

Chapter 4

A study on use of SM by Indian ministries

4.1 Introduction

Online social media has changed the way we communicate with the rest of the world. Today social media (SM) is a pervasive mode of online communication and connections from all walks of life. Increased use of ‘smartphones’ has been accepted as an essential component that enables access to social media. Social media services, such as Facebook, Twitter, LinkedIn, FourSquare, YouTube, or Flickr, provide a forum for connecting people and creating online communities to share information. A study by [12] showed that people, especially young adults, are linked to each other via social media all the time to very frequently in their daily lives. Brayer et al. [25] showed the power of social media for all political candidates as well as elected officials worldwide. Social media considered to be a component of the Web 2.0 evolution, distinguished by user-generated content, online personality making, and relational networking [26]. Different Web 2.0 applications are, therefore, being used to maintain relations with citizens while serving office [23, 24]. In the last few years, electronic government or e-government has been a subject of great

curiosity, and gained momentum, especially after the arrival of Web 2.0 technologies. E-Government is described as “the use of ICT (Information and Communication Technology), and especially the Internet, as a medium to gain excellent administration” [21]. Social media is growing as one of the significant wings of e-government initiatives. Here, we concentrate upon the use of Twitter and Facebook in different government organizations of India and its office-bearers.

4.1.1 Twitter

Twitter is a free social networking and micro-blogging service that allows users to post and read short messages (from a maximum of 140 characters earlier to 280 chars now) as tweets [42]. Twitter is a real-time interface that enables users around the world to share personal and private information through messages, which are ordered chronologically on an appropriate user’s account. The potential to interact in small real-time messages has attracted significant attention from people and groups [183]. Twitter found in 2006; the micro-blogging site has been steadily increasing its user base in India, up from 11.5 million in 2013. A Twitter user holds a brief biography of herself in her Twitter profile that includes her full name, location, link to her webpage (if any). A short profile and her tweets and other activities on Twitter and shows her profile with brief networking details of her other connections (followers and followings) [184].

4.1.2 Facebook

Facebook is an American social networking service and online social media company based in Menlo Park, California. Mark Zuckerberg founded it on February 4, 2004, in company with fellow Harvard College students and roommates Eduardo Severin, Andrew McCollum, Dustin Moskowitz, and Chris Hughes [185]. It allows users to socialize with multimedia content (text, image, audio, video) and provides the option to send it to a

targeted group or post publicly. This is more feature-rich compared to Twitter and gives comparatively more freedom to users as far as content generation is concerned.

4.1.3 Social Media in Governance

The use of online social media by government ministries is slowly taking place in India. Different government departments of India are getting active in social media day by day. They announce notifications, share information to citizens on government initiatives as well as receive input from the people on various issues. People in the government, especially ministers, do maintain a personal profile in social media and try to connect and get connected with the people personally. They often listen to people and address their grievances. To assess the coverage and depth of such connectedness and outreach, a proper study is needed. Through online searches, we identified 46 accounts of different ministries under the Government of India (GoI) and their top officials on social media (Table 4.1 and Table 4.2).

Specifically, we attempt to study the following research questions.

- SQ1. How many ministries use social media platforms, and which of them are preferred by them?
- SQ2. What type of topics do they discuss on social media?
- SQ3. How active are different GoI ministries and their officials in social media? How often do they post?
- SQ4. How do the departments interact among themselves through social media? Outside the officialdom, do they mutually refer to each other in the public domain through social media?

SQ5. How is the public participation in social media with the ministries or Government departments? How do these two stakeholders of e-Governance interact or exchange through social media?

Through our data collected from Twitter accounts of 46 ministries (since the date of joining till February 2018), the study motivated to explore answers to the above moot questions in the context of GoI ministries.

4.2 Contributions of Chapter

The Indian Government has started connecting with people through social media. Some Indian ministries and their departments have been using SM for quite some time. Indian PM's personal Twitter profile in 2019 has over 45 million followers, apart from his PMO account [54]. In this section, we attempt to see how many of them are doing it and in what way. Specifically, we seek to find an answer to the following question.

SQ1. How many ministries use social media platforms and which social media?

Through online searches, we found social media presence of 46 different ministries under the Government of India and their top officials. We found eight social media platforms (Twitter, Facebook, Instagram, LinkedIn, YouTube, Google+, Flickr, Skype, etc.) used by ministries. Table 4.1 and Table 4.2 depict the use during our period of study. Out of 46, only nine ministries use the LinkedIn account, 31 YouTube, five Instagram, 17 Google Plus, one Flickr, and two use Skype. The Ministry of External Affairs uses all of the social media accounts. The Ministry of Power uses only Facebook and Twitter accounts.

Among different social media platforms, we found Twitter and Facebook as the most popular among the ministries. While some use more platforms, these two are

common for most and, therefore, these two media considered for our study. The posts collected from ministries Twitter and Facebook accounts. Tweets collected with the keywords “#twitter accounts name.” The collected posts were in English, Hindi, and some other regional languages. For this study, we concentrated only on English posts.

Table 4.1 Ministries of India on social media

SNo.	N_Ministry	Twitter_id	FB_id	LinkedIn	YouTube	Instagram	Google+	Flickr	Skype
1	Ministry of Home Affairs	PIBHomeAffairs	HMOOfficeIndia	No	Yes	No	Yes	No	No
2	Ministry of Chemicals and Fertilizers (Including Pharmaceuticals)	Pharmadept	DeptofPharmaceuticals	No	Yes	No	Yes	No	No
3	Ministry of Agriculture	AgriGoI	agriGoI	No	No	No	Yes	No	Yes
4	Ministry of Coal	CoalMinistry	CoalMinistry	No	No	No	No	No	No
5	Ministry of Civil Aviation	MoCA_GoI	MoCAIndia	Yes	Yes	No	No	No	No
6	Ministry of Communications and Information Technology	GoI_MeIT	meityindia	Yes	No	No	No	No	No
7	Ministry of Commerce and Industry	CimGOI	PIB.Mof.C.and.I	Yes	No	No	No	No	No
8	Ministry of Consumer Affair	consaff	ConsumerAdvocacy	Yes	Yes	No	Yes	No	No
9	Ministry of Culture	MinOfCultureGoI	indiaculture.goI	Yes	Yes	Yes	No	No	No
10	Ministry of Earth Sciences	moesgoi	moesgoi	No	No	No	No	No	No
11	Ministry of External Affairs	MEAIndia	MEAINDIA	Yes	Yes	Yes	Yes	Yes	Yes
12	Ministry of Food Processing Industries	MOFPI_GOI	MOFPIIndia	Yes	Yes	Yes	Yes	No	No
13	Ministry of Defense	SpokespersonMoD	DefenceMinIndia	Yes	Yes	Yes	Yes	No	No
14	Ministry of Environment and Forests	moefcc	moefcc	Yes	No	No	No	No	No
15	Ministry of Finance	FinMinIndia	finmin.goI	No	Yes	No	Yes	No	No
16	Ministry of Health and Family Welfare	MoHFW_INDIA	MoHFWIndia	No	Yes	No	No	No	No
17	Ministry of Heavy Industries and Public Enterprises	heindustry	mhipegoi	No	No	No	No	No	No
18	Ministry of Human Resource Development	HRDMinistry	HRDMinistry	No	Yes	No	No	No	No
19	Ministry of Information and Broadcasting	MIB_India	inbministry	No	Yes	No	No	No	No
20	Ministry of Labour and Employment	LabourMinistry	LabourMinistry	No	No	No	No	No	No
21	Ministry of Micro, Small and Medium Enterprises	minmsme	minmsme	No	Yes	No	Yes	No	No
22	Ministry of Minority Affairs	Minority_GoI	ministryof-minorityaffairs	No	No	No	No	No	No
23	Ministry of Mines	MinesMinIndia	MinesMinistryIndia	No	No	No	No	No	No
24	Ministry of New and Renewable Energy	mreindia	MNREMinistry	No	Yes	No	No	No	No
25	Ministry of Rural Development	MoRD_GOI	IndiaRuralDev	No	Yes	Yes	Yes	No	No

4.2.1 Data Collection

We collected data of 46 accounts corresponding to GoI ministries from Twitter and Facebook. For Twitter data we use REST API in our program to download tweets. REST API takes words as queries and multiple queries can be combined as a comma separated list. Tweets from the previous 10 days can be searched using this API. For

Table 4.2 Table 4.1 (Contd.) Ministries of India on social media

SNo.	N_Ministry	Twitter_id	FB_id	LinkedIn	YouTube	Instagram	Google+	Flickr	Skype
26	Ministry of Panchayat Raj	MoPRIndia	MinistryOf-PanchayatiRaj	No	Yes	No	No	No	No
27	Ministry of Parliamentary Affairs	mpa_india	MOPAIndia	No	Yes	No	Yes	No	No
28	Ministry of Personnel, Public Grievances and Pensions	DoPTGol	Yes	No	Yes	No	Yes	No	No
29	Ministry of Petroleum and Natural	PetroleumMin	PetroleumMinIndia	No	Yes	No	Yes	No	No
30	Ministry of Power	MinOfPower	PowerMinistryIndia	No	No	No	No	No	No
31	Ministry of Railways	RailMinIndia	RailMinIndia	No	Yes	No	No	No	No
32	Ministry of Road Transport and Highways	MORTHIndia	MoRTHIndia	No	Yes	No	No	No	No
33	Ministry of Science & Technology	IndiaDST	IndiaDST	No	Yes	No	No	No	No
34	Ministry of Social Justice and Empowerment	MSJEGOI	ministryofs.j.and.e1	No	No	No	No	No	No
35	Ministry of Skill Development and Entrepreneurship	MSDESkillIndia	SkillIndiaOfficial	No	No	No	No	No	No
36	Ministry of Tourism	tourismgoi	ministryof-tourismgoi	No	Yes	No	No	No	No
37	Ministry of Urban Development	MoHUA_India	mohua.india	No	No	No	No	No	No
38	Ministry of Tribal Affairs	TribalAffairsIn	TribalAffairsIn	No	Yes	No	No	No	No
39	Ministry of Water Resources	mowrrdgr	mowrrdgr	No	Yes	No	Yes	No	No
40	Ministry of Women and Child Development	MinistryWCD	ministryWCD	No	Yes	No	No	No	No
41	Ministry of Youth Affairs and Sports	YASMinistry	yasministry	No	Yes	No	Yes	No	No
42	Ministry of Development of North Eastern Region	MDoNER_India	MdonerIndia	No	No	No	No	No	No
43	Ministry of Textiles	TexMinIndia	TexMinIndia	No	Yes	No	Yes	No	No
44	Prime Minister of India	PMOIndia	PMOIndia	No	Yes	No	No	No	No
45	Ministry of Steel	SteelMinIndia	SteelMinIndia	No	Yes	No	Yes	No	No
46	Ministry of Shipping	shipmin_india	ShipminIndia	No	Yes	No	No	No	No

Facebook data we used Facepager tool [186]. We collected data from 46 ministries accounts.

From collected data, we select the following fields.

- Name of the Ministry.
- Number of posts is self posted by user's in his or her Timeline.
- Average retweet of tweets.
- Number of Followers of the particular user.
- Number of followings of the user.
- The hashtags.
- Retweet relation.
- Number of likes.

- Number of retweets.
- Percentage of Hindi posts and English posts.

Table 4.3 shows the text (Hindi and English) used by the ministries in their posts. The Ministry of Agriculture uses most of the text in Hindi in both the platform in their post.

Where FB_En is Facebook English post, FB_Hi is Facebook hindi post, D_FB is message post day on Facebook. The number of days when post were posted and TFBP is total Facebook post. T_En is Twitter English tweets, T_Hi is Hindi tweets and D_T is total number of days when tweets were posted. T_TP is total Twitter tweets. We did not find the ‘Ministry of Personnel, Public Grievances and Pensions’ Facebook account (in Table 4.3, NFA = not found available). Every ministry uses English text as well as Hindi in their post. Compared to Twitter, ministries used Hindi text more in the Facebook post probably because of target audiences. In India, Twitter is mainly used by English-knowing educated people, while Hindi is the language of the masses. The Ministry of Agriculture used Hindi text more compared to English in Facebook as well as Twitter.

4.3 Content Analysis

As the first step of analysis of downloaded data, we attempt to look at the content to see what kind of information is shared by the GoI ministries in the social media. To be specific, we tried to explore the following question.

SQ2. *What type of topics do they discuss on social media?*

Table 4.3 Social Media‘ Post Language Distribution of the Indian government Ministries in %.

Ministry_id	FB_Post				Twitter_Post			
	FB_%En	FB_%Hi	D_FB	TFBP	T_%En	T_%Hi	D_T	T_TP
1	91.82	8.17	419	1580	89.64	10.35	183	3223
2	98.32	1.67	236	804	94.75	5.24	137	450
3	37.60	62.39	459	1239	56.92	43.08	419	6422
4	80.87	19.12	452	1073	80.95	19.05	380	2179
5	98.53	1.46	229	753	77.46	22.53	24	869
6	96.21	3.78	250	950	89.49	10.50	286	3206
7	95.43	4.56	32	178	97.56	2.43	286	3217
8	99.09	0.90	130	448	98.04	1.95	253	3193
9	87.98	12.01	815	2165	77.81	22.18	444	3202
10	95.43	4.56	46	132	98.01	1.98	522	3170
11	99.16	0.83	1547	3696	94.80	5.19	300	3174
12	98.49	1.50	649	1131	92.18	7.81	273	3220
13	99.31	0.68	248	1052	96.12	3.87	147	3233
14	98.11	1.88	124	444	98.01	1.98	243	2767
15	98.64	1.35	930	2657	94.85	5.14	177	3220
16	76.22	23.77	473	634	85.83	14.16	129	3231
17	98.38	1.61	11	16	99.51	0.48	32	136
18	93.27	6.72	152	387	92.21	7.78	440	2707
19	97.11	2.88	1195	3097	88.24	11.75	44	3211
20	87.01	12.98	388	921	95.06	4.93	387	2932
21	82.78	17.21	*200	1671	88.72	11.27	248	3203
22	98.40	1.59	37	88	66.15	33.84	9	51
23	84.13	15.86	124	202	75.66	24.33	119	580
24	91.98	8.01	256	542	91.91	8.08	280	3007
25	80.90	19.09	222	341	87.48	12.51	444	3202
26	86.51	13.48	100	258	93.82	6.17	14	64
27	82.11	17.88	34	50	96.34	3.65	45	253
28	NFA	NFA	NFA	NFA	84.75	15.24	32	154
29	95.77	4.22	61	335	96.86	3.13	466	3054
30	89.98	10.01	529	1559	95.78	4.21	387	1609
31	93.52	6.47	748	2295	92.35	7.64	166	6455
32	90.50	9.49	474	1090	96.13	3.86	365	3184
33	97.33	2.66	476	1265	97.44	2.55	263	3198
34	93.82	6.17	341	810	88.41	11.58	252	1061
35	92.96	7.03	741	1478	91.68	8.31	278	3207
36	91.51	8.48	503	1254	91.63	8.36	461	3140
37	97.01	2.98	449	1581	97.04	2.95	94	3214
38	95.04	4.95	183	345	91.00	8.99	160	974
39	89.62	10.37	112	162	77.33	22.66	162	1366
40	83.02	16.97	790	1981	86.61	13.38	375	3122
41	94.98	5.01	424	1199	93.97	6.02	335	1906
42	98.88	1.11	131	211	96.47	3.52	179	1363
43	78.84	21.15	238	528	99.49	0.50	29	3215
44	97.78	2.21	670	1254	84.37	15.62	243	3189
45	97.51	2.48	303	421	93.67	6.32	422	2947
46	96.96	3.03	204	559	99.01	0.98	489	3244

Topic detection is used to identify the contexts the government engages in social media platforms during conversation. With the help of Latent Dirichlet Allocation (LDA), we did topic modeling on the Facebook and Twitter data. We show top-100 words on the combined text of Facebook and Twitter.

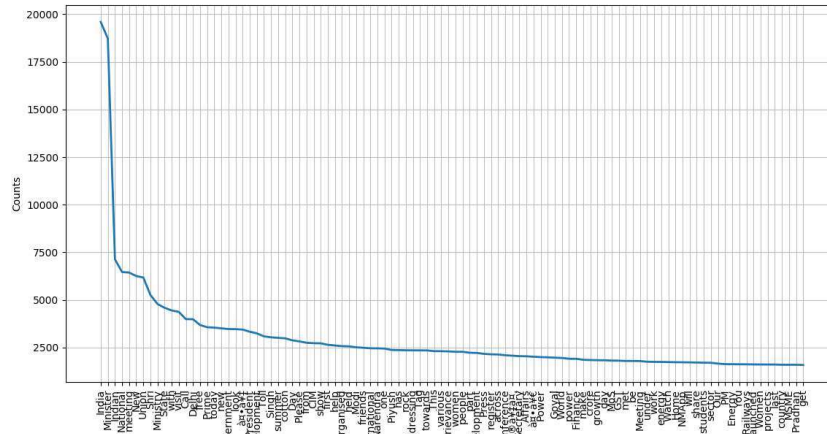


FIGURE 4.1 Topics discussed by ministries in both the platform (Facebook and Twitter)

The top ten words used in both the formats- India, Minister, Indian, National, Meeting, New, Union, Shri, Ministry, and State. Top words found are: *GST (Goods and Services Tax came into effect in 2017), launched, meeting, Pradhan Mantri Yojna, Railways project and train* etc. Figure 4.1 shows the topics discussed by ministries on social media. We present top-100 words from Facebook and Twitter, which are common words in both the platforms. Ministers discuss about the meetings and projects related to the Government. The Ministries' meetings are mostly related to work, and discussions are about progress of the projects, allocation of fund, timeline like how many days or month projects will be complete.

We have classified the ministries Twitter and Facebook data into seven classes to see which ministry data is high in which class. The six groups considered are

conversational, status, pass-along, news, phatic, and spam [5]; We add one extra class unknown. Here we choose common ministries into the group at both platforms for content classification to present in the Table 4.4 and Table 4.5.

Table 4.4 Twitter Content classification of Ministry Based on [5] in %

Group/ Class	M_id	Twitter						
		Conversational	Status	Pass-Along	News	Phatic	Spam	Unknown
Low active	22	9%	5%	86%	0%	1%	0%	0%
Moderate active	38	9%	16%	50%	8%	7%	0%	10%
High active	40	15%	31%	17%	28%	1%	0%	8%
Super active	19	14%	5%	54%	18%	1%	0%	8%

Table 4.5 Facebook Content classification of Ministry Based on [5]

Group Class	M_id	Facebook						
		Conversational	Status	Pass-Along	News	Phatic	Spam	Unknown
Low active	22	0%	28.1%	14.77%	55%	1.13%	0%	0%
Moderate active	38	20%	25%	22%	25%	3%	0%	5%
High active	40	7%	40%	12%	30%	3%	0%	8
Super active	19	20%	20%	5%	45%	3%	0%	7%

In Facebook data, there is no mention or @username related post, so it means no conversation and response post. In Facebook, most of the post belongs to news class or pass-along class and also status class, and the rest of them belong to the phatic class, there is no spam and unknown class post. Every ministry has more than 50% posts belonging to news class.

4.4 Level of Activities of different Government Ministries

SQ3. *How active are different GoI ministries and their officials in the social media? How often do they post or re-post here?*

We collected the statistics of number of posts per user from our Twitter and Facebook corpus of Goweministries and plotted the number of posts posted by them in log-scale.

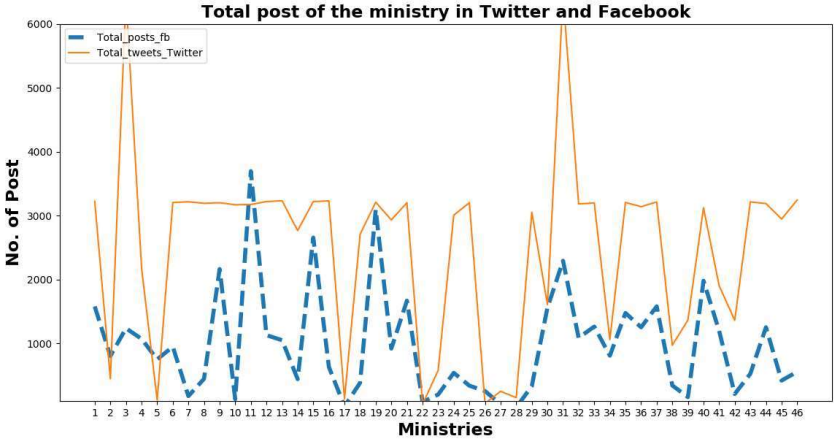


FIGURE 4.2 Number of posts per user from Twitter and Facebook

Figure 4.2 shows the numbers in increasing order. We classify the set of accounts into following four classes:

- Low Active Group: 0 to 100 posts per user.
- Moderate Active Group: 101 to 1000 posts per user.
- High Active Group: 1001 to 2000 posts per user.
- Super Active Group: 2001 above posts per user.

We find most of the ministries are quite active in both Twitter and Facebook. In Twitter, two ministries belong to low active group, and seven belong to moderate active group, and five ministries belong to high active group and thirty two ministries from super active group, based on their activity. In Facebook, out of 46 ministries, only three are in the low-active group while twenty two ministries in moderately active, and two belong to super-active group and eighteen in the high-active group.

4.4.1 Time-Series Analysis

From the total number of posts (messages, tweets and retweets) posted since their arrival on Facebook and Twitter (which we have downloaded from their timeline), We also attempt to analyse their per day activity, i.e. how many messages and tweets or retweets (reply to other's posts) are posted in a day. Table 4.6, 4.7, 4.8, 4.9 show their daily activities.

Low Active Group

Low active group consists of accounts having very low participation in Twitter and Facebook. Three ministries' Facebook and two ministries' Twitter accounts belong to this group. Users who have posted, 100 or less tweets or posts so far belong to low active group. Among them, We look at the activities of users with lowest number of tweets posted (51) - Ministry of Minority Affairs (@Minority_GoI) from Twitter and the other with the lowest (88 posts) from Facebook - Ministry of Minority Affairs (ministryofminorityaffairs).

Table 4.6 low active ministries from Facebook and Twitter

Facebook Low active	Twitter Low active
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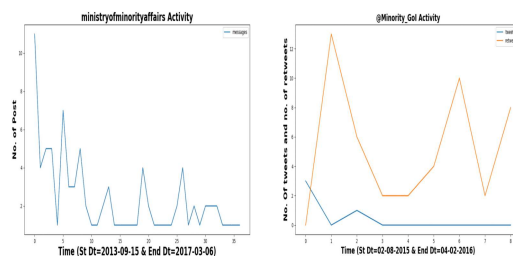


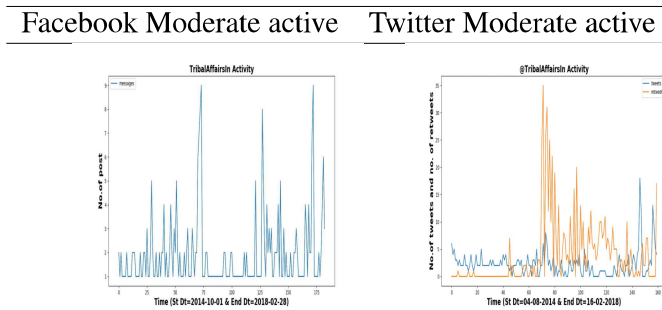
Table 4.6 shows the comparison between Facebook and Twitter low active group. On Twitter, the first tweet date is the start date of the tweeting (08-12-2014 on Twitter and 15-09-2013 on Facebook) when the Ministry of Minority Affairs posted three tweets, and 0 (zero) retweets posted. The last tweet date is the end date (20-08-2016) when 0 (zero) tweet and eight retweets. In total, there are 51 tweets within the period, with an average of 0.092 tweets per day. On Facebook, the first message date is the start date of the messaging (15-09-2013 on Facebook) when the Ministry of Minority Affairs posted eleven messages. The last message date is the end date (06-03-2017) when one message was posted. The Ministry of Minority Affairs messaging and tweeting or retweeting activity is different, not a single post posted on the same date from Facebook and Twitter simultaneously. On Facebook, the posting activity is more compared to Twitter.

4.4.2 Moderate Active Group

We call a user moderately active if the total number of messages posted by her was between 101 to 1000. There are twenty two moderately active ministries accounts from Facebook, and seven from Twitter. We take two representative ministries from the group (one from Facebook and another from Twitter) to see their activities in social media.

Table 4.7 shows posting activity of the Ministry of Tribal Affairs, Government of India (TribalAffairsIn) which is with the highest number of tweets in the Moderate Active group. It has 974 total tweets according to Twitter data. The first tweet was posted on 2014-08-04 with six different tweets and no re-tweet. The last tweet date is 2018-02-16 with posting four tweets and seventeen re-tweets. On Facebook, the first message post on 2014-06-09 (two message) and the last date post we have on 2017-11-20 (three message) according to our data. The Ministry of Tribal Affairs

Table 4.7 Moderate active ministries from Facebook and Twitter

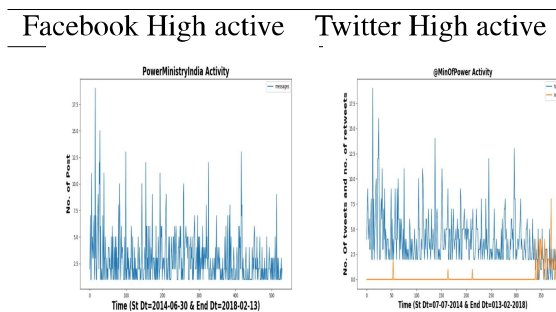


came around the same time at both the platforms but the posting is more on Twitter (974 posts) compared to Facebook (345 posts).

4.4.3 High Active Group

High Active group consists of members whose total number of messages posted was between 1001 to 2000. There are fifteen ministries' accounts in this group from Facebook and twenty six from Twitter. They quite frequently tweet and re-tweet and also reply to their followers who are mostly general public and peers. The observation is very much similar on Facebook.

Table 4.8 High active ministries from Facebook and Twitter



We take two representative examples from the category: one from the Facebook and another from the Twitter. Table. 4.8 shows the activity of the Ministry of Power (@MinOfPower). It has 1559 total messages in Facebook and 1609 tweets in Twitter. In both the media, the ministry came around the same time (in Twitter, the first tweet was posted on 07-07-2014, and on 30-06-2014 in Facebook).

4.4.4 Super Active Group

The super active group consists of those accounts which have more than 2001 tweets in total. In this group, 5 ministries' accounts are from FB and 32 from Twitter. But two ministries deserve special mention: Ministry of Agriculture (@AgriGoI) and Ministry of Railways (@RailMinIndia) as they have more than 6000 tweets according to our data. Ministry of Railways has more than 600,000 tweets with more than ten tweets in a day (normally).

Table 4.9 Super active ministries from Facebook and Twitter

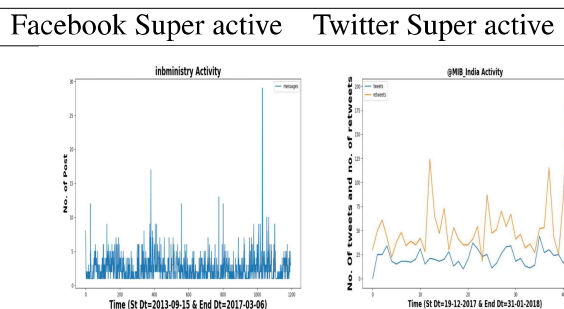


Table 4.9 shows the Ministry of Information and Broadcasting, Government of India (@MIB_India) activity. The account is active for quite some time in both Twitter and Facebook. Average rate of postings is also very high. The posting activity is

more on Twitter compare to Facebook.

4.5 Inter-connection among ministries

SQ4. *How do the departments interact among themselves through social media? Outside the officialdom, do they mutually refer to each other in public domain through social media?*

Here we attempt to look at the connection among the ministries. How the ministries are interconnected, specifically in the domain of social media, is studied through link analysis. We only chose Twitter data this as we find interconnection among ministries in Twitter in terms mentions and retweets.

Specifically, we look at their influence on social media through

- Hub and Authority [148].
- PageRank.

In Twitter, users communicate through retweets and mentions. Hence, the connection among Indian ministries or Indian government departments is seen as the combination of retweets and mentions among ministries and/or their departments. We form a directed graph G of ministries based on interconnection of retweets and mentions where,

$$G = (V, E)$$

where

$$V = \{v_1, v_2, v_3, \dots, v_{46}\}$$

and

$$E = \text{set of edges}$$

$$E = \{e_{ij} : \text{if there is any mentions/retweet from } v_w \text{ to } v_j (w \neq j)\}$$

We also build an adjacency matrix of dimension 46x46 from the interconnection graph that is used in the link analysis.

4.5.1 Hub and Authority scores

This is a concept proposed by Kleinberg [187] for link analysis. For an account v , we denote

$$h(v) = \text{Hub score}$$

and

$$a(v) = \text{Authority score}$$

$h(v)$, $a(v)$ for each $v_i (i \in 1, 2, 3, \dots, 46)$ are iteratively computed.

$$h(v) = \sum_{v \rightarrow y} a(y)$$

where,

$$v \mapsto y$$

denotes the outgoing links of v and

$$a(v) = \sum_{y \mapsto v} h(y)$$

We start with a trivial initialization

$$a(v_1) = a(v_2) = \dots = a(v_{46}) = \frac{1}{46} \text{ (normalised score)}$$

and keep on iterating until both $h(v_i)$ and $a(v_i)$ do not differ more than a pre-defined threshold in two successive iterations.

4.5.2 PageRank (PR)

It finds out importance of a node in a directed graph, denoted by its PageRank (PR).

PR of a node A is given by

$$PR(A) = \frac{\lambda}{N} + (1 - \lambda) + \sum_{B \rightarrow A} \frac{PR(B)}{out(B)}$$

Where, N is the number of nodes, λ is teleport probability ($0 \leq \lambda \leq 1$),

$out(B)$ denotes out-degree of node B . PR is computed iteratively for each node starting with some suitable initialization.

We consider a trivial initialization,

$$PR(v_1) = PR(v_2) = \dots = PR(v_{46}) = \frac{1}{46} \text{ and } \lambda = 0.15$$

We stop when PR values of each node falls below a pre-decided threshold t (we chose $t = 0.1$) between two successive iterations.

Both hub and authority scores, as well as PR values for the interconnection graph of GoI ministries, is shown in Table 4.10. Some ministries @mowrrdgr, @MoPRIndia, @Pharmadept, @consaff, @Minority_GoI, have authority score zero. It means the other ministries were not found to communicate with these ministries (No incoming retweets and mentions). Some ministries have hub score zero such as @heindustry, @Minority_GoI since We could not find their communication with other ministries. The @MIB_India is seen to be both good Hub and good Authority simultaneously. The page rank of @MIB_India is also high and @MIB_India belongs to the super active group. @Minority_GoI is having a poor Hub and Authority score, with similar page rank value. @Minority_GoI also belongs to low active group. Some ministries have no connection between them; that's why they have poor Hub, Authority and page rank. The @PMOIndia is the best Authority but with poor Hub and PR values.

4.6 Public Participation

Public participation in governance is an important aspect. There is a growing demand from the citizenry for greater inclusion of people in the discussion, deliberation, and policy-making. Can social media play a role here? There can be several aspects of the issue in depth and breadth. We however, try to explore the point with the following question.

SQ5. *How is the public participation in social media with the ministries or Government departments? How do these two stakeholders of e-Governance interact or exchange through social media?*

Table 4.10 Ministries Hub, Authority and PageRank scores

Ministry Twitter Handler	Hub		Authority		PageRank	
	H_Score	Rank	A_Score	Rank	PR Score	Rank
@AgriGoI	0.035	4	0.032	12	0.020	14
@CimGoI	0.021	24	0.032	11	0.035	4
@CoalMinistry	0.018	30	0.008	35	0.014	24
@consaff	0.031	12	0.0	43	0.003	43
@DoPTGoI	0.0089	40	0.004	39	0.005	41
@FinMinIndia	0.016	31	0.045	5	0.041	3
@GoL_MeirY	0.033	8	0.023	17	0.017	18
@heindustry	0.0	46	0.004	41	0.005	40
@HRDMinistry	0.024	19	0.044	6	0.031	9
@IndiaDST	0.028	16	0.019	21	0.020	15
@LabourMinistry	0.035	5	0.013	27	0.012	25
@MDoNER_India	0.031	11	0.020	19	0.016	23
@MEAIndia	0.005	44	0.043	8	0.035	5
@MIB_India	0.045	1	0.065	2	0.090	1
@MinesMinIndia	0.007	41	0.004	40	0.005	39
@MinistryWCD	0.028	15	0.036	9	0.033	8
@minmsme	0.022	20	0.015	26	0.011	29
@MinOfCultureGoI	0.019	27	0.030	14	0.016	20
@MinOfPower	0.011	38	0.032	10	0.020	13
@Minority_GoI	0.0	46	0.0	43	0.003	19
@mnreindia	0.022	21	0.010	32	0.011	28
@moca_goi	0.015	34	0.007	36	0.008	36
@moelcc	0.034	6	0.015	25	0.016	22
@moesgoi	0.021	23	0.009	34	0.007	37
@MOFPI_GOI	0.036	2	0.011	30	0.008	34
@MoHFW_INDIA	0.019	28	0.044	7	0.035	6
@MoHUA_India	0.012	37	0.016	24	0.010	31
@MoPRIndia	0.003	45	0.0	43	0.003	43
@MoRD_GOI	0.029	14	0.021	18	0.016	19
@MORTHIndia	0.020	25	0.029	15	0.023	10
@mowrdgr	0.016	32	0.0	43	0.003	43
@mpa_india	0.012	36	0.002	42	0.007	38
@MSDESkillIndia	0.025	18	0.031	13	0.021	11
@MSJEGOI	0.016	33	0.011	29	0.008	35
@PetroleumMin	0.031	10	0.018	23	0.017	17
@Pharmadept	0.019	29	0.0	43	0.003	43
@PIBHomeAffairs	0.031	13	0.006	37	0.009	32
@PMOIndia	0.014	35	0.069	1	0.124	26
@RailMinIndia	0.005	43	0.046	4	0.033	7
@shipmin_india	0.021	22	0.010	33	0.009	33
@SpokespersonMoD	0.006	42	0.020	20	0.016	21
@SteelMinIndia	0.020	26	0.011	31	0.011	27
@TexMinIndia	0.009	39	0.019	22	0.019	16
@tourismgoi	0.025	17	0.026	16	0.021	12
@TribalAffairsIn	0.032	9	0.005	38	0.004	42
@YASMinistry	0.033	7	0.012	28	0.010	30

Facebook and Twitter users hold a brief profile about himself/herself. The public profile includes the user's full name, place, a web page, a short biography, and the number of users posts. The people who follow the user and the people whom a user follows are also listed [184].

4.6.1 Likes

A 'Like' is represented by a small heart icon and used to show one's opinion for a post or a comment (in Facebook). One can view posts by liking the account from her profile page. We interpret here the number of likes as a measure of appreciation for posts by the

ministry. We assume, if the followers like the ministry they are likely to like its posts as well. We further assume that each post represents a topic in the form of a document and variation in the “likes” can be partly attributed to the topics. The most preferred topic is expected to earn ministry the maximum number of “likes” [188].

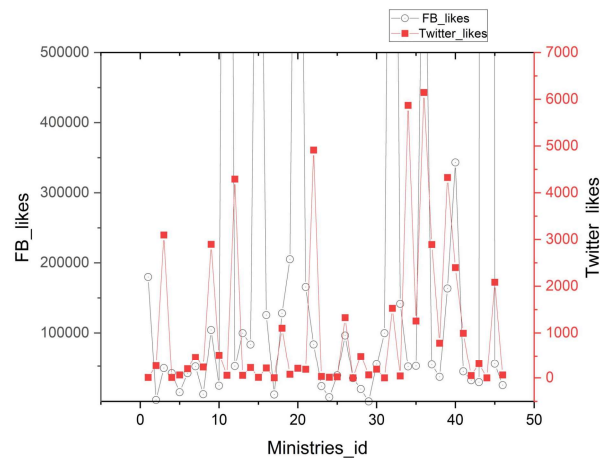


FIGURE 4.3 Number of ‘like’ of all the ministries on Facebook and Twitter

Figure 4.3 displays the distribution of number of likes as the solid line. The y-axis represents the number of likes a ministry’s Facebook and Twitter accounts get that is found to be within the limit of 5 to 500000 for Facebook and 500 to 7000 for Twitter.

The x-axis represents the ministries’ id as listed in Table I and Table II. We could not find any ‘like’ tab in the PMO Twitter profile but PMO has highest likes on Facebook. Ministry of Science and Technology profile has lot of likes for its tweets probably because people using Twitter are educated and quite tech-savvy and, therefore, like to learn whether new technology is being launched or not or any new updates related to science and technology on Twitter as well as on Facebook. The Ministry of Science and Technology also belongs to a highly active group. The Ministry of Panchayati Raj tweets has only one like and the

ministry belongs to the low active group. Some ministries have no ‘like’ button on their timeline like PMO and Ministry of Power.

4.6.2 Followers

Followers of a user are people who automatically receive messages and tweets from that user. The user-ids of followers are visible in one’s followers list. They can see messages and tweets of the user they are following in their timeline whenever they log in. Apart from the number of followers, our data-sets also include a detailed ID of the followers of the ministry. Users can decide whether general public can read their messages and tweets or they are restricted to pre-determined ‘followers’. Facebook and Twitter has more than 190 million registered users and approximately 55 million posts are processed daily [189]. A Retweet is a re-post of a tweet. A retweet is a particular case of ‘mention’ when a user finds an inspiring tweet written by another user and wants to share it with her followers; she can re-post the tweet. Usually, a text indicator (e.g., RT, Via) by adding the original user name @username format [190].

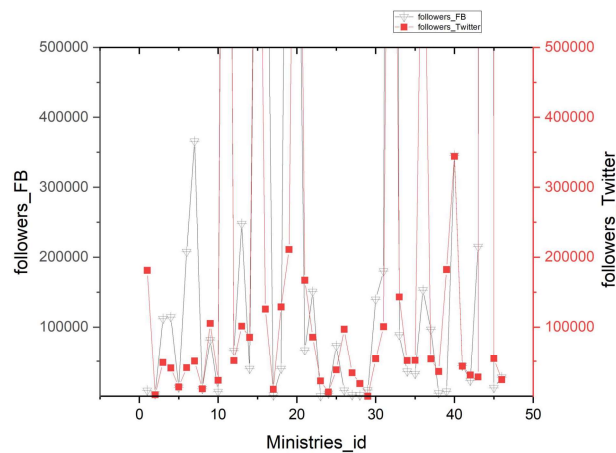


FIGURE 4.4 Number of followers of all the ministries Facebook and Twitter account

Figure 4.4 displays the distribution of the number of followers as the solid line. y -axis represents the number of followers of the ministries Facebook and Twitter accounts get that is found to be within the limit of 5 to 500000 (Twitter and Facebook) and x -axis represents the ministries Facebook and Twitter account name according to Table I and II. The Ministry of Minority Affairs has the least number of followers, and PMO has the highest number of followers on both Facebook and Twitter. The Ministry of Minority Affairs belongs to the low active group in both the platforms, whereas Prime Minister of India's Office (PMO) belongs to the super active group in Twitter, but not in Facebook. There is no targeted posts from the PMO's social media account to any individual from the public. However, most of the ministries reply to the posts or questions asked by the public or their followers.

Table 4.11 shows the ministries' tweet or message distribution, addressed to specific individual, professional bodies, and general public. The Ministry of Commerce and Industry and Ministry of Consumer Affairs have the highest public participation among 46 ministries on Twitter. In Facebook, four ministries have the highest number of posts addressed to public, i.e., Ministry id 10 (Ministry of Culture), 14 (Ministry of Environment and Forests), 33 (Ministry of Science & Technology), and 41 (Ministry of Youth Affairs and Sports). Participation in Facebook is seen to be much less than that in Twitter in general. Ministry of Science & Technology (IndiaDST) and Ministry of Youth Affairs and Sports (@YASMinistry) has high public participation in both the platforms implying that public wants to know about sports news and new launch of technology and have questions the ministry about sports as well as technology. Twitter has the highest number of public participation in the 14 Ministries - Ministry of Chemicals & Fertilizers (Including Pharmaceuticals), Ministry of Communications & Information Technology, Ministry of Commerce & Industry and Ministry of Consumer Affairs, Ministry of Defense, Ministry of Information & Broadcasting, Ministry of New & Renewable, Ministry of Parliamentary Affairs Energy, Ministry of Science & Technology, Ministry of Skill Development &

Table 4.11 Post Distribution of Ministry's Social Media Accounts into Personal, Professional and Public in fraction of total post.

Ministry_id	FB			Twitter		
	Personal	Professional	Public	Personal	Professional	Public
1	0	0.0006	0.006	0.008	0.005	0.129
2	0	0	0.001	0.004	0.002	0.242
3	0.0008	0.001	0.029	0.004	0.002	0.075
4	0	0.0009	0.0009	0.005	0.004	0.133
5	0	0	0	0.010	0.009	0.169
6	0	0	0.011	0.004	0.005	0.123
7	0	0	0.028	0.0.005	0.003	0.165
8	0	0	0.002	0.005	0.005	0.419
9	0	0.0009	0.012	0.006	0.004	0.108
10	0.015	0.030	0.242	0.003	0.003	0.112
11	0	0.001	0.002	0.002	0.0006	0.136
12	0	0	0.019	0.006	0.005	0.163
13	0.001	0.0009	0.004	0.001	0.0009	0.073
14	0.015	0.031	0.272	0.007	0.007	0.123
15	0	0.003	0.074	0.004	0.002	0.069
16	0.009	0	0.055	0.002	0.003	0.082
17	0	0	0	0.022	0	0.014
18	0.005	0.018	0.134	0.007	0.004	0.159
19	0	0	0.007	0.009	0.011	0.159
20	0	0	0.004	0.005	0.007	0.150
21	0.001	0.005	0.017	0.004	0.004	0.113
22	0	0	0	0.039	0.019	0.117
23	0	0	0.004	0.012	0.008	0.091
24	0	0	0.001	0.004	0.004	0.196
25	0	0.014	0.070	0.003	0.005	0.057
26	0	0	0.027	0.062	0.015	0.296
27	0	0	0	0.035	0.023	0.300
28	NA	NA	NA	0.025	0.045	0.181
29	0.002	0.002	0.062	0.008	0.006	0.16
30	0	0	0.002	0.004	0.003	0.187
31	0.004	0.017	0.022	0.0007	0.0007	0.046
32	0.0036	0.001	0.0229	0.003	0.004	0.068
33	0.004	0.046	0.369	0.004	0.005	0.181
34	0.003	0	0.014	0.005	0.006	0.059
35	0.002	0	0.061	0.006	0.005	0.203
36	0	0	0	0.054	0.142	0.196
37	0	0	0.004	0.001	0.01	0.034
38	0.002	0	0.040	0.0170	0.017	0.208
39	0.080	0	0.141	0.004	0.007	0.129
40	0.001	0.004	0.043	0.008	0.007	0.195
41	0.019	0.023	0.210	0.007	0.009	0.243
42	0	0	0.004	0.011	0.015	0.117
43	0	0.011	0.037	0.003	0.001	0.013
44	0	0.0007	0.0007	0.004	0.002	0.041
45	0.002	0.004	0.064	0.003	0.004	0.102
46	0	0.001	0.030	0.002	0.003	0.083

Entrepreneurship, Ministry of Tourism, Ministry of Tribal Affairs, Ministry of Water Resources and Ministry of Youth Affairs & Sports.

4.7 Influence of Social media and public opinion in Government

Media plays an essential part in disseminating information and thereby in creation of public opinion through many vital organs such as press, radio, television, cinema, theatre, books and social networking sites. Social networking sites, being interactive and instantaneous, are important channels of communication with the public. Also the sites provide forum for public discussions and opinion building on various topics, situations, problems related to political, social, cultural or economic issues which in turn potentially influence the policies and functioning of the different ministries. Every ministry has dedicated IT departments to track and monitor social media and often they troubleshoot the problems raised in social media.

For example, during rail journey, if a passenger faces any problem with the service in the train compartment, she can raise complaint to the railway ministry or any competent authority through social media (say, Twitter and Facebook) and get redressal. Here we present some real-life examples.

- Once one of the authors was traveling from Jaipur to Varanasi by Ajmer Sealdah Express; there was no water in the washroom of the train compartment. When few passengers complaint to authority by social media, water was re-filled in the next stoppage station.
- Few friends of one of the authors were traveling from Delhi to Allahabad; there was a pregnant lady in the compartment. After some time, the lady had labor pain and,

the friends as co-passengers posted a tweet on social media to the railway authority. The doctors and ambulance were ready at the next stoppage station, and the lady admitted in time to the hospital.

- The ministers also provide updates on new developments on an ongoing event.



FIGURE 4.5 News updated by PMO

4.8 Summary

We did a study on presence and activities of Indian ministries in social media, identifying 46 Facebook and Twitter accounts of different ministries under Government of India (GoI). Specifically, We studied the following research questions.

SQ1. How many ministries use social media platforms, and which of them are preferred by them?

We found eight social media platforms uses by GoI ministries. Only one ministry uses all eight platforms, i.e., the Ministry of External Affairs. All 46 ministries use Facebook and Twitter. So, We chose Facebook and Twitter for this study and data collection.

SQ2. What type of topics do they discuss on social media?

The ministries of GoI used Facebook and Twitter and shared feelings, thoughts, and official messages about anything. In this, they discuss are primarily the meetings and projects related to the government. Railways projects, GST, different development schemes, Pradhan Mantri yojana (PM projects), etc.

SQ3. How active are different GoI ministries and their officials in social media? How often do they post?

For the activity of the different GoI ministries, We did a time-series analysis based on the total number of posts. Ministry of Railways is seen posting messages or tweets and retweeting very actively on a daily basis.

SQ4. How do the departments interact among themselves through social media? Outside the officialdom, do they mutually refer to each other in the public domain through social media?

We found Inter-Connection among the ministries through Hub and Authority. The Ministry of Information and Broadcasting is a good hub and good authority as well as has good PageRank.

SQ5. How is the public participation in social media with the ministries or Government departments? How do these two stakeholders of e-Governance interact or exchange through social media?

The public participation in social media with the ministries or government departments such as the number of likes and followers. Public likes of the ministry's official or personal pages. The public like the DST ministry the most, but people mostly follow the Prime Minister of India (PMO).

