An Attempt at Using Mass Media Data to Analyze the Political Economy Around Some Key ICTD Policies in India*

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ABSTRACT

Policy making is influenced by a number of factors, including electoral politics, ideological biases of actors involved in the policy making process, and the interlocks between corporate and government entities. This influence is also exercised by shaping public opinion through mass media. In this paper, we study four ICTD policies in India, and explore the political economy around them by using data about how these policies are covered in the mass media. We study which actors are covered more in media, how they speak on the policy issues, and which aspects are given more coverage for these policies. We find that politicians get the highest coverage in mass media regarding discussions on policies, and that the politicians and business-persons often express similar ideologies related to these policies. We also observe that mass media is often biased towards issues related to its middle class reader base with a strong sense of technology driven high-modernism, and negative aspects of these policies and issues faced by the poor due to improper policy implementation are often not given significant coverage. Our key contribution is a methodology of using automated analysis of mass media data to reveal the factors that might be shaping the political economy behind policy making.

CCS CONCEPTS

• **Information systems** Information systems applications;
• **Social and professional topics** *Computing / technology policy*; • **Applied computing** *Computers in other domains*;

KEYWORDS

Mass media, media bias, social network, political economy, ICTD policies, economic policies

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1 INTRODUCTION

In this paper, we attempt to study the political economy around four key ICTD policies in India, namely *Aadhaar, Cashless Economy, Digital India,* and *E-governance*, by using data from how these policies have been covered in the mass media. We perform this analysis because policy making is known to be influenced by several factors. Interlocks between corporations and the government is one of these factors. Policy makers might be keen on implementing a technology, in order to bring profit to the corporations to which they are connected. Electoral politics is another factor, in which the policy makers may implement a policy specifically to appease a certain share of voters. Economic and political ideologies like neo-liberalism may also dominate why certain policies are implemented and others are ignored. To understand such influencing factors in the political economy, we use mass media as a data source to reveal the possible intentions and ideologies of influential actors behind policy making. We specifically use mass media coverage about these policies to understand who are the influential actors covered in the media, what sentiments do they express, what aspects about the policies do they talk about, and use the data to make arguments about different factors that might be driving these observations. As part of future work, we are also exploring the potential to combine this dataset with that on interlocks between corporate and government entities [44] to find more insights. Our methodology of using mass media data also allows us to make observations about possible biases in the mass media itself; this is important because the mass media forms an important part of the political economy since it influences public opinion about different policies.

We analyze each policy in the following two directions: (i) *What influences policy*: Some factors that influence policy include, (a) electoral politics, (b) dominating neo-liberal ideology [5, 13] and high modernism or technology determinism. The neo-liberal school of thought supports free market and lightly regulated capitalism [8]. High modernism is characterized by faith in technology as a means of social reorder [43], especially towards legibility and simplification for easier implementation of state directives. Technology determinism assumes that the development of a society is determined by its use of technology [29]. These are used as arguments by politicians as easy ways to bring change through the assumed rapid adoption of scalable technologies, (c) favor extended towards corporations by way of profits provided to them through implementation of technology [50], and (d) interlocks between corporate and government

entities [7]. (ii) *How this influence is exercised*: public opinion is essential to legitimize policies in a democratic setup, and for this purpose, media is used as a tool towards influencing public opinion. Moreover, media itself is often biased towards specific ideologies, which again could be due to interlocks of the media organizations with influential actors in the policy making process.

We attempt to analyze these two directions of what influences policy and how this influence is exercised, by answering the following specific questions:

- What is the coverage provided by mass media to the elites speaking on these policies?
- What is the sentiment slant of their statements on these policies in mass media?
- What is the breakdown of the topics and views covered by mass media?

Our analysis on the mass media data reveals that sentiments of influential business-persons align with that of politicians on the ICTD policies we have analyzed. Generally, the politicians and business-persons talk about the potential positives of the policies with a focus on technical advancements to alleviate problems of the people, and not about the negative issues or faults related to their implementation. Hence, technical nuances of policies do not get high coverage on mass media. Our findings suggest that mass media reports more on aspects related to high modernism, and technological determinism, with some coverage to issues related to common people (middle class), but little coverage given to problems faced by the poor due to the policy implementations.

Our work is especially relevant to the ICTD community because of the faultlines it reveals in how ICTD policies are formulated and pursued in practice. The ICTD ethos, in general, acknowledges human nature and various implementation nuances as part of the complexity of the world in which technologies are deployed, which affect the success of different interventions [54, 57]. ICTD researchers are in fact advised to keep policymakers involved as stakeholders in the intervention, so that the policy makers are able to understand the nuances of successes, and failures and thereby increase chances for the adoption of appropriate interventions by the state [36]. However, policies often contrarily follow neo-liberal and high-modernism approaches, and this is something we find that the mass media amplifies further. An example would be the policy event *Demonetization* [14] where not only were no stakeholders kept on board or asked for feedback, but the mass media too hardly helped shape public opinion in an informed manner by scientifically illuminating the pros and cons [45] of *Demonetization*. This raises questions about the arbitrariness in the policy formulation process by the state. We use our platform to analyze more such policies and policies which directly relate to ICTD or are at least marketed as ICTD initiatives leading to upliftment of the poor.

Our key contribution is a new methodology of using automated tools operating on media data to understand the political economy behind policies. We demonstrate how this data analysis can be used to understand some of the factors that might be shaping the political economy behind the policy making process.

2 RELATED WORK

We describe related work along the different streams we are straddling, to study the political economy around policies, the agenda setting function of the mass media, interlocks between corporate and government entities, and news aggregating applications that have been developed for easier consumption of information.

2.1 Analysis of the political economy around policies

Literature on policy making has proposed frameworks to design and conduct analysis on the political economy around policies. Moncrieffe and Luttrell [34] propose a framework for such analysis for bi-lateral donor organizations. This framework describes how interactions between different organizations and their members shape policy making and outcomes, and pointers on how staff can use the analysis to assess appropriateness of policy interventions, their content and timing, and new spaces for enagagement.

Holland et al. [23] propose a framework and tools for institutional, political, and social analysis of policy reforms at macro and micro levels. This web based tool aids users to analyze the rules people develop in political, social, and economic spheres; the structure of power relations that aids policy making; and the social relations that govern interactions between households, communities, and social groups. These theoretical frameworks often introduce the user to the main stakeholders involved in the policy formulation. Our work is related and lists out the key stakeholders and their interconnections. We, however, do it in an automated manner using different computer science techniques of natural language processing, to be able to apply the framework to analyze potentially any policy event.

Other literature on policy making analyzes the network of stakeholders. Hai et al. [20] study the process of policy formulation in developing countries, and identify a set of relevant actors who contribute towards it. This set includes elected officials, appointed officials, business actors, labour, public, think-tanks and research organizations, political parties, mass media, and interest groups. Devesh Kapur [25] in his work discusses about how policies are shaped in order to favor specific caste and class groups in India. A related work of ours in this area [44, 46] takes an automated approach to produce social network data of influential corporate and government entities that can be analyzed to understand the political economy behind the policy making process. In future, we will jointly analyze this social network data along with mass media data, to generate further insights on the political economy around policies.

2.2 Agenda setting function of mass media

Mass media is an important avenue to shape public opinion, and often has a significant effect on policy formulation [22, 31]. A study by Stromberg et al. [51] observes how content targeted at selective groups of audience to maximize profitability by catering to advertiser interests affects public policies, because it amplifies the outreach of politicians to these audience groups. In the study [2], Bartels finds a significant influence of mass media exposure in opinion shift of the public in the 1980 US presidential elections. Contrarily, the study by Lazarsfeld [26] shows minimal influence of mass media on public opinion in terms of their voting choices.

Media also have political affiliations and interlocks, which influence the news they carry, and the form in which they carry the news. For this reason they have often been called *gatekeepers* [40]. Chiang et al. [9] show evidence of endorsements given to political candidates by mass media in the USA. [18] similarly develop an index to define a measure of media slant, by analyzing key phrases in news content specifically for political ideologies. Munson et al. [42] assign a political bias score to each media outlet based on whether liberal or conservative candidates are over or under represented in them. Budak et al. [6] use crowd-sourcing and machine learning techniques to understand if the US media reports in a non-partisan manner. Works like [35] analyze bias of mass media towards certain aspects related to climate change, and its difference from social media coverage of these aspects.

We have built similar techniques that evaluate what kind of aspects the media emphasizes, or the sentiments that are communicated by the policy makers in mass media. We use only automated content analysis methods to assess this unlike some other studies that first label the participants in the media based on their ideologies, and then extend this labeling to their expressed views.

Our work helps understand possible biases in the mass media itself, but we also use data from analysis of the mass media to understand different factors that might be influencing the policy making process.

2.3 Corporate-government interlocks

Corporate-government interlocks are indicators of strong collaboration between the state and corporations that can lead to the formation of influential power structures. In the book *The Power Elite* [33], the author critiques the network of power in the US, which has significantly shaped the economy and the government. On similar lines, in *The Price of Inequality* [50], the author discusses the income inequality that results from these networks through rent-seeking and bidirectional flows of favors between the corporate and political networks, and a positive feedback loop that sets in, since increased inequality makes it easier for influential elites to leverage their networks for personal gain. Some studies provide evidence of a flow of favor from the political to the corporate domain. [15, 32] show that politically connected firms have access to greater loan amounts from the government, or experience sharp increases in stock prices if the connected politicians win elections. Studies like [16, 24] from Indonesia and Malaysia, similarly show that the fortune of politically connected firms is highly dependent on the fortunes of the politicians they are connected to.

Studies on the flow of favor from the corporate to the political domain like the work by Bertrand et al. [4] finds that in France, in the wake of municipal elections, politically connected firms in the constituency of the politicians saw a sudden rise in employment rates, and a drop in job destruction, thereby creating vote banks. Sandip Sukhtankar [52] provides evidence that during election years, politically connected Indian sugar mills pay lower prices of sugarcane to farmers with the surplus funds channeled for election campaigning, and is later passed on to farmers through waivers and other public policies if the politician wins. We are inspired by the evidence generated by this body of work and we do find strong ideological alignment between business-persons and politicians based on their

statements in the mass media. In one of our ongoing works [46], we also examine whether explicit interlocks or implicit ideological alignment between corporate and politicians might explain our observations made from the mass media data analysis. Interlocks, however, may not always be undesirable. Countries like Germany have worker and civil society representatives mandatorily on the boards of companies [17]. As part of future work, we are working towards quantifying the diversity of background of the entities in the policy making network.

2.4 News presentation

Enriching the context of news media is an important area, to provide useful background knowledge to people to help them analyze news events. Shahaf et al. [47] propose a technique of connecting entities present in the news articles to help users in navigation of the news topic. Lu et al. [28] propose a method of video summarization by selecting a chain of video subshots that shows essential events in a long input video. The GDELT Project [27] monitors the broadcast, print, and web news globally in different languages, and performs analysis to identify the people, locations, organizations, themes, sources, emotions, quotes, and events, covered in the news. Our work on summarizing topics covered by media is on similar lines. It makes it convenient for users to understand about the prominent entities involved in the policies. In future, we want to enrich this context by referring to an external knowledge base of a named entity social network of corporate and government entities, to help people analyze these news articles easily [44]. We are also able to show various content based details like the aspects covered in the media. Stasko et al. developed a system named *Jigsaw* [49] that is similar to our system in terms of the entity representation, and their interconnections. However, while Jigsaw only uses text documents for discovery of entities and interconnections, we are currently extending our system [46] to use both textual news articles and a social network formed from structured and unstructured data sources. Our work in this paper makes it easier for researchers and journalists to study the political economy behind policy making, and to understand how the different actors in this political economy speak in the mass media regarding these policies.

3 BACKGROUND

We collect media articles to study the following four policies:

Aadhaar is a 12-digit unique identity number that can be obtained by residents of India, based on their biometric and demographic data. *Aadhaar* has been positioned as a tool that can eliminate corruption by making it harder for people to take up false or duplicate IDs to access entitlements and subsidies, especially among the poor, but it has seen many challenges on the ground when biometrics fail or the technology fails due to poor network connectivity, and poor people have been denied their entitlements. Data privacy and security is another key concern, with cases where the Aadhaar numbers of people have been leaked due to seemingly careless implementation, and allegations have even been made about security lapses of unauthorized access to biometric data and other personal details.

Cashless Economy aims to create an economic state whereby financial transactions are not conducted with money in the form of physical banknotes or coins, but rather through the transfer of digital

information between the transacting parties. Among other objectives, the *demonetization* move was positioned as a policy to push India towards a cashless state, so that the poor who do not have any credit history or access to banking channels, will be able to create this data trail that will help them later get easier access to formal sources of credit and other financial instruments. Controversy however prevails, because the low access to digital technology by the poor, trust issues in using entirely electronic means for money management, capability and skills at technology usage, and even the low utilization of bank accounts by the poor, lead to arguments about whether the country is even ready for such a move and what kind of safeguards in law and skilling should be developed before such policies can be pushed.

Digital India is a campaign launched by the Government of India, which includes plans to connect rural areas with high-speed Internet networks. The underlying assumption is that easier and cheaper access to the Internet will lead to development of the poor, but many researchers have argued that such an infrastructure push should also be accompanied by a digital literacy campaign to alert first-time users of information technology about problems caused due to undesirable appropriation of technology, as has been evidenced with a rise in rumors and fake news on social media and messaging platforms. The policy and the associated push for digital payments [37] can be argued to be an example of the high modernism approach often undertaken by the state in assuming a validity in its approach without any testing [43], and has similarly been noticed in another technology-driven initiatives like *Aadhaar* in their assumed validity without adequate testing [12].

The National e-Governance Plan (NeGP) is an initiative of the Government of India to make all government services available to the citizens of India via electronic media, instead of them having to fill up paper forms. However, an emphasis on electronic means of accessing government services at the cost of not scaling traditional offline face-to-face mechanisms, is known to cause problems to the poor because of their limited technological skills, technology access, and empowerment. Studies have pointed out how E-governance initiatives have been primarily shaped by the political economy around the policy, at times leading to its misuse. A study by Benjamin et al. [3] found that the e-governance project *Bhoomi*, which digitizes land records around *Bangalore* in India, led to corruption and capture of large areas of land by elites with connections to the judiciary and administration, aided by the land-records data that became more easily accessible for strategic planning by these large players. The authors conclude that in policies related to *E-governance*, the outcomes are shaped more by the political economy around policies rather than the techno-managerial concerns. Veeraraghavan [56] in his work studied the data management platform built for NREGA, and found that the platform originally intended to curtail corruption and bring transparency, ended up mostly being useful as an accounting and reporting platform but was not able to address corruption due to new pathways discovered by local officials to bypass technology checks.

4 DATA

We have built crawlers to collect mass media data on a daily basis from some of the most popular national news sources in English, *The Hindu, The Times of India, Indian Express, The New Indian Express, Telegraph, Deccan Herald and Hindustan Times*, and archives

are used to build a corpus of news articles since 2011. We then extract entities from this article data using the *OpenCalais* tool [41], which returns entities of type Person, Company, Organization, City, Province, and Country that are stored in a document database. Along with the entities, OpenCalais also provides additional context attributes like the type of entity, its standard name, and some other context information (especially for the non-person entities like latitude and longitude for locations). We also maintain a set of aliases for each resolved entity, which keeps getting enriched with standard names of the newer entities that are resolved with it. Currently, we are using English language news sources for our analysis, since Open Calais works only for English. As part of future work, we are also attempting to analyze news articles from vernacular regional media sources.

Since the same entity might occur in various forms (in terms of spellings and abbreviations) in different articles and news sources, we perform entity resolution (ER) within the media data as described in detail in [44]. We keep a set of entities that have been successfully resolved so far, and keep augmenting it as crawling more news articles throws up additional entities to be resolved. On encountering an unresolved entity during crawling, ER within media data follows two steps: (a) It finds the top ten candidate entities from the resolved set based on partial matching of their standard names, aliases, and context (b) It further filters these top ten entities to obtain a set of best matching entities, using string matching and phonetics based distance measures applied on standard names and context of entities. The filtering is done on experimentally set similarity thresholds [1]. The context attributes used for ER include type of entity and its standard name. Apart from these attributes, it also returns locational coordinates, state, and country information for cities. We merge this context information together, for entities that are successfully resolved with each other. This improves the ER accuracy over time as the resolver gains more and more context information for each newly resolved entity (in the course of crawling new articles). If any of these steps fail, we consider the newly encountered entity as a separate entity, and enter it separately in the resolved set. The peak performance of the ER heuristic for resolution within media data is 97.61% precision and 96.47% recall for *person* entities, and 93.82% precision and 96.2% recall for *non-person* entities.

We want to analyze the coverage provided to different entities in mass media who speak on the policy issues being analyzed, the sentiment slant of the statements made by these entities, and the coverage given by mass media to the different aspects corresponding to the policy issues. We extract news articles corresponding to the four policies using a keyword based approach, similar to [1]. We first supply the following set of manually selected keywords corresponding to each policy. After extracting articles containing these keywords, the keyword set is augmented with newer keywords from these articles, based on their frequency. These two steps are repeated until the keyword set becomes static, and the final set of articles is used to perform our analysis. The final set of augmented keywords for each policy is shown in table 1.

We analyze the coverage of entities and groups of entities for an event using the measure of *relative_coverage*, defined as:

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[1]We use a combination of Jaro-Winkler similarity and Levenstein distance, along with substring and abbreviation matching for this step. The value of the thresholds were found to be between 0.8 to 0.9 in our experiments.

Policy	Keywords	Number of articles
Aadhaar	aadhar, aadhaar, UIDAI, adhar, adhar card, aadhar card, aadhaar card, PDS, public distribution system	12809
Digital India	Digital India, Digital Swades, india digital, digit india, digital desh, make india, digital divide, digital payment, free wifi service, digital locker, digital transaction, wifi hotspot, budget cybersecurity, internet connectivity, smart city, digital business, bharatnet project, digital present, Bharat net, digitalised, digitalized	12412
Cashless Payments	cashless, digital payment, mobikwik, Unified Payment interface, UPI, online transfer, SBI pay, ICICI pocket, Payzapp, Paytm, freecharge, e-wallet, mobile wallet, internet banking, net banking, mobile banking , PhonePe, physical-POS, M-POS, V-POS, digital transaction, pos machine, swipe machine, digital wallet, digital economy, card payment, BHIM, banking transaction, swiping machine, payment gateway	18315
E-governance	e-governance, information and communication technology, e-govt, e-government, electronic governance, paperless office, communication technology, ict academy, ict sector, ict information, ict tool, e-district, m-governance	4853

Table 1: Policies and the set of augmented keywords to extract articles from mass media.

$$relative\_coverage(e_i) = \frac{count(e_i)}{\sum_{e \varepsilon E} count(e)}$$

Relative coverage of the entity defines the relative importance of entity e_i w.r.t. all entities corresponding to the policy. The function *count* returns the number of statements where the entity occurs for a particular news source.

For sentiment analysis of the statements made by the entities, we first use the Stanford CoreNLP [30] to classify the statements where the entity is mentioned in the media into two classes, namely the *by class* (containing statements made by the entities covered by media) and the *about class* (statements made by the media about the entities). The NLP tool helps identify relations like *nsubj, nmod, amod, and dobj* which are used as features: whenever there is a statement by an entity, the entity occurs in an *nsubj* relation in the dependency graph; and when an entity is being spoken about, it occurs in any one of *nmod, amod, and dobj* relations.

For each of the *by* and *about* sentences for each entity, the aggregate sentiment slant is obtained using the *Vader* sentiment analysis tool [19]. Vader provides an intensity score in the range of -4 to +4 for each word in a sentence, and an overall normalized compound score in the [-1,1] range for the entire sentence. We add up the positive intensity scores of each word to obtain the overall positivity score (TPOS), and the negative intensity scores to obtain the negativity score (TNEG) for a sentence. This tool takes into account exclamation marks, punctuation, Degree modifiers (such as intensifiers, booster words, or degree adverbs), bigrams, trigrams and emoticons, which makes it more suitable to use for sentiment analysis of article sentences. We also obtain the *by* and *about* aggregate sentiments for entity groups (for example, political parties, corporates, and academicians), by summing over the specific entities in that group.

The sentiment classification accuracies were in the range of 75-79% for all policies for 250 statements manually analyzed by four authors for each policy. While calculating the aggregate sentiment score for an entity (sum of sentiment scores for all statements for an entity), the positive and negative values might cancel out, leading to a nearly neutral (close to zero) aggregate score. To capture the polarity in expression, we define another measure of sentiment polarity named the *degree of polarization (degpol)*, which is computed as:

$$degpol(s) = \begin{cases} \text{TPOS} + 1/|\text{TNEG}| + 1 & \text{if TPOS} \geq |TNEG| \\ |\text{TNEG}| + 1/\text{TPOS} + 1 & \text{if } |\text{TNEG}| \geq TPOS \end{cases}$$

degpol provides a measure of how polar the statement *s* is in terms of the sentiment polarity of the sentences in which the entity is mentioned. A non-polar statement will have the minimum *degpol* score of 1. We calculate the *degpol* of an entity as the sum of *degpol* of all statements made by the entity.

Finally, to analyze different aspects of a policy covered in the mass media, we use Latent Dirichlet Allocation (LDA) to identify different aspects within each policy. Based on experimentation, we initially provide an input of 20 clusters to LDA, and tune and manually check whether the aspects being identified by LDA are meaningful. Articles are mapped to these aspects if probability of belonging to the topic as calculated by the LDA scores is greater than 0.3. The list of aspects and their mean relative coverage for each policy is provided in figure 3. The accuracies for aspect classification were in the range of 74-78% for 200 articles manually analyzed for each policy by four authors.

5 DATA ANALYSIS

We answer the following research questions for data analysis:

Which entities and groups of entities are the most vocal in mass media on policy issues? To answer this question, we calculated the relative coverages of each entity in our mass media dataset, and ranked them in descending order of their relative coverages. This gives us a ranked list of entities that are mentioned the most in media, corresponding to the policy issues. Figure 1 shows the plot of relative coverages (for statements made by the entities) for the top 20 entities with highest relative coverage. The plots reveal some interesting trends. We find that most of the entities with top relative coverage in all of the policies considered are politicians. This indicates that most of the discussions around policies see high

(a) Aadhaar

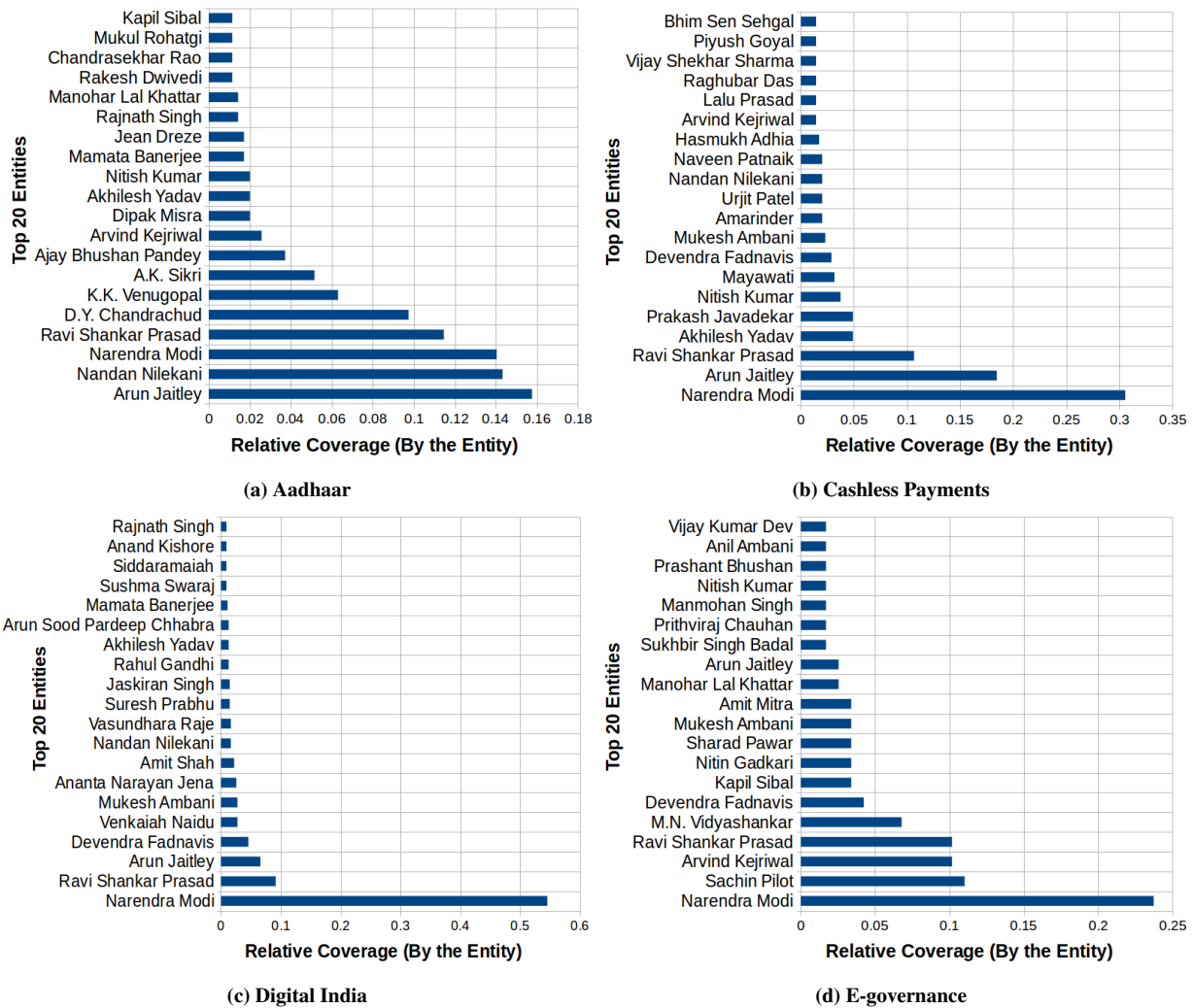(b) Cashless Payments

(c) Digital India

(d) E-governance

Figure 1: Plot of the relative coverage of top 20 entities for each policy for statements made by them: relative coverage is calculated as the number of statements made by the entity divided by the total number of statements by all entities, corresponding to a policy.

coverage of politicians and political statements, and as we explain later, this coverage is mostly about political blame-games than an introspection into the technical nuances of the policies. Some topics like *Aadhaar* do see coverage of non-politicians like *D.Y. Chandrachud, K.K. Venugopal, A.K. Sikri, and Rakesh Dwivedi*, who are all judiciary members of the Supreme Court of India, which can be explained by the fact that a lot of debates took place in the judiciary around the *Aadhaar* policy, although it revolved around the constitutional legitimacy of the policy. We also find the presence of *Ajay Bhushan Pandey*, a bureaucrat in *Aadhaar* and currently the CEO of UIDAI. The policy push towards *Cashless Payments* shows the presence of business-persons like *Mukesh Ambani and Vijay Shekhar Sharma*[2], judiciary members like *Bhim Sen Sehgal*, and economic advisors like *Urjit Patel and Nandan Nilekani* because it is

an economic policy issue. *Digital India* policy too contains *Mukesh Ambani and Nandan Nilekani* among the top covered entities. This is because *Ambani* brought out the Jio network, which has disrupted the telecom space by providing very low-cost 4G connectivity. For *eGov* policy priority, we have business-persons like *Mukesh Ambani, Anil Ambani, and M.N. Vidyashankar* among the top covered entities, who were expectedly supporters of the move.

Two trends are evident from the data: (a) After politicians, business-persons are provided maximum coverage by the mass media, and (b) Academicians and social development experts from the civil society (including social activists and researchers documenting successes and failures of these policies) are provided negligible coverage by mass media. It should be noted though that the articles analyzed here are news articles, which do not include opinions and editorials (opeds). On considering only opeds, we find a higher coverage provided to academicians and policy experts (around 8%,

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[2]Vijay Shekhar Sharma is the founder of PayTM, which gained immediate leverage in the wake of Cashless Economy.

8%, 0.6% and 13% for *Aadhaar, Cashless Economy, Digital India and E-governance*, respectively.). However, this coverage is still much smaller compared to political parties (57%, 51%, 85%, and 76% to BJP for *Aadhaar, Cashless Economy, Digital India, and E-governance*, respectively.).

We find consistent coverage of influential business-persons like *Mukesh Ambani and Nandan Nilekani* across all of the four policies. On analyzing the statements made by these business-persons, we find that they mostly talk about the positive aspects of technology led change w.r.t. these policies. For example, *Nandan Nilekani's* statement [10] on *Aadhaar*: *"You need to keep people's healthcare record electronically because health records could be voluminous because you have x-rays, MRIs and ultrasounds to be stored and you have to do digitally"* and *Mukesh Ambani's* statement [11] on Cashless Economy: *"... the company is planning to launch a digital marketplace for its b2b business, including the kirana shops, across the country."* are indicative of an ideology of technology driven change. Similarly, top politicians like *Narendra Modi's* statements [55] on Cashless Economy too reflect a technology driven developmental ideology: *"When poor farmers of villages have started adopting digital payment, now they (middlemen) have started spreading new rumours."*.

On the other hand, views such as those on the failure of *Aadhaar* implementation leading to denial of ration to poor, by development economist *Jean Dreze*, highlighting problems with the policy implementation do not get as much coverage. We find an insignificant presence of academicians and social activists in the discourse on policies, compared to politicians and business-persons.

In table 2, we show the total media coverage for groups of entities, grouped by their political parties or professional backgrounds. At the party level, we see that expectedly, the ruling party, BJP, is given the maximum coverage by the media across most policies. INC, the main opposition, comes next in terms of coverage (and has a much lesser coverage percentage than BJP). This is followed by bureaucrats, business-persons (directors), and celebrities. We again see that negligible coverage is provided by mass media to academicians (especially economists and policy experts) across all of the four policy issues. Among the non-political entities, the high coverage given to bureaucrats and business-persons can be justified as these economic policy issues require an active involvement by them for implementation, but similarly the role of civil society which is a crucial pillar too in implementing these policies is hardly mentioned. On similar lines, the relative coverage of celebrities (like *Ramdev*, the yoga guru, and owner of the ayurvedic firm *Patanjali* in relation to the *Aadhaar* policy, and the singer *Mehmood Akhtar* in relation to *Cashless economy*) is more than academicians.

What is the sentiment slant of these elites regarding the policies? To see the orientation of the most vocal entities on the policy issues, we measured the overall sentiment slant of entities towards the policies (across all newspapers) as the sum total of the sentiment scores for all sentences that the entity occurs in. We carried out this analysis for the *by* class, i.e., for statements made by the entities, and show our results in figure 2.

In the figure, the bars on the right hand side of the zero value on x-axis represent positive aggregate sentiment, and those on the left hand side represent negative aggregate sentiment. We color coded these bars on *degpol*. Darker the color of the bar corresponding to the entity, higher is the aggregate polarity of the entity's sentiment.

In terms of aggregate sentiment slant, *Narendra Modi* is consistently seen to have a high positive sentiment score, except in *Aadhaar*. *Arun Jaitley* and *Ravi Shankar Prasad* are also seen to have a quite high aggregate sentiment slant except in E-governance. We can also see that in *Aadhaar*, the aggregate positive sentiment is well distributed across several entities. On the other hand, it is skewed towards Modi (and his two ministers *Ravi Shankar Prasad* and *Arun Jaitley* in some cases), and nearly insignificant for other entities for the other three policies. This indicates that Modi being the prime minister and the most popular face of the current ruling party, made maximum number of positive comments on these policy issues, and was also covered highly by the media. Compared to his media presence, the coverage given to the other entities is much lesser (especially in Digital India and E-governance). Moreover, *Aadhaar* being the most widely discussed policy among the four policy issues, received comments from a lot of entities belonging to different sectors. This wide participation from various sectors was not reflected as much in the other policies, which mainly received attention from politicians.

We also see that the aggregate sentiment slant for all of the policies under consideration is mostly positive. This is because the actors covered by the media were mostly politicians; the ruling ones having generally positioned these policies as being good for development, and the opposition ones also being supporters, since several of them had been initiated when the opposition was in power earlier. *Aadhaar, Digital India, and E-governance* are policies that were all initiated by the INC when it was in power. *Cashless Economy* was however initiated by the currently ruling party BJP, and saw the opposition having more negative comments, which is an exception to their otherwise mostly positive coverage. Some judiciary members, opposition party politicians, and bureaucrats do have a slightly negative slant, but since the coverage given to them is much lesser than that given to politicians, these views are hardly able to become mainstream. In terms of polarization (*degpol*), *Narendra Modi and Ravi Shankar Prasad* are seen to be consistently polar in terms of their statements made across all of the four policy events. This is expected as *Narendra Modi* being the prime minister of India, was the proponent and staunch supporter of these policies. *Ravi Shankar Prasad* holds the Electronics and Information Technology portfolio, which is the prime functional ministry for all of these policies.

We also find that although the business-persons consistently get much lesser coverage compared to the politicians, they generally speak with a positive sentiment slant towards policies as also explored in the previous research question. For example, in all of the policy events, *Nandan Nilekani* is seen to speak positively. He speaks most positively about *Aadhaar*, which is expected as he was the chairman of UIDAI (the organization that issues Aadhaar numbers to citizens) and the founder of Aadhaar project. *Mukesh Ambani* is seen to speak positively on Digital India and Cashless Payments.

Some examples of aspects on which the most prominent entities in the media spoke, also verify our findings. For example, for *Aadhaar*, we find *Nandan Nilekani*, the architect of the scheme to be less polar than *Narendra Modi*. This is because *Nilekani* mainly spoke on the applications of *Aadhaar* [53] (e.g. *"... its wider application in areas such as passport issuance, online identity verification and attendance in government offices will be seen in the coming days."*). On the other hand, *Modi* primarily engaged in political topics. For

	Aadhaar	Cashless Economy	Digital India	E-governance
BJP	24.81	**57.30**	**78.61**	**57.31**
INC	**25.18**	14.62	5.91	14.62
Bureaucrats	2.51	7.21	2.59	7.21
Business-persons	0.66	2.73	2.69	2.73
Celebrities	1.40	1.17	1.87	1.17
Academicians	7.09	0.00	0.06	0.00

Table 2: Relative coverage in percentage for entity groups (considering both *about* and *by* statements): BJP and INC are the two biggest parties in India (BJP being the ruling party currently).

(a) Aadhaar

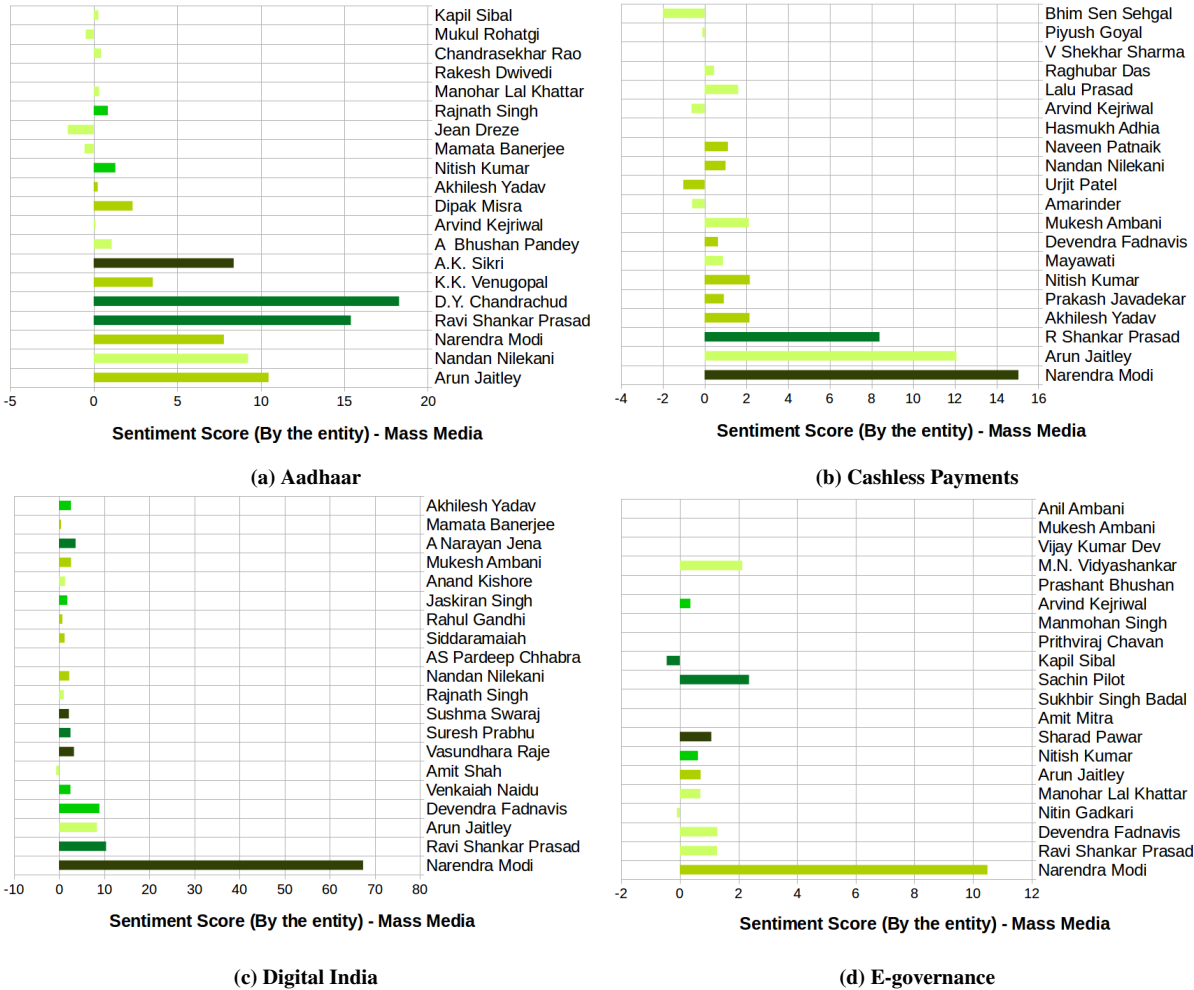(b) Cashless Payments

(c) Digital India

(d) E-governance

Figure 2: Plot of the aggregate sentiment, color coded on *degpol* for the top 20 entities with highest coverage for each policy: the aggregate sentiment/degpol is calculated as the sum total of the sentiment values/degpol values corresponding to the statements made by an entity. Higher the value of degpol (darker the color of the bar), more is the overall polarity of an entity.

example, his statement on *Cashless economy* [55] against the opposition political party, *"They will keep abusing from whichever platform they get but we have to take our nation to the forefront of the world."* indicates his tendency to use nationalism as a factor to justify the policy implementation. The negative stance of academicians like *Jean Dreze* can be attributed to issues raised by him of

starvation leading to deaths, which originated from a denial of food grains in the PDS system from a mal-functioning Aadhaar linkage of the beneficiary family (e.g. *"The state government must clarify about the orders which deny ration on account of Aadhaar seeding and biometrics, and the government should release a white paper to*

reveal how many people in the state are denied ration due to these reasons.")[48].

Which aspects are covered more by mass media on these policy issues? Here, we try to understand if mass media gives selective preference to some aspects (topics) more than others, corresponding to each policy. For each policy, we calculate the mean relative aspect coverage as follows: we first find the relative aspect coverage corresponding to each news source as the number of words in all articles belonging to that aspect in that news source, divided by number of words in all articles corresponding to that news source. Next, we find that mean of this relative aspect coverage across all news sources, for that aspect.

In figure 3, we show the mean aspect coverages for the different aspects corresponding to the four policy events. As we can see from the plots, for *Aadhaar*, the aspect *Aadhaar enrollment centers* has the maximum mean relative coverage, indicative of the mass media's push towards informing citizens about the enrollment centers. The aspect *Court cases related to Aadhaar*, which covers cases on privacy issues of Aadhaar data, and its applicability to public services, has the second largest coverage. These aspects are relevant to the consumer middle class, which is the dominant media audience anyway. For *E-governance*, we find the aspect *E-governance in transport department* to be one of the most widely covered aspects, which covers online applications and technologies built for convenient fee payment by the stakeholders, again an aspect relevant for the middle class. For *Cashless Economy*, the aspect *Ruling and opposition parties' debates on Demonetization* gets the highest mean relative coverage in mass media. This is followed by aspects like *Cashless banking, mobile banking, and Internet banking; Developments on UPI, mobile wallets, and payment gateways; and Discussion on hardships due to Demonetization*. These aspects mostly represent discussions on the advanced technologies and applications implemented for the policy, and the troubles that common people emphasize, but nearly ignores issues faced by the poor. For *Digital India*, we find *Development of cities as Smart Cities* to have the highest coverage, followed by *FDI and investments of multinational companies in India*. Aspects like *Directives on rates of Debit/Credit cards (Cashless Economy), and Digitization of land records (Digital India)*, which provide people knowledge about the actual technical nuances of the policy issue, are neglected on the other hand.

We also find from our analysis that issues related to the concerns of common people, which is the middle class (in *Aadhaar and Cashless Economy*) get significant coverage in mass media. On the other hand, issues related to the poor get much lesser coverage. In general, there is a significant coverage of issues related to futuristic technologies, applications, technology led change, and role of technical advancement in development (Smart Cities). This trend can increasingly be captured in the form of editorials like, *"The need of the hour is to harness technology and foster innovation for creating a centre of excellence for manufacturing and services in the identified sectors (The Indian Express)."*[38]. Ruling party politicians are also seen to contribute significantly to these editorial spaces and blogs in mass media. For example, Ravi Shankar Prasad's statement on Digital India is clearly seen to be a staunch supporter of technology driven change, *"After coming to power, Prime Minister Narendra Modi gave the vision of Digital India as an important programme to transform India through the power of technology and bridge the*

digital divide (The Hindu)."[39]. On the other hand, issues covering technical nuances of policies (like *Aadhaar's involvement in filing income tax returns*), issues that analyze failures of policy implementation and technology in general (like *Court cases related to Aadhaar*), and issues of the poor (like *Installation of e-POS and problems with PDS)*) get comparatively less coverage in mass media.

6 DISCUSSION AND CONCLUSION

The methodology developed in this paper begins with identifying the key people involved in policy discussions based on the coverage given to them in the mass media, followed by an analysis of the sentiment slant of their statements and the aspects they talk about. Some of our findings are along expected lines that politicians representing the ruling party in power make favorable statements for the policies under consideration, while those in the opposition are generally less positive about them, especially if the policy was conceived without their involvement. These statements by politicians on either side are highly polar because the politicians tend to either engage in blame-games with one another regarding the policy issues, or use rhetorical arguments about the promise of change through technology. Interestingly, we also find that prominent business-persons belonging to large business conglomerates tend to have favorable sentiments about the policies. Both politicians and business-persons alike generally talk about the benefits of these technology policies in solving issues of the poor. This indicates an ideological alignment between business-persons and politicians, of a belief in high-modernism and technology determinism. In related work [44], we found evidence of an increase in interlocks between corporate and government entities over the last decade, and our findings in this paper of ideological alignment between the two sets of actors builds a further case for investigation of state-capital networks which might be influencing policy for vested interests. We find evidence of such influence in studies like [21], where the authors argue that management consultancy firms are becoming important as relay nodes or mediators in the technology-for-development chain especially in driving which ICTs are adopted or not. Our ongoing work on analyzing the state-capital social network shows similar findings [46].

Our analysis also helps us comment on potential biases of the mass media itself. We find that there generally is little coverage of negative aspects about the policies, and views of experts and civil society representatives, in the mass media. On the other hand, politicians overwhelmingly get most of the coverage in policy discussions. This raises concerns on whether the Indian mass media is making people aware about the technicalities of different policies and the problems associated with them, or simply serving as a theater for politicians and political debates. Coverage of business-persons is also found to be much higher in mass media, compared to academics. We observe that business-persons generally talk about the benefits of technology, and not about the problems that arise with its use, and that the mass media editorials themselves give more attention to the possibility of bringing change through technology.

Both these observations of an ideological alignment between business-people and politicians, and of mass media too giving significantly greater coverage to these ideologies than a critical examination of policy implementation, raise worrisome questions. Are
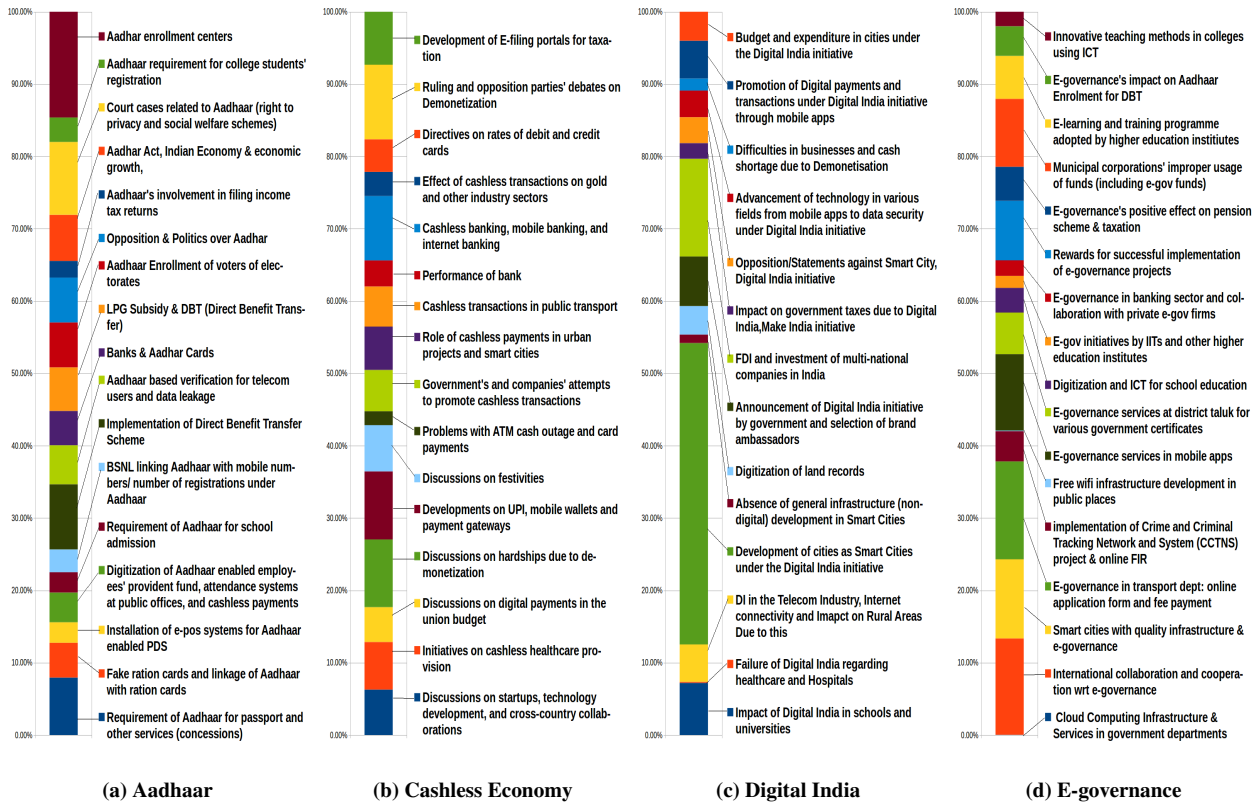
(a) Aadhaar　　**(b) Cashless Economy**　　**(c) Digital India**　　**(d) E-governance**

Figure 3: Mean relative coverages of aspects corresponding to the four policy events.

the voices of the poor in whose name most such policies are being conceived, able to shape the policies through actual positive and negative evidence emerging from policy implementation, or are vested political and business interests able to control the contours of policy formation? Are democratically elected politicians, both in power and in the opposition, even interested in understanding and talking about the technical nuances of policy implementation? Is mass media simply echoing the biases that seem to exist in the policy making process, or can it bring greater emphasis to scientific policy evaluation? These questions are important for the ICTD community to engage with, especially since ICTD policies themselves are marketed by politicians towards bringing change.

Mass media is an important avenue to influence public opinion as seen through several studies [22, 31]. We believe that our methodology can also be used to build tools for self-regulation of mass media by highlighting gaps such as the ones mentioned above about the diversity in content and entity representation, apart from analyzing the political economy of policy issues. This will bring media closer to an ideal goal of building a more informed citizenry by explaining to them the nuances of policy implementation. As part of future work, we are jointly analyzing the two datasets of mass media and a social network of corporate and government entities in India [44], and also working towards putting up our analysis on an online platform which can be used to similarly analyze other policies, and the political economy around them.

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