on group functioning. In fact, Strijbos et al. (2007) found roles to facilitate the member's awareness of peer contributions and overall group performance and to contribute to the distribution, coordination, and integration of subtasks to attain a shared goal (Strijbos & Weinberger, 2010).

Herrmann et al. (2004) show that social roles have a structuring, coordinative, and supportive function for communities. Also, robust brand communities establish cultural foundations by enabling everyone to play a valuable role (Fournier & Lee, 2009), which then contribute to the creation of a common value (Schau et al., 2009). However, some outstanding issues limit the scope of these results. First, studies have used different concepts to investigate users' characteristics in online context, such as user types (Füller et al., 2014), social roles (Golder & Donath, 2004), social types (Turner & Fisher, 2006), or behavior patterns (Viegas & Smith, 2004). As well, the conceptualizations and the methodologies used to investigate members' behaviors are different, leading to different types of taxonomies. Further clarification of role conceptualization and operationalization are therefore still required. Second, most researchers analyzed the whole community in a specific context – e.g. consumption activities (Kozinets, 1999); collaborative e-learning (Stijbos & Weinberger, 2010) – and those focusing on the core community (the most active group) have centered mainly on leadership roles (i.e. Johnson et al., 2015), requiring more investigation of other community core's roles. Third, there is still a need for further studies about internal dynamics in online communities, specifically about standards diffusion from the core to the periphery, in different types of communities (Rullani & Haefliger, 2013).

In attempting to fill these gaps, our research explores the functioning of a media-based community initiated by users by investigating how core members engage differently in the community dynamics through the roles they play and how they impact other members. First, relying on a social role's systemic conceptualization (Parsons, 1949) and on positioning theory (Davis & Harré, 1990), we propose an investigation of member's roles based on an analysis of three dimensions: member's activity, shared content, and position in the network. Second, by extending the integrated methods used by Füller et al. (2014) to study crowd innovation communities or by Johnson et al. (2015) to model community leadership, we use a three-step methodology — quantitative, qualitative, and structural — to investigate each dimension. This investigation led to the identification of five user profiles, then a typology of core members' roles based on three key elements: *object of interest* (product, practice, and community), *main contribution type* (sharing information and seeking information), *individual orientation* (factual, emotional), enriching previous typologies in the literature. Third, through the prism of practice theory, we describe how these roles participate, through the content they share, in the construction, enrichment, and evolution of the practice at very different and specific levels. We then propose an explanation about how the core shapes the peripheral members via the standards contained in the artifacts they share. Fourth, through additional nonparametric tests, we validate that core roles impact differently peripheral activity, specifically the generated comments. Finally, by using structural equivalence, we show that members with the same roles regarding their shared content have different positions in the network and reach different members.

Social role conceptualization

Social role is a key concept that has been widely investigated in different fields, such as anthropology (Linton, 1936), sociology (Newcomb, 1950), and social psychology (Mead, 1934), leading to the development of three main conceptualizations. The **functionalist** perspective (Linton, 1936) defines social role as the behavior resulting from the person's position in a social structure: the "statute." This perspective sees the role as externally defined by societal norms and, thus, imposed onto the individual (Newcomb, 1950). In the **interactionist** perspective (Mead, 1934), roles are situational, as they are created within interactions. This perspective considers the role as a response or reaction to others' behavior, and, as such, it can't be experienced outside these interactions (Mead, 1934). Relying on those two theoretical backgrounds, a third conceptualization, the **systemic** approach, emerged on the basis of *action theory*

(Parsons, 1949). According to this conception, roles emerge from interactions, but these interactions are shaped by the structural system in which they occur. Social role is then defined as an organized pattern of behavior, related to a particular position of the individual in an interactional environment.

In the context of virtual communities, social roles have been defined differently, according to the perspective chosen by researchers (see Table 1). For instance, some definitions (Welser et al., 2007; Fisher et al., 2006) are based on a functionalist conceptualization, since they consider the member's behavior as being related to his position in the network. Yet, insofar as roles in virtual communities are informal and developed in a dynamic way through interactions between members (Herrmann et al., 2004), the interactionist and systemic approaches have been more frequently used (Jahnke, 2010). Welser et al. (2007), for example, define social role as " … a highly distinctive combination of meaningful, situated actions associated with actors in particular positions." More specifically, according to Herrmann et al. (2004), social role has four characteristics: 1) **Position** in the group; 2) **Functions/tasks** related to the position of the role's actor, usually in the form of explicit and documented expectations assigned by the group; 3) **Behavior-expectations**, nonexplicit expectations: "It is mostly an informal agreement and commitment" (p. 169) about what is expected in some situations; 4) **Social interaction,** the result of "*a negotiation between the role actor and those with whom he or she interacts*" (p. 169).

From conceptualization to operationalization

Closely related to those conceptualizations, different methodologies have been used to investigate social roles within online communities (Gleave et al., 2009). Studies based on a **functionalist** perspective focus on an analysis of the member's activity or position, or both of them, using principally *quantitative* and *structural analysis* that rely on mathematical tools, visualizations, and metrics (Fisher et al., 2006; Viegas & Smith, 2004). Conversely, investigations using an **interactionist** approach focus on the analysis of the context and content of exchanges. They mainly use *interpretative analysis*, through qualitative methodologies such as ethnography and content analysis (Golder & Donath, 2004). The **systemic** approach, by considering both the member's position and interactions, uses a combination of qualitative and quantitative or structural methodologies (Füller et al., 2014; Johnson et al., 2015).

The use of such varied methodologies leads to the detection of various role taxonomies. Indeed, quantitative analysis results in a definition of roles based on a member's activity description, either its intensity or density – e.*g. key contributors* or *low volume repliers* (Brush et al., 2005). Structural methodologies enable to detect roles based on social actions, directed toward other members – e.g. *question/answer people* (Fisher et al., 2006). Finally, the use of qualitative analysis leads to a definition of roles based mainly on members' functions – *facilitator-knowledge; elicitor* (Waters & Gasson, 2005) – or participative attitudes – *celebrity; flamer* (Golder & Donath, 2004). Table 1 relates some roles taxonomy to the used methodologies.

One conclusion drawn from this literature review is that the wide range of role conceptualizations and methodologies used in virtual communities' context makes it difficult to set a clear framework to investigate this concept. Each conceptualization and methodology presents both advantages and limitations. The functionalist approach focuses principally on the member's participation level and his position in the social structure. Yet, although the participation level impacts the member's role (Golder & Donath, 2004) and gives an indicator of his engagement in the community, it is not a sufficient criterion for detecting the whole role. Moreover, structural methodologies, used to identify the member's position in the network, provide a better understanding of the network structure, but don't

Table 1 Main roles conceptualizations and taxonomies according to methodology used

Author	Concept and research context	Elements of conceptualization	Approach	Methodology	Detected taxonomies and other principal results
Turner et al. (2005)	Roles in newsgroups	Behavior patterns and structural position of member	Functionalist	Quantitative analysis of posting activity and structural analysis through visualizations.	7 member types: *answer person, questioner, troll, spammer, binary poster, flame warrior, conversationalist.*
Brush et al. (2005)	Social roles in newsgroups	Member activity	Functionalist	Quantitative analysis of activity type and intensity on 3 datasets: survey; usage log; social accounting data.	5 roles: *key contributor, low volume replier, questioner, reader, disengaged observer.*
Nolker & Zhou (2005)	Roles in newsgroups	Member behaviors, conversation, relationships, and social networks.	Functionalist	Predefined roles Quantitative analysis of activity and structural analysis of the social network.	Description of attributes and measures to detect key members: *leaders, motivators, chatters.*
Fisher et al. (2006)	Social roles in newsgroups	« ... *behavior of status occupants ... oriented toward the patterned expectations of others* »	Functionalist	Investigation of different types of newsgroups. Structural analysis at the collective and individual level.	A newsgroup typology based on their network structures. Distinction between: *question/answer people* and *discussion people.*
Welser et al. (2007)	Social roles in newsgroups	Structural and behavioral patterns of members' participation (role *signature*).	Functionalist	Structural analysis (visualization of local networks) across three usenets. Content analysis to validate the results	Development of a methodology to detect automatically the *answer person* role.

Table 1 continued

Author	Concept and research context	Elements of conceptualization	Approach	Methodology	Detected taxonomies and other principal results
Golder & Donath (2004)	Social roles in newsgroups	Member's communicative competence, participation level, strategies of 'self presentation'	Interactionist	Ethnography on 17 newsgroups Qualitative analysis of exchanged content.	6 roles: *Celebrity, newbie, lurker, flamer, troll, ranter.*
Waters & Gasson (2005)	Roles in collaborative learning context	Member's behavior on three learning dimensions: teaching, social and cognitive.	Interactionist	Experimentation and qualitative analysis of posts issued from exchanges between members	8 roles: *Initiator, contributor, facilitator, knowledge-elicitor, vicarious-acknowledger, complicator, closer, passive-learner.*
Hermann et al. (2004)	Social roles in collaborative learning context	Member's position; tasks and function; expectations; social interaction.	Systemic	Experimentation and case study Qualitative analysis of exchanges between members.	9 roles: *Author, guest, conclusion-maker, promoter of the procedure, decision-initiator, scaffolder, organizational-supporter, technical-supporter, conflict-mediator.*
Strijbos and De Laat (2010)	Roles in collaborative learning context	3 conceptualization levels: micro, meso and macro level.		Conceptual paper	A role taxonomy, at the macro level, based on: group size; orientation; member effort. 8 roles: *Over-rider, ghost, free-rider, captain, pillar, hanger-on, lurker, generator.*

Table 1 continued

Author	Concept and research context	Elements of conceptualization	Approach	Methodology	Detected taxonomies and other principal results
Turner & Fisher (2006)	Social types in newsgroups	A construct that falls, conceptually between an individual behavior and role.	Systemic	Quantitative analysis of social interactions data and qualitative analysis (focus groups) with the leaders.	4 social types participating in the information flow in the group: *members, mentors, managers and mengols.*
Pfeil et al. (2011)	Social roles in online support community	Member's position in the network and his interactions with others.	Systemic	Qualitative analysis of members' exchanges and structural analysis of the interactions network.	6 roles: *Moderating supporter, central supporter, active member, passive member, technical expert, visitor.*
Welser et al. (2011)	Social roles in a distributed collaboration system: Wikipedia.	A set of situated actions associated with actors in particular positions.	Systemic	An iterative process using qualitative and structural analysis. 3 levels of abstraction: social action; behavioral regularities and distinctive positions; abstract theoretical categories.	4 roles: *technical editors, substantive experts, vandal fighters, and social networkers.*
Füller et al. (2014)	User types/ user roles in crowd sourcing context	Behaviors and relationships structure.	Systemic	Quantitative analysis based on the member's activity and network structure data and content analysis across the six identified user types.	6 roles: *Socializer, idea generator, master, efficient contributor, passive idea generator, passive commentator.*

Table 1 continued

Author	Concept and research context	Elements of conceptualization	Approach	Methodology	Detected taxonomies and other principal results
In the field of marketing					
Kozinets (1999)	User types in communities of consumption	Two dimensions: relations with the activity and relations with the community.		Conceptual paper	Typology of four users types: *tourists, minglers, devotees, insiders.*
Fournier et al. (2009)	Social and cultural roles in brand communities	Not specified	Interactionist	Not specified. Examination of research on different communities.	18 social and cultural roles: *mentor, learner, back-up, partner, storyteller, historian, hero, celebrity, decision maker, provider, greeter, guide, catalyst, performer, supporter, ambassador, accountant, talent scout.*
De Valck et al. (2009)	Member types in virtual community dedicated to culinary matters	Not specified	Interactionist	Survey and netnography Quantitative analysis of frequency and duration of visit, and activity type and qualitative analysis of core members' discussions.	6 member types: *core members, conversationalists, informationalists, hobbyists, functionalists, opportunists.* 4 main frames of discussions in core members' shared content.
Seraj (2012)	Social roles in a community on aviation	Not specified	Interactionist	Netnography with offline, online, and email interviews with 11 active members of the community.	7 roles based on the value type the member creates: *educator, seeker, challenger, governor, appraiser, player, innovator.*

take into account the context and content of relations (Gleave et al., 2009). Besides, two individuals may have a similar position in the network but not a similar role, e.g. the broker role (Burt, 2005), "*nor is role use likely to result in exact similarity of positions*" (Gleave et al., 2009, p. 5). The interactionist approach, which relies on interpretative methodologies, has been used efficiently to identify and understand important social roles and the context in which they develop. Such methodologies neglect however the macrosocial structure within which the roles emerge and develop, with findings often specific to a particular context and, thus, difficult to compare across social settings (Gleave et al., 2009).

In the purpose of addressing these remaining conceptual and methodological issues, we rely on a further conceptual framework to improve our conceptualization and operationalization of social roles. Positioning theory (Davis & Harré, 1990), which considers all interaction as being discursive or narratives, provides a conceptual and methodological resource particularly appropriate to investigate interactions in virtual spaces (Tirado & Gálvez, 2008). This theory might constitute a promising expansion to discursive and emergent aspects of roles investigated in literature (Sarmiento & Shumar, 2010). By providing a complementary picture of role conceptualization, positioning theory contributes to gain a deeper insight about the processes underlying the role emergence. We draw thus upon this theory to clarify and refine our role conceptualization, to establish a basis for its operationalization, and to guide our investigation.

Positioning theory as an analysis tool

Positioning is defined as "*the discursive process whereby people are located in conversations as observably and subjectively coherent participants in jointly produced storylines*" (Davies & Harré, 1999, p. 37). The fundamental core of positioning theory's proposals is the idea of discursive practice (Tirado & Gálvez, 2008), taking an interest on "*how people use words (and discourse of all types) to locate themselves and others*" (Moghaddam & Harré, 2010, p. 2). Tirado & Gálvez (2008) propose two areas which articulate the proposals of positioning theory: people in their interaction, which negotiate positions, and narrative accounts constructed within this dynamic, which configure a person's activities. Positioning theory offers then the advantage of allowing to position people regarding their location and their relative stance within a content (Sarmiento & Shumar, 2010). Conversely, as proposed by these authors, studies in the context of online communities (specifically in CSCL) offer the possibility of inquiring about how knowledge artifacts are also subject to positioning and about the ways that this might affect knowledge-building. The same approach could be applicable to the community we investigate[1]. Social role is indeed mainly a question of position and action in interaction. Using positioning theory to investigate roles in an online community, where members perform different actions and tasks, mainly through sharing content of different nature, would enable to go beyond a simple classification of members' roles. It would allow to draw a richer picture about these roles interactions, by positioning members in relation to each other (in the community), and in relation to the constructed artifacts (shared content).

Thus, based on prior conceptualizations, and in line with the systemic view, we define social role as *a pattern of observable behaviors emerging from member's interactions and related to his position in the network*. For the operationalization, we draw upon both positioning theory and Herman et al.'s (2004) and Jahnke's (2010) role's conceptualization. We consider three aspects, two of them defined by these authors, highlighting how each one positions differently the member: 1) *activity* intensity, as the first characteristic to define a member's role in a group. It positions the member into the whole

community, indicating its contribution in its overall activity; 2) *shared content* resulting from interactions, indicating the tasks performed by the member within the group. This aspect positions the member regarding the content he constructs through his actions (speech acts); 3) *position in the network*, which impacts the member's function in the group. This criterion positions the member in relation to others at a structural level. In line with this conceptualization, we implemented a three-step methodology for roles investigation.

Methodology

Data collection

Our research investigates a social media-based community, initiated by consumers on Facebook around a product (a cooker of one of the world-leading manufacturers of small appliances). Our first step was to join the community to observe conversations and exchanges between the members. For ethical reasons, we informed the community creators of our academic profile and our research. Our second step was to collect the conversations data of the community, using a crawler based on Facebook API previously developed by two computer scientists in our research team. The data collection, conducted between December 2013 and January 2015, gathers conversations, activity, and relations between the members. For ethical reasons, we followed six rules defined by U.S. federal regulations governing research (45 CFR 46.116.d), and the guidelines set by scholars: Our research was executed in a way that would not cause harm to the subjects; we took every precaution to protect subjects' privacy, and we anonymized the data; we did not interact directly with the subjects. We believe the finality of this study is sufficiently high to merit the potential costs associated with the use of data. Data will not be used for any other purpose; all data are programmed to be deleted within 3 years after collection.

The community consists of 13,814 active members, an active member having performed at least one action, either posting, commenting, or liking, during the period. The analyzed activity is based on 16,173 posts, 137,814 comments, and 120,680 likes.

Role investigation: a three-step analysis

Step 1: Users' activity analysis and community core's identification
In a first step of our investigation, we looked at members' activity by considering two dimensions: the *activity intensity* (participation level), as the sum of posts, comments, and likes of each member; the *activity type*, which differentiates actions initiated by the member (posts) from his reactions to other members' actions (comments or likes). These three types of activities reflect different engagement levels among participants, who can be either "actives" or "reactives" (Teichman et al., 2015). We described then seven user segments according to their activity types: members performing one action only (post, comment or like); two actions only and, finally, all three activities. We focused then our further analysis on the segment of members who performed the three activities (posting, commenting, and liking) at last once during the period: the PCLs.

Following recommendation of previous researchers (i.e. De Valck et al., 2009), we ran a two-step cluster analysis as it combines the principles of hierarchical and partitioning methods and has recently gained increasing attention from market research practice (Mooi &Sarstedt, 2011). We used six variables: number of posts (member's engagement); number of likes and comments (member's reactions); number of received likes and comments (member's influence); average number of received comments per post (feedback density); average number of given comments per post (reaction density that may

indicate a "chatter" profile (Nolker & Zhou, 2005); self-comments (weight of comments on own posts in total of member's comments, indicating whether the member is oriented toward others or self-oriented). We first checked that correlations between variables were lower 0.90 to avoid overrepresentation in the clustering solution. In order to reduce the extremity of outliers (Pinj & Stewart, 1983), we standardized the variables and selected Euclidian distance which is adapted to continuous variables. We finally obtained a silhouette coefficient of cohesion and separation above .50, confirming cluster validation. This cluster analysis led to the detection of five groups and enabled us to identify the community core.

Step 2: Content analysis of core group's posts and roles' detection
In a second step, we conducted a content analysis of the 1,150 posts shared by the community core's members. In a first exploratory investigation, we passively observed the interactions between members to improve our understanding of the community. In a second stage, we read the contributions, making notes about key themes and topics. This thematic codification followed an iterative process until saturation was reached. Our analysis is based on an interpretative paradigm as we didn't predefine dependent and independent variables, our objective being to construct knowledge about the social reality -of the investigated community- through social constructions (e.g., shared meanings) (Klein & Myers, 1999). Nevertheless, the development of our coding scheme was guided by two main questions: 1- What is the objective of the post (e.g. making an enquiry, answering a question, sharing information), 2- What is the topic of the shared content (e.g. cooking; using the product). Our coding was enriched incrementally as we progressed in our reading of posts. The objective, in line with our conceptualization, was to investigate the activities done by members in their interactions, so that we can position them in relation to the content/artifacts they constructed. The final coding scheme (see table 2) resulted in 24 themes grouped in six categories. A subset of 345 posts (30%) was coded by a second researcher; 10% of the complete dataset is frequently given as a guideline for recoding (De Swert, 2012). Comparing the coded messages of the main researcher and the second coder resulted in a Cohen's kappa coefficient of 0.71 which was considered to be a strong agreement (Landis & Koch, 1997).

Individual analysis and detection of behavioral patterns: To analyze shared content at the individual level, we calculated, for each theme, the difference between its frequency in individual posts and the mean observed in the entire group. The objective was to emphasize categories distinguishing certain members from others, and de-emphasize similar categories among many members, to identify the individual behavioral recurring patterns (Pfeil et al., 2011). Identifying such specific patterns of behavior enabled us to group together members playing the same role.

Step 3: Structural analysis and roles description through position in the network
In order to identify each core member's position, we ran a social network analysis. The first stage was to build the core members' network on Gephi[2] software. Each node represents a core member or a member linked to him (by a given or received comment). Then, we characterized each member of the network using the structural variables defined by Easley and Kleinberg (2010). The most famous measures are the *in-degree* (number of arrows going into the node) and the *out-degree* (number of arrows going out of the node). The *degree* (number of direct links of a node) gathers in-degree and out-degree. The *betweenness centrality* is the number of shortest paths from all nodes to all others that pass through the considered node. A node with high betweenness centrality plays an important role in information transfer through the network, by connecting different subcommunities. The *HITS algorithm* (Kleinberg, 1999) uses two

Table 2 Coding scheme issued from posts content analysis.

Category: Description	Examples
1-Questions and requests	
1.1-Questions about the product: product use in general, its compatibility with other products …	*Good evening, can we use "MyCookr" to make pasta with sausage?*
1.2-Questions about cooking practice: recipes, advice or ideas	*Hey, I have puff pastry in my fridge … and an urge to play with MyCookr … any ideas?*
1-3-Questions about the functioning of the group: technical functionalities or group rules	*How do I invite a person to join the group? She just ordered [its] MyCookr.*
1-4-Other questions and requests	
2-Content sharing about cooking practice	
2.1-"on the menu": sharing info about the meal the member has prepared or is going to prepare.	*Excellent tuna bread … a real success … then a delicious chili con carne!*
2.2- Recipe sharing	
2.3- Planned activity	*As soon as I have 5 min I will share a recipe*
3-Information sharing about the product: factual aspect	
3.1-The product use: new usage suggestion; advice and guidance …	*Do you know that you can also cook hard boiled eggs in your MyCookr?*
3.2-Practical aspects: cleaning and servicing; advice about problem solving …	
3.4- Other sharing: good deals, new products ….	*The latest version of the M. Brand should be available in December for a price ranging from 299 to 330*
4-Content sharing about the product: personal and relational aspect	
4.1- Link and relationship with the product: affective relations; feelings toward the product.	*This MyCookr is my new best friend!*
4.2- Personal stories related to the product: stories related to product use; reflections and thoughts related to the product; activities.	*So sad to have to forego his new toy for a whole day because I could explode!! Mission: finish leftovers before playing with toy again pffff!*
5-Community life	
5-1-Details and clarification about the functioning of the group: rules, functionalities and "spirit" of the community.	*An index of recipes has been provided so that you can more easily access all the recipes Please follow the link you can add your recipes in the tab at the top*
5.2- Group development and identity maintenance: maintenance and preservation of group unity.	*If you feel happy in this group, can I suggest that you don't respond to intruders. Don't answer them, it makes them feel important. Ignoring them is best …*

Table 2 Continued

Category: Description	Examples
5.3-Group improvement: suggestions and ideas to improve group functioning, motivating members to participate	Hello, it would be better if each of us made an effort to search for recipes on the net because we go round and round in circles with the same old recipes …
5.4-Relationship to the group: attachment and belonging	Hello, my favorite group! I wish you a good week and tasty meals with MyCookr. kiss
5.5- Other participation: ideas, content update	Can I suggest we post a new recipe every month? To participate, you can add your recipe to this post
6-Socialization	
6.1- self-disclosing messages: introduce oneself, personal stories..	Baby Jules is sleeping, my eldest children are watching tv, my old man went to cut wood for the stove...

scores to identify *authorities* (nodes that many other nodes point to) and *hubs* (nodes that point to a relatively large number of authorities) in the network.

RESULTS

Role investigation through activity, content and position analysis

Activity analysis and core's identification: positioning in the whole community

This first analysis allowed us to describe seven user segments according to their activity types. Table 3 describes the weight and the activity of each identified segment.

As results show, the *Poster-Commenter-Liking* segment (PCL) represents 31% of the community and 77% of the total of its activity, and almost 90% of received comments. We selected thus this segment to perform a cluster analysis which resulted in the detection of five clusters (see table 4).

Table 3 Description of activity type in the community

Activity type	Number	Weight %	# Post.	#Com.	#Likes	Activity weight %	#Received likes	#Received com.
Exclusive post	442	3.20	495	0	0	0.18	992	461
Post + like	396	2.86	439	0	1411	0.69	1616	519
Post +com.*	1 062	7.68	1 823	6 925	0	3.24	8 551	14 285
Post + like + com.	4 274	30.93	13 418	110 909	83 044	76.91	101 891	122 219
Exclusive like	3280	23.73	0	0	9 202	3.41	0	0
Exclusive com.	1 426	10.32	0	3 807	0	1.14	0	0
Like + com.	2 938	21.26	0	15 934	22 234	14.15	0	0
Overall activity	1 3818	100	16 175	137 575	115 891	269 641	113 050	137 484

*Com.: Comments

Table 4 Description of clusters within the Poster-Commenter-Liking Segment

Activity type	Passive contributors	Commentators	Self-centered	Active contributors	Highly actives
Size	2 459	465	786	510	51
Posts/user	1.44	2.69	4.71	7.32	22.57
Given com. /user	7.23	37.37	23.26	50.06	615.2
%Self-oriented com.	36.08%	17.14%	50.22%	49.49%	27.44%
Commented posts/user	4.21	21.43	10.68	21.19	246.78
Density of com.*	1.71	1.74	2.18	2.36	2.5
Given likes/user	5.45	62.5	10	24.14	389.55
Received comments /user	3.48	3.61	27.8	71.33	306.04
Density of received com*	3.72	3.74	5.9	9.74	13.55

*Density of com.: Average number of comments per commented post;*Density of received com.: Average number of comments received per post

- The *passive contributors* group represents the majority and is characterized by a low intensity on the three activities: posts, comments, and likes. These members are similar to the "lurkers," previously defined in the literature as low participants (Ridings et al., 2006).
- The *commentators* group is characterized primarily by a high level of *commenting* activity and a lower *posting* activity. Members of this group are oriented towards others. Otherwise stated, the low average number of comments per post (1.74) reveals that they have an answer profile.
- The *self-centereds* group comprises members with more than 50% of comments made on their own posts; they rarely like other members' posts.
- The *active contributors* group is notable for its high activity, both in posts and comments. Members are characterized by a self-centered activity (almost 50% of the comments are made on their own posts), but differ from the self-centered group by a higher activity and average number of given comments per post, and more likes, suggesting a more sociable profile.
- The *highly actives* group is the smallest one (51 members), constituting the *community core*, and is characterized by an intense activity oriented towards others. These members actively participate in the life of the community, both in terms of activity (comments) and generated reactions (received comments). This community core represents 1.2% of the total number of PCLs (0.37% of the whole community), and 25.26% of the PCL segment's activity (20.17% of the whole community activity; 1,150 shared posts and 31,319 given comments). This group also generates 21.25% of community reactions in terms of comments and likes.

This classification enabled a first positioning of members regarding their contribution in the overall community's activity. While "passive contributors" and "active contributors" profiles have been widely discussed in literature – e.g. *posters and lurkers* (Ridings et al., 2006), *active and passive members* (Pfeil et al., 2011) – the "commentators" and "self-centereds" need more investigation, particularly to examine if they interact together in a complementary way. This step enabled also the identification of the core group -the highly actives- on which we focus our further analysis, for two reasons. First, because of their extensive participation, the community core's members play an important role in defining the community's character and content (De Valck et al., 2009). Second, the small size of this group allows for deep content analysis of the posts, which is necessary for the detection of social roles, as previously mentioned.

Content analysis and core roles detection: positioning in relation to the content

We present first a description of the characteristics common to the entire group, then, we focus on an investigation at the individual level, highlighting the differences between members.

Group description: a first descriptive analysis of the occurrences of the main categories in all group's posts showed that the shared content has mainly a social aspect (the category "*socialization*" appeared in 60% of the posts) and is related to cooking practice (the category "*content sharing about the cooking practice*" appeared in more than 50% of the posts'). The two other most frequently occurring categories are "*questions and requests*" and "*community life.*" The analysis of themes' occurrences revealed that, beyond "*greetings*" formulas, sharing experiences about cooking and meals prepared ("*on the menu*" theme) represent the main discussed topic (in almost 45% of posts). "*Questions and requests about cooking practice*" appeared in 12.5% of the posts; "*personal stories related to the product*" and "*recipe sharing*" in around 10% of the posts. This shows that core members are heavily involved in the community, both at the personal and social level. They like to share their personal experiences about cooking and the product, and engage in the preservation and improvement of the community. Three main concerns structure thus the group exchanges: *cooking practice*, *product,* and *community*. To reveal the different roles within this group, we focus hereafter on individual-level analysis,

Individual analysis and detection of behavioral patterns: This step, as mentioned in the methodology section, consisted in bringing members into groups according to their shared content. For this purpose, and drawing upon the procedure used by (Pfeil et al., 2011), we calculated first the percentage represented by each of the 24 coded themes in each member's posts, and second the average frequency of each theme in the whole group. Then, we calculated the difference between these two values. These measures were taken as a basis to highlight themes distinguishing members from others and then, grouping together members who share these distinctive themes. This led to the detection of 10 different groups, with different behavior revealing members' roles, described below.

1-The mentor is a central group member, who ensures the proper functioning of the community by specifying or recalling the technical aspects of navigation and platform's functionalities in order to facilitate members' participation. He also plays an active role in promoting and improving the group, and encourages community cohesion by getting involved in social exchanges. This member also shows strong knowledge of and skills in cooking practice, as he actively participates in recipes sharing. He thus contributes to the enrichment and development of the group, both in terms of expertise and strengthening of relationships.

2-The gatekeeper is the pillar of the community who primarily focuses on the preservation of group identity and values. He also ensures the proper functioning of the group, mainly by emphasizing the rules and standards to be met. He is the protector of group unity and defends the community from potential threats from competing groups.

3-The product ambassador is essentially product-oriented and is primarily active in sharing information about the product in order to improve other members' knowledge. This member is also engaged in community life and intervenes, in particular, in group improvement and development. Her participation in community life is aimed essentially at the promotion of the group as a users' meeting place. For this member, the group is an area of product promotion.

4-The generalist is mainly involved in community life and in social exchanges with others, but at a lower level than mentors or gatekeepers. He also exchanges posts about the product and/or practice, without having an expert or an amateur profile.

5-The friendly product fan is mainly characterized by a strong relationship with the product, expressed through affective attachment or storytelling around its use. He is also involved in social interactions with other members, especially in animation activities, and community life. He seems to be particularly interested in creating social or emotional connections, either with the product or with

other group members. This member plays an important role, promoting discussions about the product and its use, creating close and genuine relationships around it.

6-The amateur mostly posts to share his "achievements" (prepared meals), showing his real interest about cooking practice, but from a social perspective. The amateur seeks particularly to share aspects of his daily life with the group; he socializes around the cooking practice.

7-The product fan amateur is also characterized by a socializing behavior around cooking practice, but she also expresses an affective attachment to the product. The role of this member is important as she associates the product's emotional benefits - her affective relationship - with its functional benefits - the meals she prepares with the product. Relating these two factors would indeed lead to the consolidation of the link between users with different profiles.

8-The product fan learner is both emotionally close to the product and interested in improving his competencies by asking questions and seeking information about the product or the practice. For this member, the group is both a discussion board about the product and a mean of acquiring new knowledge and skills.

9- The amateur learner is both passionate about cooking and sharing her achievements, and interested in learning and in improving her knowledge about practice or product use. For her, the group is a place to exchange ideas about the practice, in a social way, and as a place of learning.

10- The friendly learner is interested in knowledge acquisition, particularly about cooking; he is also involved in the creation of social ties with other members.

Our analysis of the community core's posts enabled us to differentiate members and detect their roles by positioning them according to the content they construct and share. This content-based positioning can be made according to three dimensions, which emerged from the analysis: *contribution type* (sharing information or seeking information); *object of interest* (product, practice, or community); *orientation* (factual or emotional). Positioning core members in this way provides an interesting picture about how they build the community's dynamics, impacting the information flow across the community. Some roles show interest in two different objects (e.g. product and practice; product and community; practice and community), making them connected. The *Mentor*, through his expertise and involvement in the community life, disseminates information and knowledge about the practice throughout the group. The *friendly product fan* creates closeness between the community and the product as he shares his experiences and emotional attachment to the product. The *product fan amateur* significantly participates in relating the practice and the product by sharing his experiences about these two objects. Conversely, other roles are characterized by focusing on one object such as *the gatekeeper*, *the amateur* and *the product ambassador*, who have specialist profiles. Finally, there are the information seekers who are engaged in a learning process as they participate essentially by asking questions, either about the product, the practice or the group functioning.

This typology's description provides insight about how core members participate actively, and in a complementary way, in the creation, diffusion, and evolution of *cookery* as a social practice. Schatzki (2002, 2015) defines social practice as "*nexuses of human activity, open-ended sets of doings and sayings organized by understandings, rules, and teleoaffectivities*[3]" (Schatzki, 2015, p. 1). It is a socially shared pattern of activity shaped through three dimensions (1) meanings and representations; (2) objects, technologies and material culture in general (3) embodied competences, activities and 'doing' (Magaudda, 2011). These dimensions represent three key elements of integration of the social practice (Shove & Pantzar, 2005), which allow it to be perpetuated, reproduced and transformed over time (Dubuisson-Quellier & Plessz, 2013).

By disseminating information about the product (i.e characteristics, uses), cooking practice (know-how; recipes, personal experiences) or the community (i.e rules; identity), on a factual or emotional basis, core members construct new meanings, rules, and "*bundles of practices*" - articulated
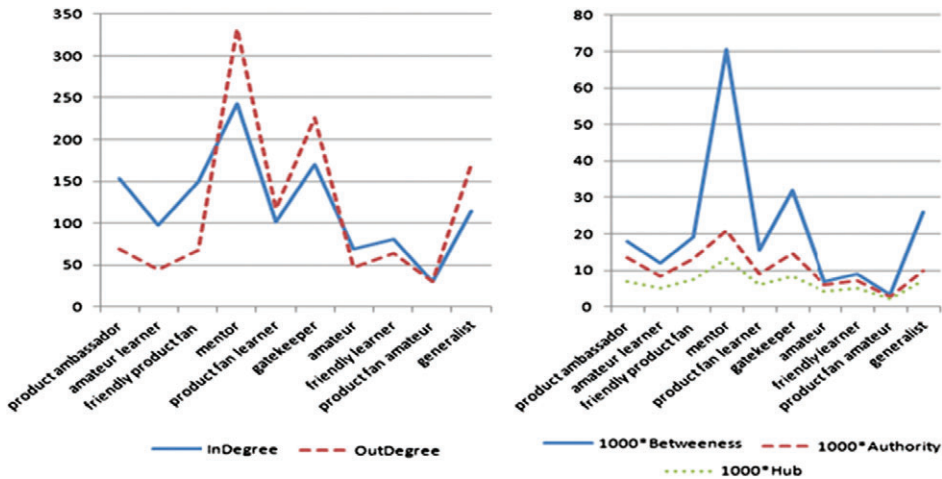
Figure 1 Network centrality measures per role

around both practice and material arrangements (i.e. the product, the online platform) (Schatzki, 2002, p. 51), such as cooking with the product; sharing recipes on the platform-, as well as new teleoaffective structures (*ibid*). This leads to the evolution and the enrichment of the practice according a particular "circuit" (Magaudda, 2011), where each of the three dimensions of social practice (objects, representations and doing) impacts each other, leading to practice evolution. The scope of the core's contribution in practice creation is discussed later.

Structural analysis: positioning in relation to other members in the network

This analysis allows a description of core roles regarding the members' positions in the network. Figure 1 shows how these roles differ according to different network structure's characteristics.

The mentor and the gatekeeper are at the first and second highest level respectively, in respect of their centrality, authority, hub, and connector position. The generalist scores highly in terms of out-degree and betweenness, revealing a high connector role, but he is neither authority nor hub. On the contrary, the product fan amateur and the friendly learner have the lowest scores on all the criteria. The product ambassador is characterized by a relatively high in-degree score despite of a low out-degree score, revealing a strong interest of members towards product-related content.

Betweenness is then related to profiles sharing content about the community (e.g. the gatekeeper) or both community and practice (e.g. the mentor and the generalist). Sharing expert content about the product provides high centrality but doesn't result in a connector position (e.g. the ambassador). Furthermore, having a sociable profile (engaging in social exchanges) does not necessary mean that the member is positioned as connector at a structural level.

Table 5 summarizes the roles characteristics detected through our three-staged investigation: *activity*; *connectivity*, related to betweenness score of the structural analysis; *sociability*, referring to social proximity (i.e. social exchanges), detected by content analysis; *expertise type*, referring to the type of contribution and the object of interest, detected through content analysis.

We can see that the mentor and the gatekeeper are the bedrock of the community, scoring very high on all the criteria, but having a different expertise (practice vs community life). The product ambassador and generalist have high activity and connectivity, but differ in sociability and expertise (product vs no

Table 5 Summary of role description

	Activity	Connectivity	Sociability	Expertise type
The mentor	very high	very high	very high	Cooking Practice
The gatekeeper	very high	very high	very high	Community life
The product ambassador	high	high	moderate	Product
The generalist	high	high	high	No expertise
The friendly product fan	moderate	high	high	Product affective link
The amateur	low	very low	high	Own practice
The product fan amateur	very low	very low	high	Product affective link, own practice
The product fan learner	moderate	moderate	moderate	Product affective link, questioner
The amateur learner	low	low	moderate	Own practice, questioner
The friendly learner	moderate	low	moderate	Questioner

expertise). The amateur and product fan amateur have low or very low activity and connectivity, but high sociability and specific expertise on own practice. The learners (the product fan, amateur or friendly) differ by activity and connectivity levels. These results show the benefits of investigating social roles by positioning members according to activity, content, and network structure, providing then a richer understanding about roles characteristics.

In the following section, we extend our analysis to examine the impact of these core roles on the community functioning, analyzing how they shape the community periphery[4]. First, we expand our previous analysis and explain how the social practice created by the core members, through the content they share, is disseminated among the periphery, impacting their representations, knowledge and habits. Then, we investigate the impact of these roles on the peripheral activity. Finally, we analyze the influence of the role position in shaping the periphery at a structural level

Core's Roles influence on the periphery

Core's roles influence through content

In the previous section, we discussed how core members participate actively in the construction and evolution of the cookery as a social practice through the content they share. The core's engagement in the construction and sharing of the practice is a key factor ensuring the community's success (Probst & Borzillo, 2008). Practice theory enables to look further at how the core disseminates the practice standards throughout the community, shaping the periphery around these standards and guiding their actions. According to Rullani and Haefilger (2013), the nonmaterial artifacts (Faulkner & Runde, 2010) that the core produces, such as online discussions, are the vehicles through which standards, defining the social practice, propagate in an online community. These standards include social rules and shared values, aimed at guiding the social and technical processes that constitute the activities of the community. As pointed out by Rullani and Haefilger, when peripheral members read the artifacts produced by the core, they can be affected by "the footprint of the practice" contained in these artifacts. This may lead to the adoption and socialization of the practice standards, helping in propagating common ways of working between members.

Differentiating core's roles according the content they share allows highlighting which type of standards they construct and propagate. By being involved in the construction of the cookery practice at different levels (i.e. the product use, the cooking skills, sharing on the platform), each role impacts differently the dissemination of the practice standards among other members.

The gatekeeper for example, constructs and propagates standards about the community functioning (i.e rules and values), impacting other members' behaviors on the platform (i.e. way to share information, way to ask questions) and their representations of the community's identity, as well as their identification with the group. By adopting these standards, peripheral members participate actively in reinforcing them and in the stabilization of the community's identity. The mentor sets and propagates standards about cooking (in the real world) and about sharing knowledge about this practice (in the virtual world). Also, by being engaged in the community life and in personal interactions with other members, he highlights the "social aspect" of the cooking practice. By sharing these standards, the mentor creates new *bundles of practice* (Schatzki, 2002) which brings together practice and platform as *material arrangement*. This fosters the adoption of new habits among peripheral members - related to the activity of cooking and the activity of sharing about it- and leads to the evolution of meanings associated to the cookery practice. The product ambassador, for his part, sets and disseminates standards related to another *bundle of practice*: cooking with the product, introducing additional cooking skills and habits, and creating new expectations among users (i.e. about what to achieve with the product).

The members who share their emotions and personal experiences about the practice (i.e the amateur), the product (i.e. the friendly product fan) or both practice and product (i.e. the product fan amateur) participate also in the practice's enrichment and diffusion. Indeed, in Schatzki' practice theory (2002; 2015), emotions participate in the organization of the activities which compose practices. Thus, through the content they share, those members create connections between emotional states and activities such as cooking or using the product, which could affect other member's representations and habits.

Core's roles influence on the activity

According to Bucklin (2010), a social network user is an influencer if his activity level has a significant effect on other members' activity levels. Applying this definition, we define an influencer in the community as a member whose activity level in terms of posts generates other members' comments. Table 6 presents the number of comments and likes generated per role, showing different levels of influence according to the role.

To confirm the impact of roles on other members' behaviors, we ran non parametric tests to measure the differences between the roles regarding the number of "received comments" and number of "received likes." On account of the small and different size of each group, of the nonnormal distribution and heterogeneous variances of these two variables, we used Kruskal-Wallis non parametric tests. Results showed a significant effect of roles on other members' behavior for received comments ($H(9) = 16.570$, $p < .05$) but not for received likes ($H(9) = 9.589$, $p > .05$). Pairwise comparisons with adjusted p-values revealed that there were significant positive differences on the number of received comments between mentor and respectively friendly product fan ($p < .05$), amateur ($p < .05$), amateur learner ($p < .05$), and friendly learner ($p < .05$). There were also significant positive differences between product ambassador and respectively amateur ($p < .05$) and amateur learner ($p < .05$) as well as between generalist and amateur learner ($p < .05$). All the other pairwise comparisons showed no significant differences. These results provide additional insights about core's roles influence. While the influence via content shows how practice is diffused from the core to the periphery, the activity analysis reveals the intensity of this diffusion, through the number of comments given by the periphery

Table 6 Impact of roles on members' behavior

	#received comments		#received likes	
	Mean	Standard deviation	Mean	Standard deviation
The mentor	1140	1120	1183	1317
The gatekeeper	873	932	880	819
The product ambassador	603	491	537	749
The generalist	555	318	547	392
The friendly product fan	354	299	364	302
The amateur	243	134	189	117
The product fan amateur	103	138	99	138
The product fan learner	341	268	278	254
The amateur learner	196	177	179	195
The friendly learner	370	439	209	215

to the core, engaging conversations and creating communication channels and interactive audience. Results show that roles differ in terms of power to create this interactive audience, the mentor being a big catalyzer.

Core's roles influence through structural position
Another issue about core's roles influence on periphery consists in wondering if there is a benefit to have several individuals assuming the same role in the community core. This question may be answered by identifying if members having the same role in the community core influence different individuals in the periphery. We then studied the roles and their structural positions, which is a strong tradition within social network analysis (Breiger et al. 1975; Doreian et al., 2005), using structural equivalence. Structural equivalence is widely used although many notions of "role" and "position" have been proposed in the literature (see Doreian et al. (2005) for an extensive treatment). Structural equivalence is defined as following: Two vertices of a network are structurally equivalent if they share the same neighbors. In practice, exact structural equivalence is fairly rare. Nevertheless, one may identify nodes which are approximately structurally equivalent, in that their neighborhoods are "similar" in some well-defined sense. As a true equivalence relation, structural equivalence divides a given graph into equivalence classes, which are termed positions. Similarity in network analysis occurs when two nodes (or other more elaborate structures) fall in the same equivalence class. We applied this methodology to the network we previously constructed (i.e. community core's members plus members related to them by comments). We first calculated the similarity between the core members using Euclidean distance and then proceeded to a multivariate data analysis. We applied a hierarchical clustering and divided the members into 10 equivalence classes (we selected the same number of the roles to judge about similarity between classes and roles). We finally visualized both the roles and the equivalence classes (categorical variables) as presented in Figure 2. We conclude from this analysis that community core's members having the same role do not belong to the same equivalence classes, they are not consequently equivalent. In the mosaic plot of Figure 2, the surfaces of the rectangular fields that are available for a combination of features are proportional to the number of observations that have this combination of features. For instance, the members having the "amateur learner" role are classed into class 2, class 3, and class 10. The members of role the
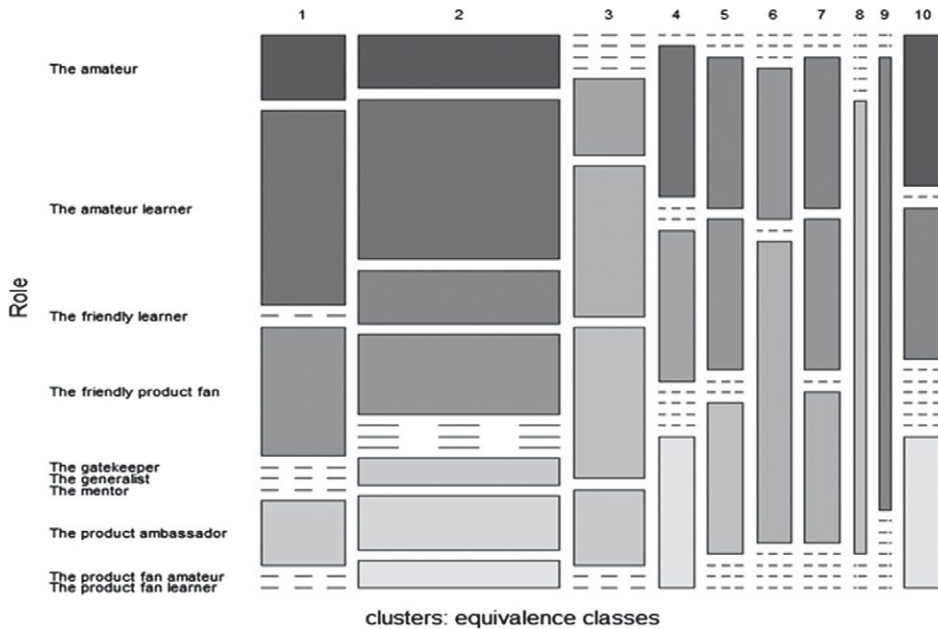
Figure 2 A mosaic plot of Roles and Equivalence classes.

"product fan learner" are classed into class 2 and class 3. We obtain similar results when we look at the roles that generate the higher number of comments or likes, such as "mentor" and "gatekeeper." The mentors are classed into three different classes while the gatekeepers are classed into two different classes. In conclusion, the structural equivalence analysis shows that within each role, core's members do not influence the same members in the periphery. This reveals the benefit of having several members in each community core's group, because they enlarge the audience in terms of practice diffusion, interactivity, and communication.

Discussion and managerial implications

Major findings
The main objective of the paper was the investigation of a social media based community through the analysis of the community core's roles, and the impact of these roles on the periphery. Relying on both roles and positioning theories, we followed a three-stage approach based on an investigation of three aspects: member's activity, shared content, and position in the network. Our study contributes to the literature on core roles at different levels.

First, extending the works of Johnson et al. (2015) or Füller et al. (2014), our research provides a richer core roles typology, thanks to a deepened content analysis. Based on a positioning of members with respect to the *object of interest* (product, practice, community), the *main contribution type* (sharing and seeking information), and the *individual orientation* (factual, emotional), our typology goes beyond previous roles description and has several implications.

Regarding roles description, even if some roles we identified were previously mentioned in literature - i.e. *mentor* (Fournier et al. 2009); *learner* (Watters et Gasson, 2005); *gatekeeper* (Xu et Chen, 2003) -,

socializer (Fuller et al. 2014), we more deeply analyzed these roles by defining them more specifically. For example, Fournier and al. (2009) define the mentor as a member who shares his expertise, while we make a distinction according to the expertise object (e.g. the mentor as a practice expert; the gatekeeper as a community expert; the ambassador as a product expert). In the same way, those authors define the learner as a member who enjoys learning, while we distinguish between learners interested in the product and those interested in the practice. This distinction between expert and learner roles differentiates the members who are central in sharing information and knowledge, contributing to the creation of *cultural value* (Seraj, 2012) in the community, and those who stimulate curiosity by asking questions, encouraging other members' participation, and contributing to the *intellectual value* (*ibid*.). Also, beyond the roles specialized in knowledge sharing or request, we detected roles mainly oriented toward sharing personal experiences and feelings or emotions, either about the product (*the friendly product fan*), the practice (*the amateur*), or both the product and the practice (*the product fan amateur*). These roles can be related somehow to Fuller's *socializer* role, as they engage in socialization activities, but our typology is more specific since it takes into account the object around which the member socialize, and it highlights the emotional dimension of the content he shares. This is an important issue as previous studies have found that emotional content has a positive effect on information diffusion (Stieglitz et al., 2013), and that positive affect in messages reinforces the sense of community and encourages continued participation (Joyce & Kraut, 2006). Faraj and al. (2011) stress also that participants with passion can inspire other members, leading positive consequences for knowledge collaboration. Furthermore, sharing personal experiences represent an important aspect in value creation (Ramaswamy, 2011). These emotion- and experience-oriented roles are then important for improving community's cohesion and information diffusion, either about practice or product, and to create emotional connections to the product among others members. They contribute to create a *social value* (Seraj, 2012).

Second, a further social network analysis provided additional information about roles structural characteristics, enabling us to improve our typology. We found that the centrality and authority are confirmed for the two experts: mentor and gatekeeper, but not for the product expert (the product ambassador). Also, the generalist who has no specific expertise is characterized by high levels of activity and connectivity. Furthermore, having a sociable profile does not necessary mean that the member is positioned as connector at a structural level. These results confirm that some roles characteristics cannot be inferred from structural data, but rather, that structural analysis is an excellent complement to the interpretative approaches in roles investigation (Gleave and al. 2009). Thus, used in a complementary way, content and structural analyses provide distinct information to describe the roles. More specifically, the content analysis informs about the sociability and expertise profile, while the structural analysis provide indications about the connector position in the network. By combining these two analyses, we provide a multidimensional role description according to five characteristics: *activity*; *connectivity*, *sociability* and *expertise type*. These five "*generic*" dimensions may represent a base for further roles investigations in other types of communities.

Our third contribution is related to the investigation of the core's influence on the periphery, at three complementary levels. Based on the social practice theory, we explain the impact of the different roles in terms of practice diffusion, linked to the type of standards they construct and how they propagate these standards. We showed that each role develops and disseminates different "*bundles of practice*," which articulate activities and material arrangements (the product; the platform), building the cookery practice at different levels: activities (i.e. the product use, the cooking skills); rules (how to share on the platform); teleoaffectitivies (i.e. expectations towards the product use, emotions related to cooking practice). We draw upon Rullani and Haefilger's theoretical development to explain that, by sharing standards related to each of those aspects, the core likely impacts the behavior of peripheral members, as well as the meanings they associate to the cookery practice. Some previous works have studied the

impact of the core on peripheral members through the prism of practice theory, either at a theoretical level (i.e. Rullani & Haefliger, 2013), or an empirical level, such Borzillo et al. (2011) who investigated the process of member evolution from peripheral to core members. These works present primarily an overall vision about the core's impact on constructing and sharing the practice. We take these investigations to a next level by relating each core role to different aspects of the practice, providing thus a more detailed view about the dynamics of those roles' activities.

By a second analysis, we more focused on the intensity of the roles impact on other members, showing their difference in terms of generated activity. A third analysis, using structural equivalence, highlighted the benefits of having different core members having the same roles to enlarge the diffusion of the practice as well as the interactivity and communication. Furthermore, these results raise the issue of the individual differences among members performing the same role, and the importance of interpersonal relationships built up between members. According to Goffman (1959), individuals use different strategies of *self-presentation* (i.e. ingratiation; exemplification) which impact their "*role-playing*": the same role can be then performed differently. Investigating such individual differences, by analyzing the strategies used by members in presenting themselves, could provide further relevant information to explain the differences observed between same roles in terms of influence and personal relationships.

Implications, limitations, and future research
This research highlights the importance of core roles investigation to better understand the internal dynamics of online communities, in order to improve their functioning. In the era of social media, digital marketers and community managers would benefit from exploring their community core's members by using a global approach consisting in identifying their roles through activities and shared content and analyzing their position in the network, instead of segmenting separately on each dimension. They would also gain a deeper insight into community dynamics by identifying the standards shared by the core and their impact on the periphery. They should therefore apply specific customer relationship management to each role. CtoC product communities' mentors and gatekeepers should be identified, and relational marketing (through product information or cocreation) used to strengthen relationships with this target group. Companies should also focus on learners (product vs practice) by organizing educational tools (videos, text) responding to the needs of this target group, or diffusing emotional content for the friendly product fan, product fan learner, and amateur. We propose also a multidimensional description of roles according four dimension (activity, connectivity, sociability and expertise type), which could readily be implemented in social media dashboards.

However, this research reveals a number of limitations and identifies future required research. First, we defined roles over a particular timeframe but a dynamic analysis would provide more valuable information for marketers. Second, we manually coded the 1,150 posts of the community core members, but machine learning should be considered as a method for coding the content of all the posts and comments in order to attribute roles for all members of the community. Third, further investigation in other types of communities and conversation networks is needed to investigate which roles are common to all communities and which are very specific ones. Fourth, regarding the results of the structural equivalence analysis, it would be highly relevant to focus further investigation on personal differences between members performing the same role. Finally, experimentations about communication strategy should be run to optimize the interactions and content sharing about the product between the community's members.

Notes

1 We underline that the type of community we have chosen is particularly adapted to an investigation through positioning theory as it has a strong discursive practice.
2 **Gephi** is an open-source network analysis and visualization software package written in Java and initially developed by students of the University of Technology of Compiègne (UTC). Gephi has been used in a large number of research projects in academia.
3 Teleoaffective structures are described as the range of correct ends, tasks for achieving ends, beliefs, and emotions motivating the actor to desire the ends. Teleoaffectivity implies that the individual always undertake actions to accomplish a certain goal and that he is emotionally invested in situations.
4 In order to simplify, we use the term periphery to refer to all other groups of the community besides the core

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