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Transnational Sentiment Analysis of Social Media for CSA Social Enterprise Innovation – From the Perspective of Sharing Economy and Collaborative Consumption

Wei-Feng Tung*

MBA Program in International Management (imMBA) College of Management, Fu Jen Catholic University

Yu-Feng Chiu

MBA Program in International Management (imMBA) College of Management, Fu Jen Catholic University

Abstract

Purpose—In recent year sharing economy and collaborative consumption have become a global and innovative business strategies and trends. More business models based on sharing economy and collaborative consumption (CC) are growing rapidly (i.e., Airbnb, Uber, Zipcar). Coincidentally, the value proposition of agriculture social enterprises with community supported agriculture (CSA-SEs) nearly alike value proposition of CC and sharing economy (i.e., The Mana Group, Taiwan; Borders Maschinenring, UK; The Intervale Group, USA). However, most CSA-SEs are rarely discussed their social media strategies in existing literature. In order to enhance service innovation of CSA-SEs, this study is to analyze transnational social media's sentiments to help to understand their public opinions about their business performance. Thus, this study intends to bridge the gap between social media's sentiments and business innovation. In terms of the most commonly used social media platforms, Facebook, Instagram, Twitter, and YouTube are measured for social and business observations.

Design/methodology/approach — The main research method is to statistical analyze the sentiment from social media using self-coded R language and PLOTY.

* Corresponding author. Email: 076144@mail.fjfu.edu.tw
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Findings—From the research finding of UK and US CSA-SEs (Maschiner, Intervale), Instagram is identified as the most effective social media platform in inducing positive sentiments in consumers. Taiwanese CSA-SE (Manna) has been found to be mainly using pictures for its social media. The number of Facebook pages and additional social media platforms can be made instead. Future studies can build on the results of this study, include more variables or develop in-depth studies on the social media strategies of social enterprises.

Research limitations/implications—One of the limitations is the choice of organizations of interest, which in this case, are agricultural businesses that are involved in sharing economy activities (social enterprises). Because of the nature of these organizations, their customer segments are often limited. The second limitation is the inclusion of organizations from multiple countries, whose culture, language and value differ greatly.

Practical implications—This study provides insights into how CSA social enterprises operate social media to improve the different elements of business model innovation. These insights lead to the revelation of the importance of posting type and content in garnering positive sentiments. This study also finds that the Manna group, the focus group of this study, has been practicing the better social media strategy. Suggestions to consolidate its many sub-groups and to employ a pictorial-based social media platform are made to potentially improve its business performance.

Originality/value—This study contributes to the growing literature on sharing economy activities and provides one of the first studies on sentiment analysis of social media usage strategies by CSA social enterprises in different regions. The novel approach of gauging customer sentiment using indicators unique to each social media platform and comments from the public provides new insights into CSA-SEs. The inclusion of multiple social media platforms in current study also increases the possibility of generalizing the findings of this study to other relative social enterprises. While the results of current study is reliable, social media's innovative strategy that can induce positive sentiment in customers can serve as a guide for other SEs' social media innovation.

Keywords: social enterprises (SEs), social media, sentiment analysis, community supported agriculture (CSA), sharing economy, collaborative consumption

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以社群媒體的跨國輿情分析協助社區支持農業之社會企業創新－從共享經濟與協同消費觀點

董惟鳳*

輔仁大學國際經營管理所 (imMBA)

邱郁峰

輔仁大學國際經營管理所 (imMBA)

摘要

近年共享經濟與協同消費成為全球與創新商業策略與趨勢之一。愈來愈多的商業模式基於共享經濟與協同消費且逐漸成長中, 例如: Airbnb、Uber、Zipcar 共享經濟與協同消費也正與社區支援農業社會企業的價值主張相近, 例如台灣瑪那社會企業、英國 Borders Maschinenring、美國的 Intervale Group。然而, 卻很少文獻是探討關於社區支持農業的社會企業與他們的社群媒體策略, 為了增進社區支持農業的服務創新, 本研究分析跨國社群媒體輿情分析去幫助了解他們商業績效的公眾意見。因此, 本文連結社群媒體輿情與商業創新, 就所有普遍地使用社群與商業觀察, 本研究採用 R 語言自行開發統計分析, 並用 PLOTY 進行圖形視覺化。就美國與英國社會企業的研究發現, Instagram 是他們最有效益的社群媒體, 包括很多正面消費者輿情, 並比較粉絲專頁數與其他社群媒體的使用。然而, 這些跨國社群媒體輿情分析可以作為台灣社區支持農業社會企業或相關社會的社群媒體策略執行的參考。

關鍵詞: 社會企業、社群媒體、輿情分析、社區支持農業、共享經濟、協同消費

* 本文通訊作者。電子郵件信箱: 076144@mail.fju.edu.tw
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1. Introduction

Sharing economy activities are becoming a mega trend around the world (Weber 2014; Botsman & Rogers 2011; Johnson et al. 2008). In the last decade, many forms of collaboration have emerged in the business world contributing to new and different systems of commerce (P2P foundation 2012). Because of the limited resources, the more we share, the fewer Earth's resources will be consumed. Moreover, consumers prefer the lower costs that results from participating in sharing economy movement; the cheaper the better. Some literatures cover a general review on sharing economy and collaborative consumptions (CC) for business. (Dillahunty & Malone 2015; Felson & Speath 1978). CSA-SEs are similar with the business concepts of collaborative consumptions of sharing economy. According to the new economic trend, the research is to use social media analysis to more understand the existing problems and enhance SE's business innovation.

The motivation of this study is to assist Taiwanese agricultural social enterprise (Manna) improving its business innovation according to the related the successful transnational social enterprises (Borders Maschinenring (UK), and The Intervale Group), which initially calls for a study to assess its business model and potential ways to improve it. Practical developments and literatures give rise to the idea of investigating their social media usage strategies as compared to other more established and similar agricultural initiatives in the world. It is in the hope that these comparisons would shed lights on how the more established initiatives use social media and what effects their strategies brought to their companies. With these new insights, research conclusion can be made to the Taiwanese Manna group on how to better utilize social media to build its brand. Ultimately, current study will contribute to the less studied field of sharing economy business model and social media usage in agri-businesses among the fast-growing body of literature on sharing economy. The objective of this research is to evaluate social media usages - sentiment analysis of three agricultural social enterprises from different parts of the world as part of their business model proposition strategies and using the results to inform the strategy of the Manna group.

2. Research Background and Theoretical Framework

Nowadays, the application of sharing economy is not limited to accommodation or transportation, but also in the agricultural sector like sharing food or farming equipment.

This part of the literature review briefly discusses sharing economy in the agricultural sector by introducing three social enterprises from the United States, United Kingdom and Taiwan. Social enterprise is a form of sharing economy because it possesses features of sharing economy such as collaborative consumption, pool of resources and services, trust, etc.

The concept of community supported agriculture (CSA) was first introduced in the United States in 1985. CSA was introduced with the principle of sharing the risks and costs of harvest in agricultural farms. It is especially popular in the U.S. (Schnell 2007) and U.K. (Henderson & Van En. 2007). CSA uses a marketing strategy that lets the consumers place order to buy their “shares” in the farm before farmers begin to plant their crops. Consumers will receive a portion of anything that is available each week such as eggs, honey, vegetables, meats, and/or dairy products during the growing season.

2.1 Intervale Group

Current study uses Intervale Center, situated in Vermont, U.S., as my case study of CSA. Intervale Center is one of the many organizations who participates in CSA in the U.S. and has a partnership with Intervale Food Hub as their distributor (Home, n.d). They grow vegetables naturally, innovatively and sustainably and deliver their produce to the community mostly via local pick up stations. In current study, Intervale Center and Intervale Food Hub are collectively referred to as the Intervale CSA Group to ease communication. The Intervale CSA Group uses a combination of organizational support model (Intervale Center) and cooperative model (Intervale Food Hub) as its business model.

2.2 Machinery Ring (Maschinenring)

Machinery Ring is a farmers support group or association in the agriculture and forestry industries (Matzler et al. 2015). It uses a combination of employment and cooperative business model. It allows for the collaborative use of machinery and procures excess labor capacity for farmers and foresters in need. The first Machinery Ring support group was founded in 1958 in Bavaria, Germany with the idea of sharing farming machineries among a group of farmers (Matzler et al. 2015). It rents its farming machineries to farmers, which helps to increase the efficiency of crops cultivation and harvest. Farmers soon started to organize into syndicates that buy and provide members with full range of machinery for their work. After that, machinery ring expanded its idea

even farther into the personnel leasing industry. During winter, because of the cold weather, a lot of farmers are underemployed. Moreover, many farms are too small in scale to support farmers and their family, so they often need extra income to cover their living expenses. Fortunately, most farmers are hard workers, so many companies would hire them for short-term work. These companies in turn found that tons of skilled, hardworking temporary workers were provided through the Machinery Ring. Today, more than 258 Machinery Ring affiliations serve Germany, including around 193,000 farmers which constitute more than 55% of all farmers in the German economy (Matzler et al. 2015).

2.3 The Manna Group

In current study, the Manna Group is used to refer to the Taiwanese agricultural social enterprise, Manna Organic Culture and Living Association (MOCLA) and its partner and distributor, Auroras Social Enterprise. MOCLA was founded in 2006 with two branches (Alishan and Nantou). Most of the members are farmers who are native Taiwanese. The business model of the Manna Group is a hybrid of organizational support model (MOCLA) and cooperative model (Auroras Social Enterprise). MOCLA trains and helps local farmers in developing their organic agricultural skills in Alishan. In addition, MOCLA also implements an organic certification and consultation system to make sure that all produce of its members are truly organic and high in quality. Later in its venture, MOCLA formed a partnership with Auroras Social Enterprise, which uses a guaranteed acquisition price strategy to protect MOCLA members from exploitation by merchants in the market. This alliance ensures that the farmers are rid of concerns on prices which are often affected by weather or natural disasters and focused on maximizing their farms' productivity.

3. Research Framework

With the aim to improve business model innovation of the Manna group, sentiment analysis can support the understanding of public opinions. The three core concepts is to provide CSA social enterprises innovation. Empirical studies on sharing economy is also comparatively lacking. Some applications of sharing economy in agriculture include entities such as social enterprise and non-profit organizations. BMR (1987) and the Intervale CSA Group (1986) were founded about thirty years ago compared to the Manna group which was founded only in the last decade (2008). Therefore, there is

reason to assume that the formers are better established and functional than the latter. This provides a good opportunity for the Manna group to improve its business model strategy by learning and adopting strategies of the two more established initiatives. The key features of the business models of the aforementioned organizations are presented in Table 1.

Table 1: An overview of organizational size, type of social enterprise business model, four elements of a business model (Osterwalder & Pigneur 2010) and the types of social media platforms employed by the three organizations studied in current project

Social Enterprise Name (CSA)	Organization Size	Business Model	Customer Segments	Value Proposition	Channels			Customer Relationships	Social Media
					Communication	Distribution	Sales		
Intervale Group	31 farm members	Cooperative Model and Organizational Support Model	Normal Consumers	Product, Service	Physical, Electronic	Physical	Physical, Electronic	Communities, Self-Service, Personal Assistance	Facebook, Instagram, Twitter
Borders Machinery Ring	Over 930 farms and contractors	Employment and Cooperative Model	Community Farmers	Service	Physical, Electronic	Physical	Physical, Electronic	Communities, Personal Assistance	Facebook, Twitter, YouTube
Manna Group	31 farm members	Cooperative Model and Organizational Support Model	Community Farmers and Normal Consumers	Service	Physical, Electronic	Physical	Physical, Electronic	Communities, Personal Assistance	Facebook

The popularity of social media and its wide user base have contributed to its important role in business models of many businesses. A lot of companies use social media for marketing, connecting with customers, maintaining their presence online etc. Social media is therefore a valuable data source in understanding the interaction between companies and their markets. This leads to my choice of social media data as my data source in addition to reasons such as the ease of obtaining data (even for foreign companies) and the comparability for data obtained from the same social media platform. For example, both BMR and the Intervale CSA group are using Facebook and Twitter as part of their business model strategy (Figure 1) Data obtained from these two platforms for these two organizations can therefore be compared and made sense.

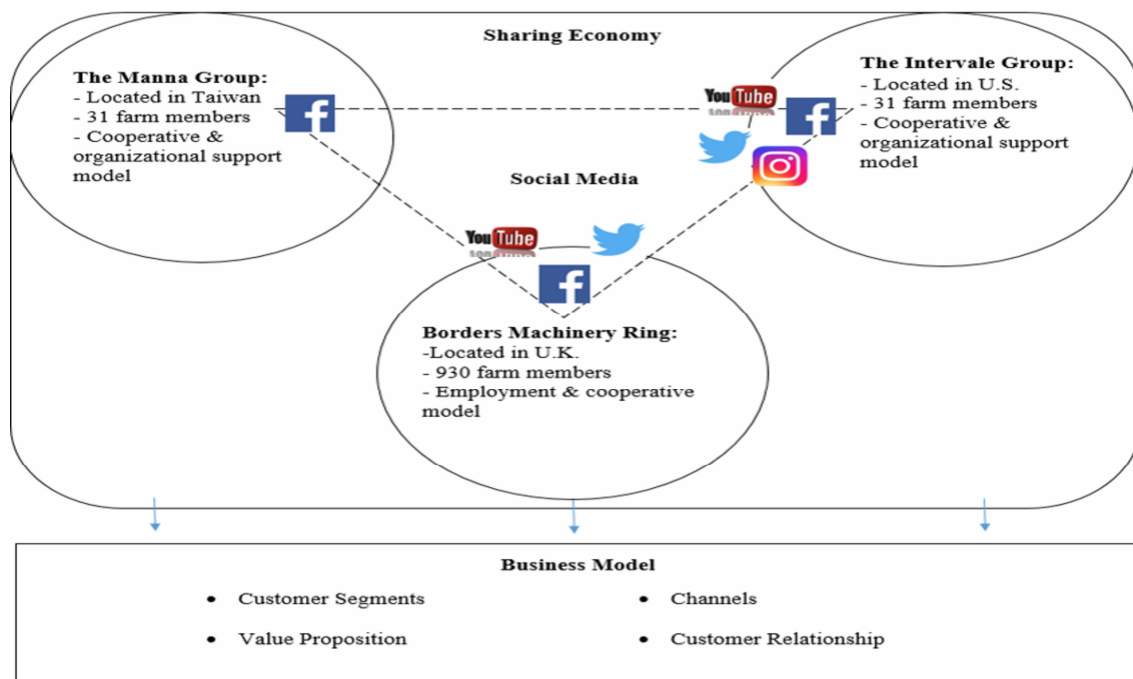


Figure 1: Research Framework

Because of the nature of social media data, not all elements of a business model can be evaluated using the datasets generated from data collected from social media platforms. Social media data usually involve interactions between companies and potential customers for the purposes including brand building, marketing, service/product sales, post-sales support etc. Therefore, four elements of a business model (Osterwalder & Pigneur 2010) can be studied using social media data. These elements are Customer Segments, Value Proposition, Channels, and Customer Relationships. For example, it is a common practice for many companies promoting or selling their products or services (Value Propositions) on Facebook. The frequency of such occurrence and responses from the public for each promotional/sale event can be obtained and dissected to inform future marketing strategy.

4. Social Media Analysis

Data analysis that ensued following data collection consists of quantitative data to gather general statistics for each social media platform and to determine the best performing social media platform among those that included in this study. The second

part of the analysis switches gear to understanding the composition of social media postings in terms of business model elements and how the strategies of the studied organizations varied from one another.

Data analysis was done in two incremental stages of which the first stage laid the foundation for the second and so on and so forth. Statistical analysis in current study were done using packages in R v3.4.0 (Team, R.C. 2017) in R Studio v1.0.143 (Team, R.S. 2016). As with many research utilizing quantitative data, the first stage of data analysis consisted of mainly descriptive statistics (Trochim 2006). Descriptive statistics forms the basis of quantitative analysis of data and simply describes what the data shows (Trochim 2006). In current study, this would mean the overall statistics of the four social media platforms of which data were collected, often accompanied by relevant graphical presentations.

4.1 Sentiment Measurements

Sentiment score for each organization was calculated using a modified equation from O'Connor et al. (2012), which defined sentiment score S_i as the sum of positive score for n post:

$$\sum_{i=1}^n S_i = S_1 + S_2 + S_3 + \dots + S_n \quad (1)$$

The standardized sentiment score S_s was then obtained by dividing S_i with the total number of posts

$$n : S_s = S_i / n \quad (2)$$

To standardize for the varied number of social media postings for each organizations. Whereas positive score P for each post is calculated a little bit differently for each social media platforms, generally as an aggregate of variables that indicate positive impression on the organization.

1) Facebook:

$$P_{fb} = \text{number of likes} + \text{number of shares} + \text{number of positive comments} \quad (3)$$

2) Twitter:

$$P_{twit} = \text{number of likes} + \text{number of retweets} + \text{number of positive comments} \quad (4)$$

3) Instagram:

$$P_{insta} = \text{number of likes} + \text{number of positive comments} . \quad (5)$$

Originally, sentiment score was meant to be calculated using O'Connor et al. (2012) equation of calculating the score as an estimation of likelihoods using relative frequencies. However, after completion of data collection, it was discovered that many social media postings by the studied agricultural organizations lacked comments. Many users simply “liked”, “shared” or “retweeted” these postings. A novel, modified way of calculating sentiment score was therefore improvised (as shown above) from those of O'Connor et al. (2012) to estimate public sentiment towards each organization. The resulting standardized sentiment scores were used to unveil the best performer (e.g., the highest sentiment score per post) among the social media platforms included in current study. Analysis in the first stage were done using the R package DPLYR (Wickham & Francois 2016) and graphical visualizations mostly with packages GGLOT2 (Wickham 2009) and PLOTLY (Sievert et al. 2017).

4.2 Research Process

Following the first stage of data exploration in search of meaningful patterns, the second stage of data analysis switched to the perspective of business model elements. Utilizing the same data sets, this stage tried to establish sentiment score of each business model elements therefore assessing the components of social media strategies of each organization (e.g., what percentage of postings was attributable to an element?). This enables further dissection of the efficacy of each component (e.g., which type and/or category of postings induced most positive interaction?) in achieving public interaction and imposing positive sentiment. In addition, the second stage of data analysis also aimed to address the proposed research questions by finding the best social media usage strategy given the data (e.g., what combination of type and category gives the highest sentiment score?) (Figure 2)

This study set to evaluate the social media strategy of a Taiwanese agricultural social enterprise, the Manna group with the goal of improving its performance through better strategy. For this purpose, the social media strategy of two more established organizations: the Intervale CSA group (USA) and Borders Machinery Ring (UK)

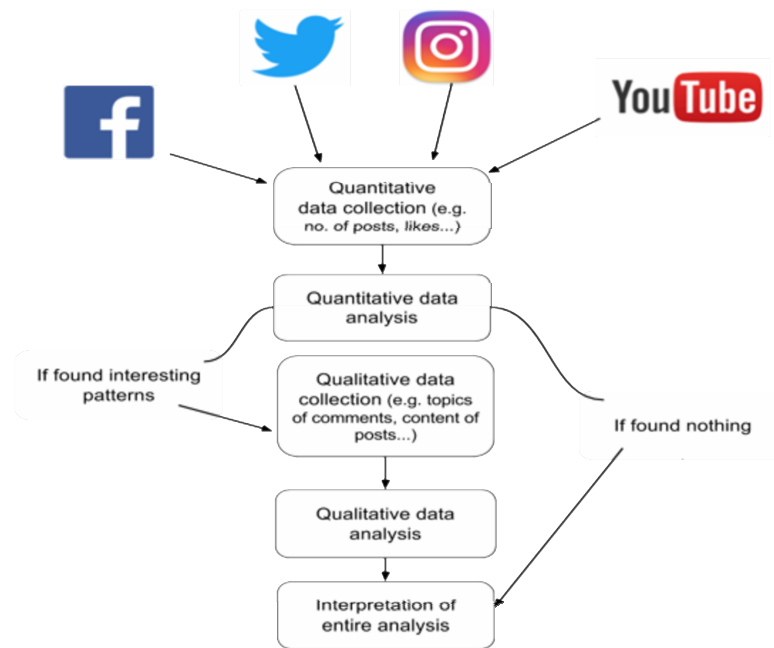


Figure 2: Research process of current study, modified from Creswell (2013)

The first step in evaluating suitable organizations to be included in this study was to find agricultural organizations that practiced sharing economy activities and used social media platforms as part of their business strategy. Since the Manna group uses Facebook, other organizations chosen as the case studies have to at least use Facebook among the many social media platforms. From Table 1, it can be seen that this is true for both the Intervale CSA group and BMR, which used Facebook and several other platforms.

4.3 Research Results

Four social media platforms: Twitter, Facebook, Instagram and YouTube (Table 2) used by the Manna group, BMR and the Intervale CSA group were included in this

study. Basic statistics of the groups and subgroups (the Manna group: 6 subgroups and the Intervale CSA group: 2 subgroups) for the four social media platforms were presented in Table 2. Data collection strategies for Facebook, Instagram, Twitter and YouTube were detailed below:

Table 2: An overview of the social media platforms used by the Manna group, BMR and the Intervale

Group	Subgroup	Facebook		Twitter			Instagram		YouTube
		Like	Follow	Tweets	Followers	Like	Posts	Followers	
The Manna Group	瑪那有機文化生活促進會南投分會	356	-						
	瑪那的家	1,053	1,032						
	光原社會企業	2,834	2,792						
	Manna 社企 CAFE	776	755						
	Manna Tsou Cafe	229	231						
	瑪那有機團購	376	374						
Borders Machinery Ring		675	675	446	622	-			21
Intervale Group (CSA)	The Intervale Center	4,683	4,572	1,606	4,547	9	173	2,039	7
	Intervale Food Hub	2,994	2,953	1,464	1,426	707	677	2,268	2

4.3.1 Facebook

Facebook is one of the most popular social media platforms used by the three agricultural organizations (Table 3, Figure 3). The Facebook data collected for the Manna group consists of six sub-groups with individual pages with different functions and purposes. For instance, the Manna Organic Group Buying page mainly focuses on promoting and selling agricultural products to customers via Facebook. Borders Machinery Ring (BMR) is the least active (e.g., < 50 likes and ~ 10 shares and comments) on Facebook as opposed to the Intervale group (e.g., > 5000 likes, >700 shares and >200 comments)

Table 3: Statistics of Facebook usage of the Manna group, BMR and the Intervale group for the year 2014-2015, which show the number of posts, likes, shares and comments

Facebook				
	Number of Posts	Number of Likes	Number of Shares	Number of Comments
Manna Group	136	1520	43	31
BMR	64	48	3	11
Intervale Group	1022	5779	704	209

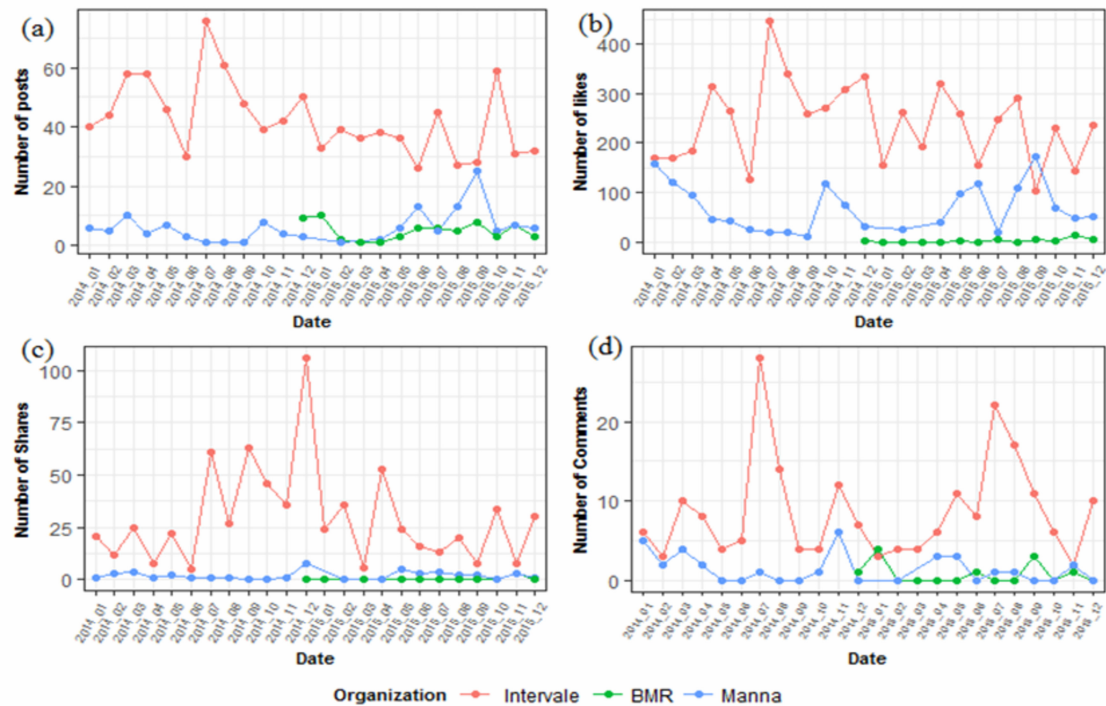


Figure 3: Statistics of Facebook usage of the Manna group, BMR and the Intervale group for the year 2014-2015

Figure 3 reveals an interesting pattern for the Intervale group which has the most numbers of posts, likes, shares and comments in July, 2014 (Figure 3 a, b and d) Also, from the figure, it can be seen that BMR started using Facebook in December 2014 (Figure 3) Its activity level is slightly higher when it first started its Facebook page in the end of December 2014 (Figure 3 a) The Manna group, on the other hand, is most

active in the second half of 2015 (Figure 3 a) Its number of posts is the highest in September 2015 (Figure 3 a), which is also when the organization receives the most number of likes (Figure 3 b).

The Intervale group is the organization that receives the most number of positive comments for its Facebook postings (Figure 4). This results is expected because it is also the organization that receives the most comments compared to the other two (Figure 3 d). For the months that the Intervale group receives higher number of comments (e.g., July, August and November 2014 and May, July and August 2015, Figure 3 d), it also possesses higher number of positive comments (Figure 4). Similar patterns are also observed for BMR (peaks on January 2015 in both Figure 3 d and 4 (neutral comments)) and the Manna group (peaks on November 2014 in both Figure 3 d and 4 (positive comments)).

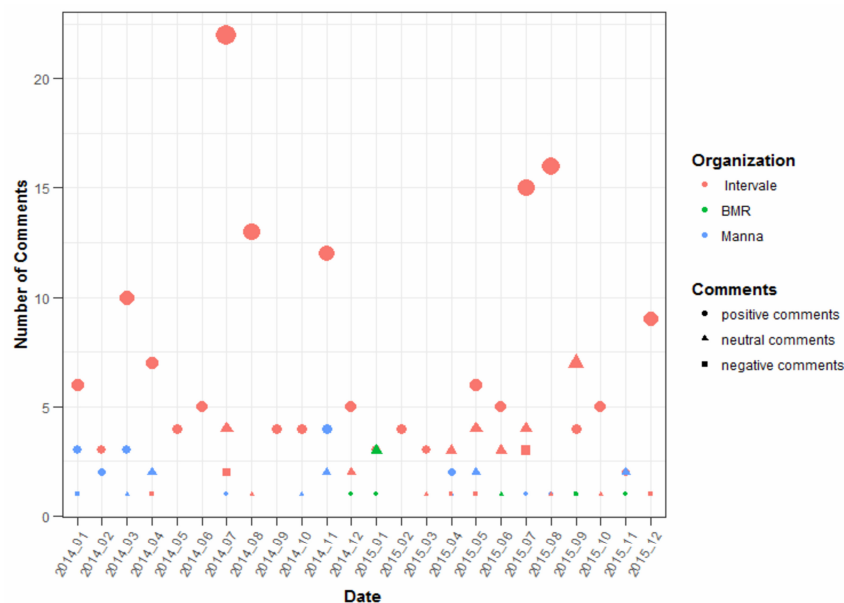


Figure 4: A bubble plot showing the number of positive, neutral and negative comments for the Facebook posts of the Manna group, BMR and the Intervale group for the year 2014 and 2015

After standardizing for the varied number of Facebook posts by different organizations, sentiment scores of the Manna group is surprisingly high in the sampled two years period compared to the Intervale group and BMR (Figure 5). The mean of sentiment scores of the Manna group ($\bar{x} = 14.36$) is more than double of that of the

Intervale group ($\bar{x} = 6.62$, data not shown) even though the former has less total number of posts compared to the latter (Table 2).

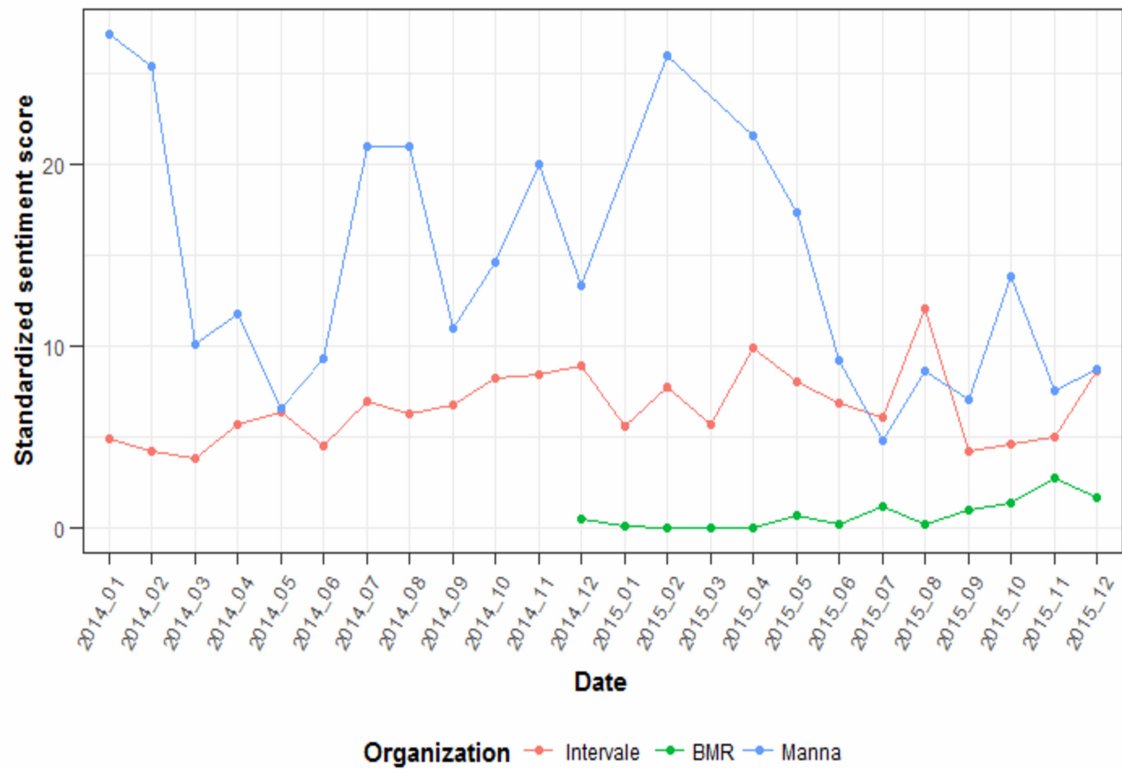


Figure 5: Sentiment score of the Facebook posts for the Manna group, BMR and the Intervale group for the year 2014 and 2015.

4.3.2 Instagram

The Intervale group is the only agricultural social enterprise among those included in my study that uses Instagram (Table 4). Despite having less posts (349 posts, Table 4) compared to Facebook (1022 posts, Table 2), the Intervale group has received more likes for its Instagram posts (7107 likes). The number of comments received is also similar to those that received for Facebook postings (Table 2, 4).

Table 4: Statistics of Instagram usage of the Intervale group for the year 2014-2015, which show the total number of likes and comments

Instagram			
	Number of Posts	Number of Likes	Number of Comments
Manna Group			
BMR			
Intervale Group	349	7107	195

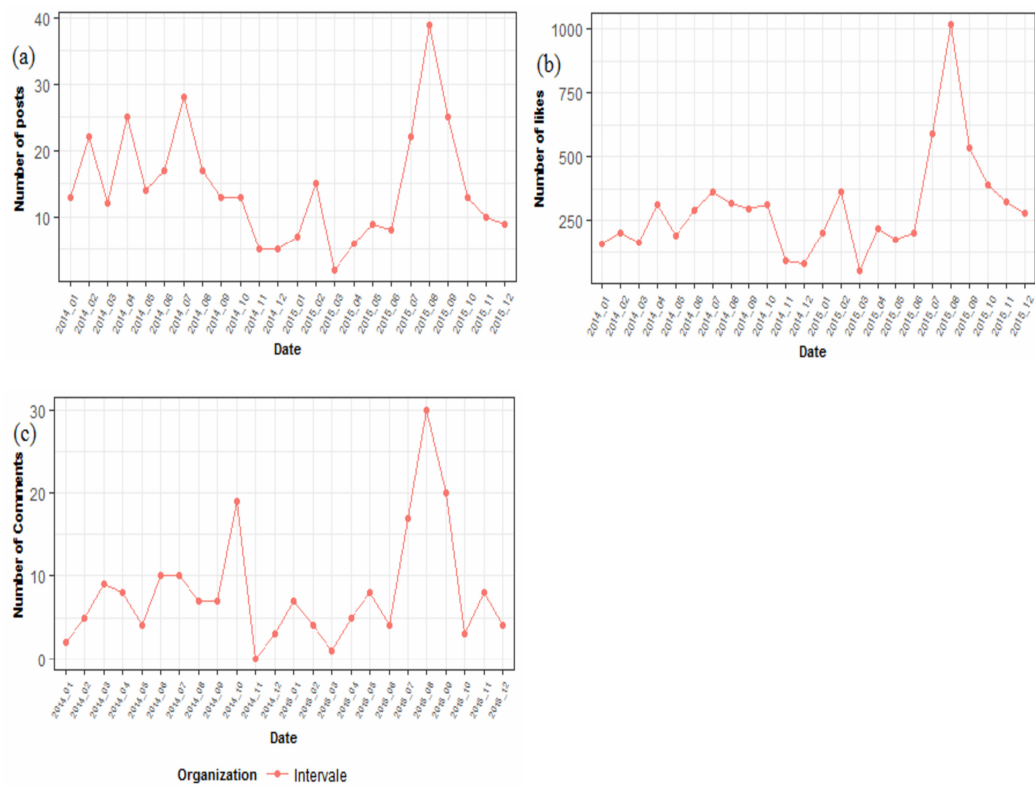


Figure 6: Statistics of Instagram usage of the Intervale group for the year 2014-2015

According to Figure 6, the Intervale group is most active on Instagram on August, 2015. Coincidentally, it also receives the most number of likes and comments on the same month (Figure 6 b, c).

Not unexpectedly, the patterns in Figure 7 coincide to that of Figure 6c, which peak on October 2014 and August 2015. Majority of the Intervale group Instagram comments during the year of 2014 and 2015 are positive comments (Figure 7). Standardized

sentiment score of the Intervale group's Instagram posts increases steadily from early 2014 to late 2015 and peaks on April 2015 (Figure 7).

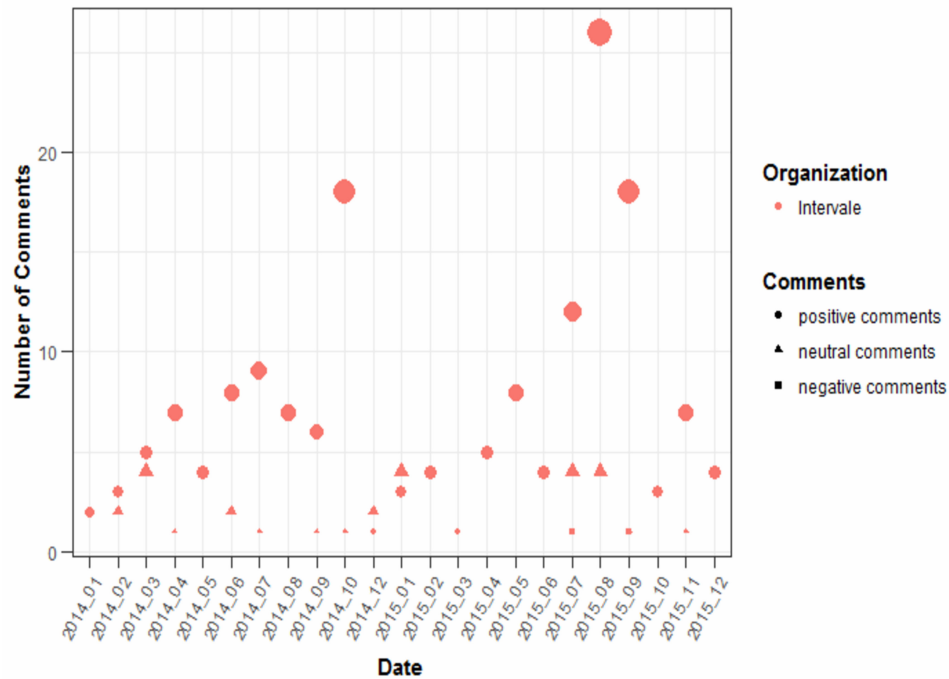


Figure 7: A bubble plot showing the number of positive, neutral and negative comments for the Instagram posts of the Intervale group for the year 2014 and 2015

4.3.3 Twitter

Twitter is another popular social media platform utilized even by the U.S. President Donald Trump, who regularly frequented the social media site and tweets. Borders Machinery Ring (BMR) and the Intervale group both use Twitter as part of their business model strategies but not the Manna group (Table 5; Figure 8). Borders Machinery Ring (BMR) is more active in using Twitter compared to Facebook.

Table 5: Statistics of Twitter usage of BMR and the Intervale group for the year 2014-2015, which show the total number of posts, likes, retweets and comments

Twitter				
	Number of Posts	Number of Likes	Number of Retweets	Number of Comments
Manna Group				
BMR	200	92	145	7
Intervale Group	376	227	236	15

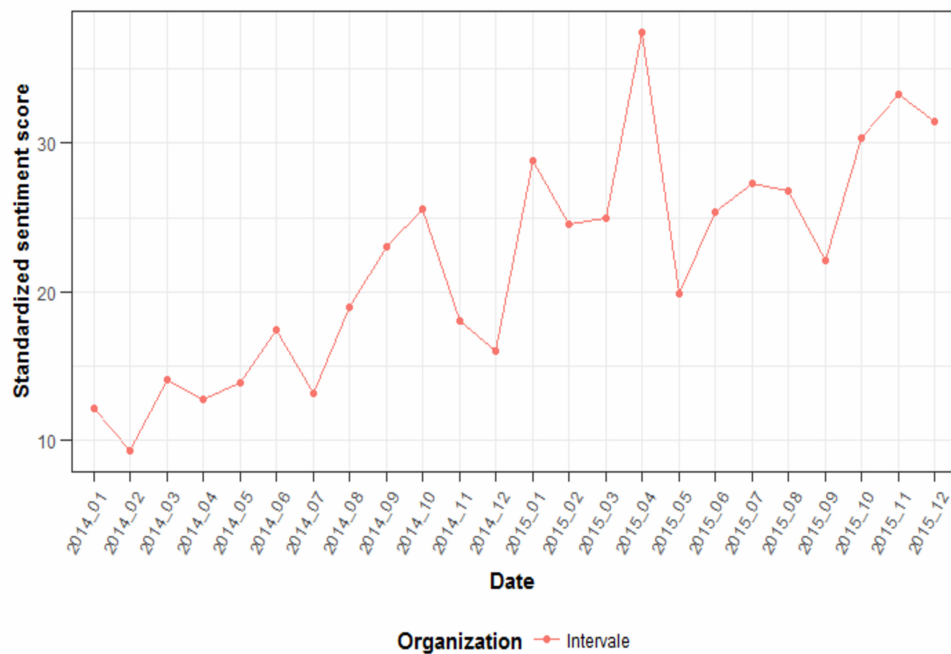


Figure 8: Sentiment score of the Instagram posts for the Intervale group for the year 2014 and 2015

From Figure 9, it can be seen that BMR does not post any tweets in January 2014. Although its activity level is higher than Facebook in Twitter, its number of posts fluctuates between 0 - ~20 (Figure 9a). During November 2015 when BMR tweets the most tweets in the two year period, the organization also receives the most number of likes and considerable number of retweets for its posts (Figure 9b, c). The Intervale group has a higher activity level compared to BMR (Figure 9a). The organization receives the most likes (December 2014), retweets and comments (August 2014) for its

tweets during few of the months of which it is most active (Figure 9)

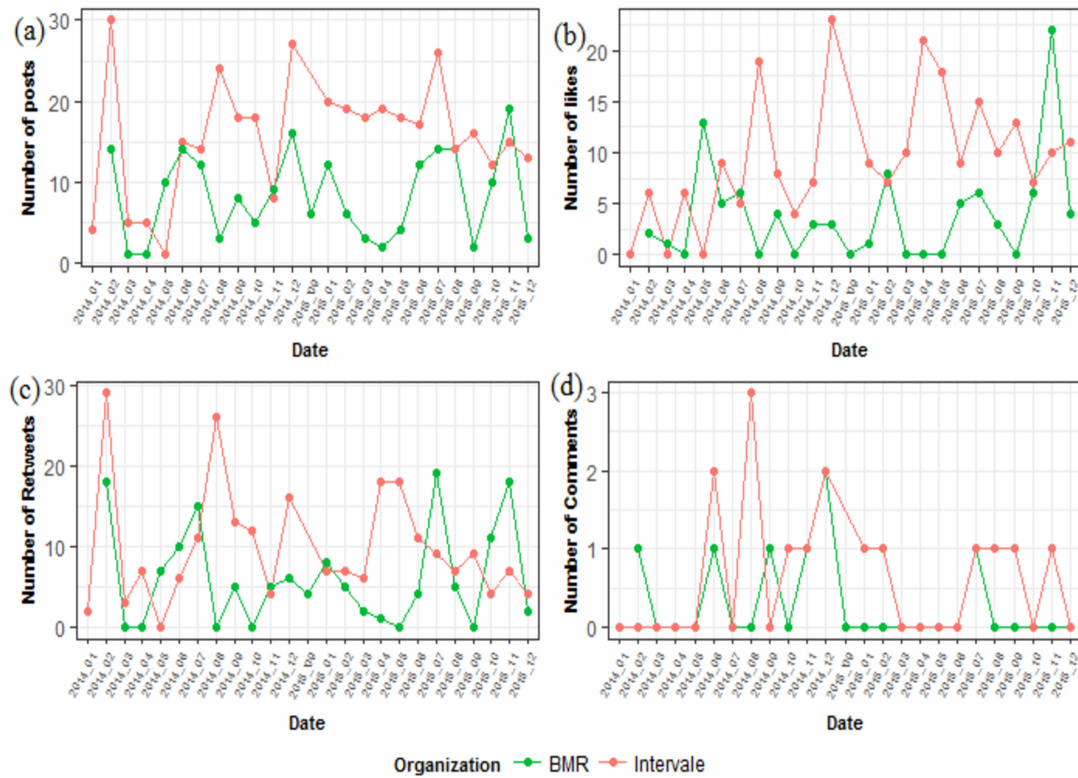


Figure 9: Statistics of Twitter usage of BMR and the Intervale group for the year 2014-2015

A bubble plot which breaks down positive, neutral and negative comments of Twitter postings shows that both BMR and Intervale do not get many comments for their tweets (max = 3, Figure 9d). Sentiment scores generated from Twitter's data are relatively low compared to the social media platforms discussed earlier (e.g., Facebook and Instagram). Patterns of standardized sentiment score of the Intervale group corresponds the patterns of the organization's activity level (Figure 10, 6a). For BMR, its sentiment score fluctuates quite a bit with no clear pattern (Figure 10).

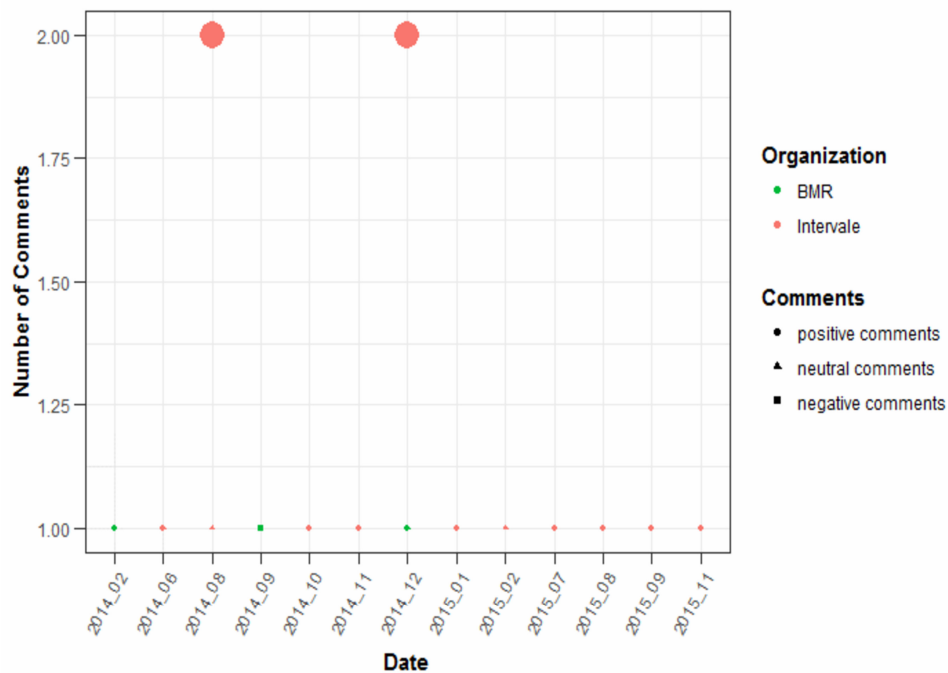


Figure 10: A bubble plot showing the number of positive, neutral and negative comments for the Instagram posts of the Intervale group for the year 2014 and 2015

The above results plainly reveal that the social media can have a large number of feedbacks and interactions not depends on the scale of company. The interactions of smaller SE can be higher than larger SE. In other words, the larger organizations are not necessarily to obtain the higher attentions on social media. From the above and following results of the standardized sentiment scores, a smaller SE like Intervale also can have higher performance than the larger SE (MBR) on the different social media.

4.3.4 YouTube

Borders Machinery Ring (BMR) and the Intervale group were the two organizations among the three studied that employ the social media platform YouTube in their business model strategy. However, after completing data collection, it was found that YouTube postings by BMR and the Intervale group in the sampled time frame (2014-2015) were lacking. All of BMR videos were posted in the year of 2013 (Table 6). While the Intervale group (The Intervale Center) had two postings in the year of 2014 with the remaining videos dated before 2014 or after 2015 (Table 6). Moreover, the number of total postings from both organizations were low (<30 posts). Data collected

from YouTube will therefore be excluded for the rest of the analysis.

Table 6: Statistics of YouTube usage of BMR and the Intervale group for the year 2014-2015, which show the total number of views, likes, dislikes and comments

YouTube				
	Number of Views	Number of Likes	Number of Dislikes	Number of Comments
Manna Group				
BMR	34904	14	4	2
Intervale Group	3046	27	0	1

4.4 Sentiment Score of Social Media Platforms

In addition to looking at general statistics of individual social media platforms, it is also of interest to figure out which social media platform has the highest sentiment score per posting over the two-year period that data was collected (Figure 12). Instagram outperforms Facebook and Twitter most of the time during the two-year period except the first half of 2014 (Figure 11, Table 7). Twitter has the worst performance among the three social media platforms, with almost flat sentiment score of about 1 throughout the time (Figure 12). There is a big range in terms of Facebook's sentiment score; its better scores sometimes exceed that of Instagram (e.g., July and August 2014, Figure 12). The mean of sentiment score per post for the three social media platforms supports the patterns observed in Figure 11, with Instagram leading the poll (mean Ss = 22), follows by Facebook (mean Ss = 8) and Twitter at the bottom with a mean of 1.

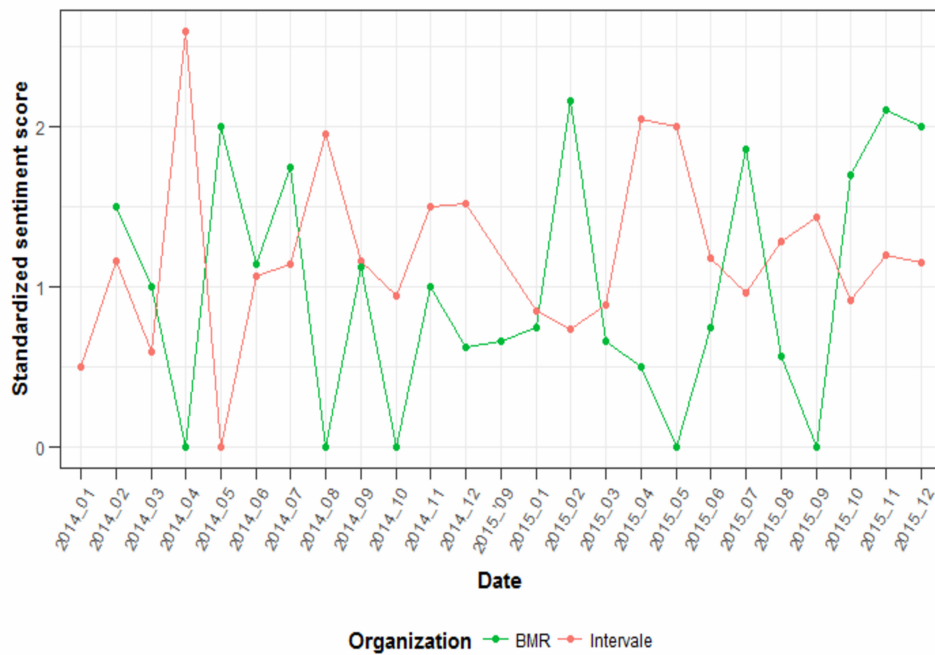


Figure 11: Sentiment score of the Twitter posts for BMR and the Intervale group for the year 2014 and 2015

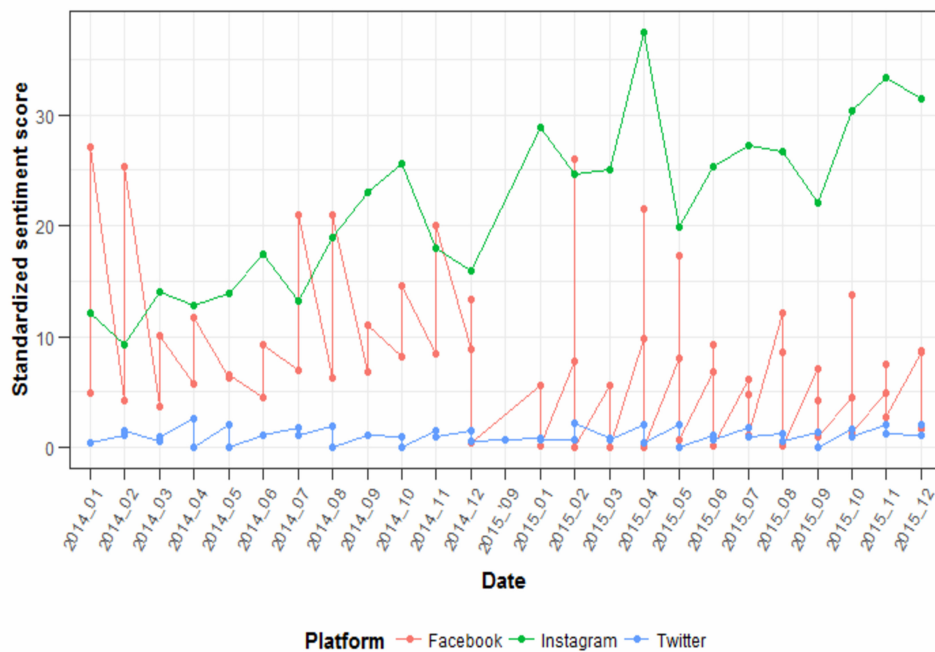


Figure 12: Sentiment score per post for the social media platforms: Facebook, Instagram and Twitter for the year 2014 and 2015

Table 7: The average standardized sentiment score for the three social media platforms

Social media platform	Mean of sentiment score per post, S_s
Facebook	8.21
Instagram	21.96
Twitter	1.10

Table 8: Types of social media postings by the agricultural social enterprises and their corresponding standardized sentiment score (S_s)

Type	Standardized sentiment score (S_s)
Check-in	5.6
Event	3.3
External link	4.4
Picture	8.5
Text	1.7
Video	6.0

The next logical step is to figure out which type of postings is most popular with the three studied organizations. The results are shown in Figure 13. It is quite surprising to find a huge discrepancy between the three organizations (Figure 13). Borders Machinery Ring uses mostly text (67%) in its social media correspondence (Figure 13). The Intervale group, on the other hand, uses external link in over half (58%) of its postings (Figure 13). Whereas picture dominates in the Manna group's social media postings (79%, Figure 13).

According to the above results, it plainly reveals that the different types of information the user prefer in different countries. For example, Manna in Taiwan has much more pictures on these social media. Intervale in US has much more external_link information on these social media. BMR in UK has much more texts on these social media.

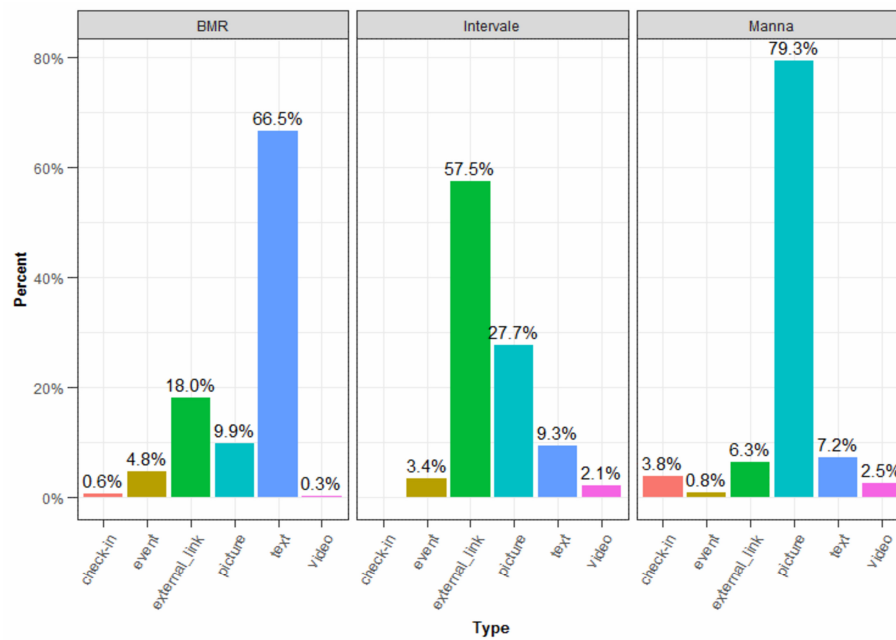


Figure 13: The type of social media postings utilized by the three CSA social enterprises

4.5 Social Media Strategy for SE's Innovation

In order to figure out innovative business model of CSA social enterprises, the relationships between the two predictors (type and category) of social media postings need to be untangled. The social media posting type “check-in” is excluded in this analysis because it is not used in the posts of the business model element of customer relationship. The type of posts seems to impact sentiment score the most. Last but not least, in order to visualize the relationship of the two categorical independent variables, mean of sentiment score is plotted against business model element and the points colored with the type of social media postings (Figure 14). The best strategy to induce positive reaction from the public appears in social media to be posting picture from the business model element of value proposition and the worst strategy is text or event type of postings of the element of customer relationship (Figure 14).

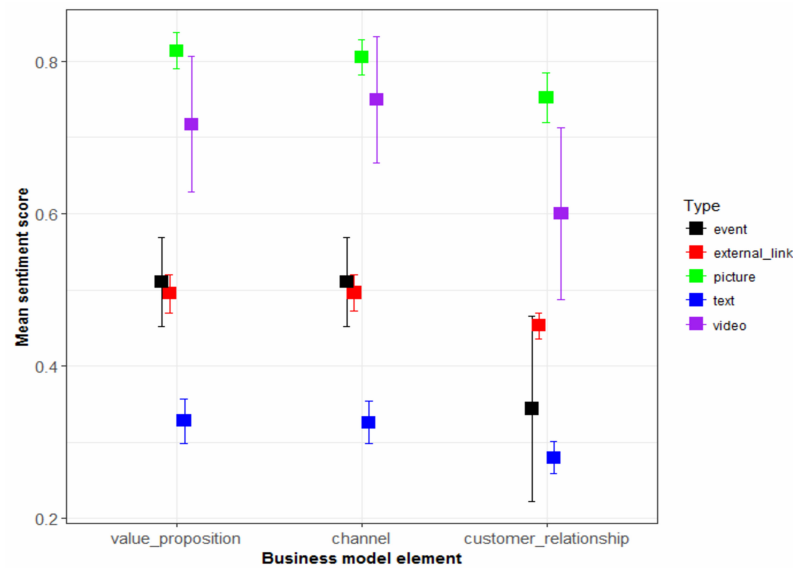


Figure 14: Mean sentiment score plotted against business model elements of value proposition, channels and customer relationship. Standard error of mean is added as error bar

5. Conclusions

This study contributes to the growing literature on sharing economy activities and provides one of the first studies on sentiment analysis of social media usage strategies by CSA social enterprises in different regions. The novel approach of gauging customer sentiment using indicators unique to each social media platform and comments from the public provides new insights into CSA-SEs. The inclusion of multiple social media platforms in current study also increases the possibility of generalizing the findings of this study to other relative social enterprises. While the results of current study is reliable, social media's innovative strategy that can induce positive sentiment in customers can serve as a guide for other SEs' social media innovation. Because of the popularity of social media platforms such as Facebook and Instagram, they provide a cost-effective venue for social enterprises in general to market their products or services and connect with their customers. Better social media innovation, therefore, are crucial and important to SEs take full advantage of social media strategy. Sentiment analysis can help to determine what social media strategy (i.e., Mana posts information to News' media has higher views than other popularized social networks) and further new value proposition (i.e., Mana can enhance value propositions according to transnational

sentiment analysis). (i.e., Value proposition can be extended according to the public opinions of Borders Machinery Ring (BMR) in UK and Intervale in USA in this study).

The only social media platform used by the Manna group, and other social media platforms as part of their business model strategy. The more successful business brand was measured by the users' sentiments (positive or negative) towards social enterprise innovation strategy. Sentiment analysis is therefore used to measure how well each SE is doing after collecting social media data. Data collection has a period of two years for the four social media platforms. In addition to R language and PLOTY can be used to measure big data to explore the reputation or potentially public sentiment. This study provides insights into how CSA social enterprises operate social media to improve the different elements of business model innovation. These insights lead to the revelation of the importance of posting type and content in garnering positive sentiments. This study also finds that the Manna group, the focus group of this study, has been practicing the better social media strategy. Suggestions to consolidate its many sub-groups and to employ a pictorial-based social media platform are made to potentially improve its business performance.

There are several limitations to current study, which can potentially inform the direction of future studies. One of the limitations is the choice of organizations of interest, which in this case, are agricultural businesses that are involved in sharing economy activities (social enterprises). Because of the nature of these organizations, their customer segments are often limited. This translates to limited social media data which reduces the amount of data available for empirical research. This issue can be rectified by longer term studies which collect data over a long period of time, the inclusion of more variables or the supplementation of social media data with traditional data such as questionnaire or survey. The second limitation is the inclusion of organizations from multiple countries, whose culture, language and value differ greatly. This means that differences or patterns found in the study may be due to cultural differences instead of real differences in observations. Future studies can build on the results of this study, include more variables or develop in-depth studies on the social media strategies of social enterprises.

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