

The role of positive and negative emotions in the value formation process: an analysis of problematic social interactions in the social media context

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Abstract

This article aims to explore the role of emotions involved in problematic social interactions during the value formation process. Thus, we adopted an explanatory sequential mixed-method design based on a text-mining algorithm, a non-parametric rho-Spearman, and a thematic qualitative analysis. We found that despite the kind of problematic social interactions, the same pattern of emotions appears but with different intensity. Also, value co-creation (VCC) and value no-creation (VNC) occur in a value co-destruction (VCD) context (peak of negative comments). This study contributes to the understanding of the impact of emotions in different kinds of problematic interactions and shows how correlated emotions affect the value formation outputs (VCC, VNC, and VCD) in the social media environment.

Keywords: emotions, value formation, problematic interactions, value co-destruction, value co-creation, value no-creation, social media.

1. Introduction

The popularity of the Internet and social media has enabled customers to provide feedback by posting their comments online. Customers can also post their opinions on specialized social media to which firms and other customers can respond (Ho-Dac et al. 2013). These social interactions fuel a process of value formation. *Social interactions* are practices in which two or more actors (e.g., customers and firms) have reciprocal actions and influences over time (Plé and Chumpitaz Cáceres 2010). While, *interactive value formation* is the process in which value is co-created (VCC), no-created (VNC), or co-destroyed (VCD) during the interactions between actors (Echeverri and Skålén 2011). When complications between firms and customers happen, a mix of emotions is felt and reflected on the online interactions leading the value formation process towards outcomes such as VCD – “an interactional process between service systems that results in a decline in at least one of the system’s well-being” (Plé and Chumpitaz Cáceres 2010, p. 431).

The relations among emotions and the interactive value formation have been recognized as crucial to better understand the value formation results such as VCC, VCD, and VNC (Sthapit and Björk 2019). However, several existing studies analyzed only positive or only negative emotions. For instance, negative emotions such as anger (Smith 2013) and guilt (Sugathan et al. 2017) may result in VCD (Baron et al. 2005). On the other hand, positive emotions such as pride can trigger VCC (Moreau and Herd 2010).

Also, the former researcher identifies four main problematic social interactions in the value formation process: misbehavior (Kashif and Zarkada 2015); contradictory interactions (Vartiainen and Tuunanen 2016); conflictual interaction (Vafeas, et al. 2016); negative interaction (Nam et al. 2018). In this debate, some scholars consider problematic interactions in the value formation process as a determinant for VCD (Worthington and Durkin 2012) or value diminution (Vafeas et al. 2016). Instead, other researchers argue that contradictions and conflicts might be a source of VCC (Fyrberg Yngfalk 2013; Laamanen and Skålén 2014).

All in all, social interactions are acknowledged as intrinsic to the interactive value formation, while it is ambiguous how interactions can be characterized as a source of VCC, VNC, or VCD. Even if this body of literature increased our understanding of the role of customers’ emotions in the value formation process, it is missing a study that investigates the conjoint action of positive and negative emotion during such process. Key questions such as “How do emotions felt during problematic social interactions impact the value formation process?” remain unanswered. Thus, the present study aims to fill the gap in the literature *a better understanding of the emotions involved in the problematic social interactions during the value formation process*, which has eluded academic interest (Plé 2017).

In doing so, this study adopted an explanatory sequential mixed-method design (Creswell and Clark 2017) by combining a text mining algorithm, a non-parametric rho-Spearman, and a thematic qualitative analysis. This research analyzes comments collected from the Huawei Mobile US Facebook page (from 2011 to 2019) and categorizes customers’ positive, neutral, and negative comments; pinpoints peaks of negative comments; identifies customers’ positive (joy, trust, surprise) and negative emotions (anger, dissatisfaction, disgust, fear, and sadness); and correlate these emotions. Moreover, we performed quantitative analysis as well to explain the quantitative findings in-depth.

We found that despite the kind of problematic social interactions and their degree of negativity, the same pattern of emotions appears but with different intensity. Besides, we found that value VCC and VNC occur in peaks of negative comments (VCD context). This study contributes to the understanding of the impact of emotions in different kinds of problematic interactions and shows how conjoined actions of negative and positive emotions affect the value formation outputs (VCC, VNC, and VCD) in the social media environment.

2. Theoretical Background

2.1. Interactive value formation and customers' emotions

The links between emotions and the interactive value formation have been identified as pivotal to identify the value outcomes such as VCC, VCD, and VNC (Sthapit and Björk 2019). Troublesome engagement can lead to customers' unfavorable thoughts, negative emotions, and misbehaviors toward the firm during interactions (Leventhal et al. 2014). According to Moreau and Herd (2010), positive emotions such as pride can trigger VCC, while Baron et al. (2005) suggested that negative emotions such as anger (Smith 2013) and guilt (Sugathan et al. 2017) may result in VCD. Moreover, failures in co-creating products differ from general situations of failure since unsuccessful co-created products generate in customers self-directed emotions such as guilt, shame, and self-pity. However, these emotions are moderated by the degree of co-creation (Sugathan et al. 2017). Other studies found that trust and distrust are key emotions in online reviews (Sigala 2017). Unfavorable reviews, when expressed by trustworthy customers, can destroy value by spreading the negative electronic word of mouth (eWOM)(Ludwig et al. 2013). Regarding exaggerated online reviews, Baker and Kim (2019) observed that value destruction depends on language style and on how emotions influence customer perceptions of reviewers, website, and firm reliability. On the other hand, firms' lack of empathy destroys value in terms of losses of customers' emotional resources (Plé 2016). While, companies find their value destroyed by the customers' misbehavior in terms of, e.g., company reputation (Sthapit 2018). Further studies on deviant behaviors in Facebook found that customers may have multiple social interactions with not only the firm and other customers but also company fake profiles and anti-brand organizations (Frau et al. 2018). Finally, incongruent social practices give rise to negative emotions such as hubris, sadness, frustration, and disgust which, in turn, lead to value destruction through direct and indirect sharing of bad practices (Malone et al. 2018).

2.2. Interactive value formation in social media and problematic social interactions

The notion of social interactions also plays a key role in the studies on the value formation process (Makkonen and Olkkonen 2017). Concerning social media interactions, customers can express their opinion on any product or service (e.g., restaurants and technological devices) through reviews and scores systems in which companies and other customers can reply (e.g., TripAdvisor) (Sigala and Gretzel 2017). Besides, more interactive social media, such as Facebook, provide a great selection of tools for customers' interactions and expressions of emotions, such as emoji associated with the main emotions and dedicated pages in which firms and customers can share any kind of content (e.g., comments, pictures, videos, and gif). The value formation process supported by the social media interactions results in a complete range of outputs: VCC, VCD, as well as value no-creation (VNC), or rather, customer experience about a product or service is consistent with the expectations (Sthapit and Björk 2018, Tang et al. 2014).

Overall considered, this stream of researcher identifies four key problematic social interactions in the value formation process. The first, *misbehavior*, is defined as the intentional, candid, or covert actions of customers that disrupt functional interactions by violating the accepted norms of conduct (Kashif and Zarkada 2015). Some examples from social media include unexpected booking cancellations, scams, cheating, making insults, lacking transparency, and providing false information. (Jmour and Hmida 2017). The second, known as *contradictory interaction*, occurs when the customers involved in a business relationship have divergent opinions that effectively mar their interactions (e.g., structural

tension) (Vartiainen and Tuunanen 2016). The third, defined as *conflictual interaction*, is the result of divergent opinions. However, in this case, such interaction leads to real conflicts between customers (Vafeas, et al. 2016). Finally, the fourth, *negative interaction* refers to all the interactions found undesirable by one or more customers (Nam et al. 2018). In this classification, some researchers consider problematic social interactions in the value formation process as a determinant for VCD (Worthington and Durkin 2012) or value diminution (Vafeas et al. 2016). Other researchers endorsed this view maintaining that any problematic interactions trigger and encourage misuse of resources (Kashif and Zarkada 2015; Smith 2013), which acts as an input for VCD. On the other hand, some researchers debate that contradictions and conflicts might be a source of VCC (Laamanen and Skålén 2014). For instance, Fyrberg Yngfalk (2013) suggests that “contradictory resource integration and interactions are fundamental for value to be co-created” because they start a process of “new interpretations and meaning creation” for innovative solutions. In conclusion, recent studies highlighted that interaction episodes accumulated into a relationship and combined with neutral social interactions can drive to VNC as well (Tang et al. 2014).

3. Methods

To analyze the role of emotions involved in the problematic social interactions during the value formation process, the study adopted the explanatory sequential mixed method research design (Creswell and Clark 2017). In the present study, the mixed methods approach is useful because quantitative methods categorize comments into positive, neutral, and negative, identified peaks of negative comments in which the main customers’ emotions are identified and analysed to identify correlations. However, they did not provide any detail about the type of problematic interactions characterizing those peaks which are provided by the qualitative analysis. This study is performed on Huawei Technologies Co. Ltd., a Chinese company of ICT and telecommunications that globally develops systems, network solutions, and technological products. It is one of the leading brands in the mobile and telecommunications industry. In this study, Huawei was selected for its fast market development. The analysis was restricted to the US Huawei Facebook page for the greatest number of likes compared with the other English-language pages of the company.

3.1. Data pre-processing

The quantitative dataset consists of 35,644 posts and comments on the Huawei US Facebook page from September 2011 to May 2019.

Data cleaning. First, a data cleaning process involved the removal of 3,125 records relative to the comments from external pages and their replies, because we considered exclusively the dyadic interactions between Huawei Mobile and its customers. Successively, the “stop words” (i.e., articles, conjunctions, and prepositions) were removed after being listed using a vocabulary stored in the “tm 0.7-3” R package (Meyer et al. 2008), as well as the numbers, considered not significant for the analysis. From the remaining 32,519, only 30,955 comments and posts were considered for the analysis.

3.2. Data analysis

Quantitative analysis: The text mining-based algorithm. The algorithm consists of three main parts, which can (1) discern positive, negative, and neutral comments; (2) pinpoint the periods characterized by significant peaks of negative comments; and (3) characterize

each topic with negative and positive emotions.

Firstly, the algorithm classifies the customers' comments as positive, neutral, and negative by running a Sentiment Analysis. The algorithm constructs a document-term matrix (DTM) from the original comments. So, the text is vectorized by creating a map from words to a vector space. Then, the algorithm runs a logistic regression model on an external database and fits the DTM generated from the study dataset. Finally, the algorithm performs a ROC analysis (Krzanowski and Hand 2009) to define two thresholds in line with the coordinates of the ROC curve, for the sensitivity and specificity, respectively, at .75 in both cases. This process helps in obtaining three groups of comments (positive, neutral, and negative) in line with the literature, which states that social interactions may trigger, respectively, VCC, VNC, and VCD as outcomes of the value formation process (Makkonen and Olkkonen 2017).

Secondly, the algorithm uses empirical fluctuation tests to identify the time intervals in which the distribution of negative comments shows structural changes. The algorithm recognizes these ranges by testing when the distribution of negative comments differs from a regression model with null slope: first, a model that captures the fluctuation in terms of the sums of residuals is fitted to data and an empirical process is derived, then the ranges in which this empirical process is statistically different ($p < .05$) from a linear model with null slope are identified as the periods with significant peaks of negative comments. The empirical processes are assumed as MOSUM processes and the OLS-based MOSUM test is performed.

Lastly, the algorithm characterizes the identified peaks with appropriate positive (joy, surprise, trust) and negative (anger, dissatisfaction, disgust, fear, and sadness) emotions by using a lexicon that consists of words and their associated emotions.

The analyses were run using the packages of the statistical program "R" version 3.4.4 (Team 2018): text2vec 0.5.1 (Selivanov and Wang 2016); strucchange 1.5-1 (Kleiber et al. 2002); glmnet 2.0-16 (Friedman et al. 2010); and tidytext 0.1.9 (Silge and Robinson 2016).

Quantitative analysis: non-parametric rho-Spearman. Once the algorithm processed the comments, the relationships between the individual groups of negative and positive emotions were analyzed. Due to the non-fulfillment of the requirements for the r-Pearson correlation analysis, non-parametric rho-Spearman analysis was used (Crewson 2006). The number of negative and positive correlations were counted and summarized in Figure 2.

Qualitative analysis. A qualitative dataset was created by selecting the negative comments constituting each peak (see the fourth column of Table 1). The selected comments were uploaded into NVivo 10 for the thematic qualitative data analysis (Bazeley and Jackson 2013). A two-phase coding process was performed for the seven peaks. All the comments were inductively coded based on the studies by Miles and Huberman (1994). The first coding phase observed descriptive and interpretative codes. Descriptive codes need little or no data interpretation, whereas interpretative ones indicate the researcher's understanding of the data (Miles and Huberman 1994). The first phase gives a former collection of structured codes which represent problems faced by the customer with their devices. These problems formed the basis for the second coding phase in which we sought thematic codes (Miles and Huberman 1994). The second phase helped to identify and associate the kind of problematic social interactions with the seven peaks of negative comments (see Table 1 for the list).

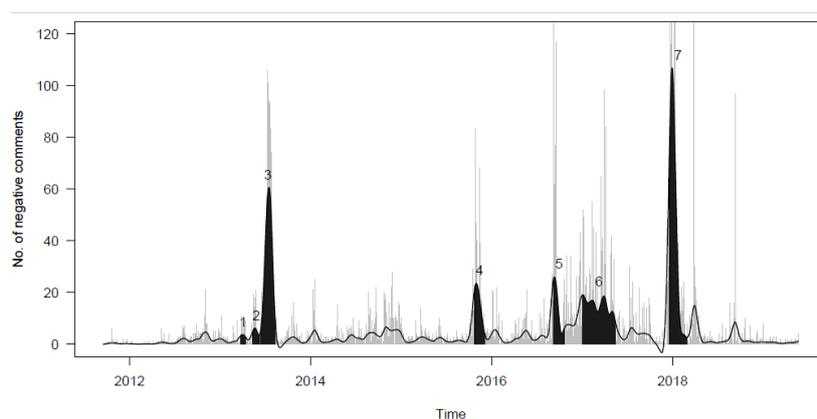
4. Results

4.1. Customers' emotions in problematic social interactions

To shed light on the role of emotions involved in the problematic social interactions during the value formation process, we first need to discern between positive, neutral, and

negative comments to identify the VCD context. Therefore, from the application of the algorithm, we calculated the probability of positivity of each comment. The probability ranged from 0 (totally negative comment) to 1 (totally positive comment). The comments with a likelihood of their positivity lower than .4636 were set as negative, while those with a probability of positivity higher than .5575 as positive. Finally, the comments with a chance between .4636 and .5575 are considered as neutrals. From September 2011 to May 2019, the algorithm recognized seven peaks which are the VCD context for this study (see Figure 1).

Figure 1: The negative comments distribution. The solid black line is the relative cubic smoothing spline. The darker areas indicate the seven periods characterized by statistically significant ($p < 0.05$) structural changes from a flat trend.



Then, thanks to the algorithm, we calculate the probability that the comments are characterized by each of the positive (joy, surprise, trust) and negative emotions (anger, dissatisfaction, disgust, fear, and sadness).

Table 1: Peak duration, size (number of comments), emotions percentage distribution, and related kind of problematic interactions.

Peak n°	Duration		Number of negative comments	% of negative emotions in the peak					% of positive emotions in the peak			Kind of problematic interactions
	from	to		Anger	Dissatisfaction	Disgust	Fear	Sadness	Joy	Surprise	Trust	
1	25/03/2013	14/04/2013	105	9.32	22.36	12.42	8.70	10.56	11.80	6.83	18.01	Conflictual
2	13/05/2013	09/06/2013	182	10.97	17.94	12.3	11.96	12.29	13.95	7.64	12.96	Contradictory
3	13/06/2013	11/08/2013	1,796	11.86	16.85	12.23	10.56	12.53	11.59	8.40	15.97	Negative
4	25/10/2015	05/12/2015	718	10.07	21.12	7.48	15.65	9.03	10.47	5.01	21.17	Contradictory
5	07/09/2016	21/10/2016	679	8.62	16.38	6.17	12.87	12.23	13.83	7.23	22.66	Negative
6	02/01/2017	15/05/2017	1,989	12.44	21.26	7.49	10.65	10.91	12.05	7.36	17.84	Conflictual
7	18/12/2017	27/02/2018	3,320	11.59	20.83	8.93	10.61	11.65	11.95	7.50	16.94	Contradictory

The combination of quantitative and qualitative analyses revealed that the seven peaks are associated with three problematic interactions identified in the literature: contradictory (peak 2, 4 and, 7), conflictual (peak 1 and 6), and negative interactions (peak 3 and 5).

From September 2011 to February 2013 there are no peaks of negative comments. In 2013, the Huawei US Facebook page faced three peaks (peaks 1, 2, and 3). Peak 1 is characterized by dissatisfaction (22.36%), disgust (12.42%), and sadness (10.56%), but also by a high percentage of positive emotion trust (18.01%). Concerning peak 2, the negative emotions percentages show a period of comments not only characterized mainly by dissatisfaction (17.94%) but also influenced by a balanced mix of anger (10.97%), disgust (12.3%), fear (11.96%), and sadness (12.29%). Here, joy (13.95%) plays a predominant role within the positive emotions. Peak 1 and 2 are shorter (20 and 27 days) and smaller (105 and 182 negative comments) than the other five peaks. Despite their similarity in dimensions,

peaks 1 and 2 differ in terms of the type of problematic interactions and the value formation dynamics. As detected by the thematic qualitative analysis, peak 1 is conflictual due to the customers' frequent use of bad words and strong negative sentences such as: *"Terrible bastardized iPhone clone"*. While peak 2 is a contradictory type of problematic interaction since customers even expressing divergent opinions that mar their interactions, they commented avoiding very strong negative judgments: *"I was told mine [product name] would ship late this week or very early next. If there is no shipment by then I'll be very upset... ☹"* Peak 3 cumulated 1.796 negative comments in only 59 days. According to the qualitative analysis, regardless of its fast growth, peak 3 is categorized as a mild negative kind of interaction. The quantitative analysis showed that peak 3 is distinguished by dissatisfaction (16.85%), followed by sadness (12.53%), and disgust (12.23%). In peak 3, customers keep using polite expressions even expressing their criticisms, e.g., *"[...] my phone screen [product name] cracked yesterday. I want to fix it. I am trying to contact the customer service (via chat) but no answer. I couldn't find any service center. Can someone help me? Regret getting my phone, really do!"*. Here, a positive influence in the value formation process has been played by the firm response that reassured the customer: *"After you are a Gold Member, please contact our Technical Support hotline to book in your phone for the free screen replacement."* This may explain the high percentage of trust (15.97%) discovered in peak 3.

In 2014, no peak was detected, while peaks 4, 5, 6, and 7 were pinpointed from 2015 to 2018. Peak 4 and 5 are similar in duration (41 and 44 days) and size (718 and 679 negative comments). However, from a deeper qualitative analysis, peak 5 is characterized by negative interactions with are less impacting from a value formation point of view compared with the contradictory interactions detected in peak 4. The latter is distinguished by negative emotions like dissatisfaction (21.12%), fear (15.65%) the highest within the seven peaks, and anger (10.07%). Once again, trust is the stronger emotion (21.17%) within the positive ones. However, customers often use impolite expressions during the interaction, e.g., *"Why it's so fucking smooth?? cracked my phone as soon as I walked out of the store!"*. While in peak 5 the emotion mix is composed of dissatisfaction (16.38%) and almost at the same level of fear and sadness (respectively 12.87 and 12.23%). Except for sporadic uses of imprecations or sarcasm, in peak 5 the customers' conversations were overall easy: *"Huawei any new updates for its EMUI 2.3? or I will be stuck with EMUI 2.3 Forever??"* and the interactions kept respectful *"we would want an update with Yummi function. Thank you"*. Indeed, trust and joy are the highest of the seven peaks (respectively 22.66 and 13.83%).

Peak 6 lasted 133 days, the longest peak of the observed timeframe. Peak 6 grouped 1,989 negative comments which make it the second-largest peak among the seven. The qualitative analysis categorized peak 6 as conflictual. For its size, duration, and kind of problematic interactions, peak 6 had one of the most negative impacts in terms of value formation. Its mix of negative emotions is composed of dissatisfaction (21.26%), anger (12.44%), fear (10.65), and sadness (10.91%). The positive mix of emotion is made of trust (17.84%), joy (12.05%), and surprise (7.36%) which plays a minor role. Customers appear to be even more hostile than contradictory peaks (e.g., peak 2 and 4), they often use rude language which could trigger real conflicts with a negative effect on the value formation, e.g., *"Junk phones and no customer service... good luck growing as a company with shit you do!"*

Peak 7 is the most populated. It grouped 3.320 negative comments in 72 days. Peak 7 is characterized by a high percentage of dissatisfaction (20.83%), followed by anger (11.59%) and sadness (11.65%). The highest positive emotions are trust (16.94%) and joy (11.95%). Peak 7 is contradictory because the interactions are offensive but not as destructive in terms of value formation as the conflictual ones: *"People only care about iPhone"*.

4.2. Value formation process: VCC, VNC, and VCD at the same time

We based on the relationship matrix analysis to show the relationships between positive and negative emotions. Positive compounds are marked in light grey, while negative ones in dark grey. The number in the cells represents the number of statistically significant relationships. There are three areas of dependence: negative vs. negative (1), negative vs. positive (2), and positive vs. positive (3). Each area corresponds to a region in which the value is mainly co-destroyed (area 1), not created (area 2), or co-created (area 3) (Figure 2).

Figure 2: Negative and positive correlations within emotions: the map of interactive value formation outcomes.

	anger	dissatisfaction	disgust	fear	sadness	joy	surprise	trust	
anger		negative 4	7	7	7	negative 3	4	3	
dissatisfaction			negative 7	negative 5	negative 4	4	7	5	
disgust				1	6	4	negative 4	2	negative 6
fear						7	1	2	negative 2
sadness							negative 2	1	4
joy								7	7
surprise									7
trust									

In the VCD area, correlations are between negative emotions. Dissatisfaction does not support any of the other negative emotions not resulting in the occurrence of the other negative ones. Being dissatisfied therefore causes neither anger, nor disgust, nor fear nor sadness. It can be assumed that dissatisfaction is within the area of the customer's acceptable attitude. Therefore, from a VCD perspective, an unsatisfied customer does not escalate negative emotions unless provoked. While the remaining negative emotions are correlated and so supportive with each other. This result shows the great role of extreme emotions in VCD. Therefore, moving the customer beyond the dissatisfaction causes stronger negative interactions in which intertwined negative emotions efficiently trigger problematic interactions and so value co-distraction.

In the VNC area, we identified positive relationships between positive and negative emotions. The exception is related to the correlation between dissatisfaction and surprise. In other cases, anger moderately supports surprise and trust, and dissatisfaction supports surprise in all peaks. Fear and sadness commonly support dissatisfaction as well as sadness moderately supports trust. It is worth noting, however, that the correlations achieved are weak (Spearman's $Rho < 0.2$). This means that we are dealing with an intermediate state – value is not destroyed but is not created either. Thus, we can distinguish factors of VNC. Here, correlations include dissatisfaction which does not interfere with joy, surprise, or trust, and, less frequently, anger which does not affect surprise and trust. As we observed above, the lack of correlation between dissatisfaction and the remaining negative emotions is additionally reinforced by a positive relationship with positive emotions such as joy, surprise, or trust. Concluding, dissatisfaction does not support strong negative emotions and does not weaken positive emotions. Importantly, *this happens for all peaks, which means that doesn't matter the kind of problematic social interactions which prevail in the peak.*

In the VCC area, there are no negative relationships. This means that the positive emotions support each other without exceptions. It is interesting to notice that even if in a pure context of VCD (peaks of negative comments), customers can feel positive emotions during problematic social interactions, and those emotions mutually support one another. These results suggest that *value can be co-created and co-destroyed at the same time when problematic social interactions occur in the value formation process.*

5. Discussion

Building on marketing studies, this study contributes to the literature on interactive value formation in social media by showing the impact of emotions in different kinds of problematic interactions and displaying that VCC and VNC occur also in the VCD context.

5.1. Customers' mix of emotions does not change in different types of problematic interactions

Earlier studies have considerably deepened our understanding of the value formation process by explaining the problematic social interactions according to the intensity of VCD (e.g., Echeverri and Skålén 2011, M. Smith 2013, Vafeas et al. 2016). This field of literature has greatly elucidated the link between customers' problematic interactions and value formation outcomes such as VCC, VNC, and VCD. On the other hand, it remains unclear the involvement of emotions in such problematic interactions and their effects on the value formation process (Plé 2017). Our analysis unveils that no matter whether the problematic social interactions have a high (conflictual) or low level of negativity (e.g., contradictory), emotions influence the customers' interactions likewise. This means that, in the value formation process, emotion has the same impact on another one in conflictual, contradictory, and negative interaction. There are only differences in the strength of the relationship in different interaction categories. Therefore, by extending former research, our study contributes to better understand the impact of emotions in the value formation process by investigating the relationships between positive and negative emotions and their impacts on the kinds of problematic social interactions.

5.2. Emotions in the value formation process lead to VCC and VNC even in a VCD context

The former researcher considers problematic social interactions as a factor for VCD (Echeverri and Skålén 2011, Worthington and Durkin 2012; Vafeas et al. 2016). However, some researchers disagree theorizing that problematic social interactions might be a source of VCC too (Fyrberg Yngfalk 2013; Laamanen and Skålén 2014). While, Cabiddu and colleagues (2019) theorized the variation space in which value can be co-created, no-created, or co-destroyed according to the actors' interaction practices. Overall, social interactions are acknowledged as an intrinsic component of the interactive value formation, while it is unclear as to how it can be characterized as a source of VCC, VNC, or VCD.

Our study on negative peaks of comments in the social media environment context shows that all statistically significant relationships between emotions are either negative or positive. Moreover, we identified three areas of dependence in a VCD context: negative vs. negative (area 1), negative vs. positive (area 2), and positive vs. positive (area 3). In the first area, it is clear that dissatisfaction does not lead to VCD in the value formation process since it does not result in the occurrence of other negative emotions. In the second area, we identified positive relationships between negative and positive emotions. This means that we are dealing with an intermediate state – values are not destroyed but are not created either (VNC). While, in area 3, all emotions support each other. This means that even in a VCD context –peaks of negative comments– positive emotions may occur and they are mutually supportive. Concluding, not all emotions involved in the value formation process are contributing to VCD, but there are areas of relationships between emotions where value is no-created or co-created rather than being co-destroyed (e.g. areas 2 and 3). Our results empirically demonstrate that in its formation process, value can be no-created or co-created even in the context of VCD which is the second contribution of this research.

5.3. Managerial Implication and Future Research

The algorithm at the base of this study is a useful managerial tool that helps in monitoring the huge amount of positive, neutral, and negative comments posted by the customers on firms' social media every day. Indeed, our algorithm can easily identify the trend of negative comments even the same day it appears so that social media managers can act before the negative comments turn into a high peak. Examining the emotions, with the help of a specialist, if necessary, may also support the social media managers to design tailor-made response strategies. This approach can help in mitigating the problematic interactions between the firm and customers and among customers moving the company from a dangerous situation of VCD to a neutral position of VNC or even in a VCC state.

Despite the combined use of quantitative and qualitative methods, this study has limitations, which suggest opportunities for further theoretical and empirical research. For instance, in the multitude of social media contexts, we have run the algorithm on data collected only on Facebook not considering other important online environments (e.g., Instagram, Twitter, or LinkedIn). Therefore, future research may extend their analysis to a wider range of social media contexts with the aim of identifying differences in the customers' mix of emotions and their impact on the value formation process.

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