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Megaproject and the city: Theorizing social media discourses across the lifecycle of an infrastructure project

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ABSTRACT

Managing the perception of project communities is critical to the success of infrastructure megaprojects. This study focuses on the Nagpur metro rail project in India to understand people's experiences and discourses in the pre-construction, construction, and operation phases. We use qualitative content analysis and open coding of the tweets from five years covering the lifecycle of the project to understand the discourses. The study identifies focus areas such as improving customer experience, sustainability, value for money, and embracing the local community. It also highlights the importance of effective communication and raising awareness to address community concerns throughout the lifecycle. The study provides a framework for using social media for community engagement over the megaproject's lifespan. This research can help megaproject management teams plan efficiently and create a positive perception of their projects.

Introduction

Infrastructure projects are undertaken as ambitious plans aiming to achieve the socio-economic goals of the area in a short time and therefore are delivered as megaprojects[46]. Megaprojects are "large-scale, complex ventures that typically cost a billion dollars or more, take many years to develop and build, involve multiple public and private groups, are transformational, and impact millions of people"[13]. Despite all the challenges the large infrastructure projects bring, not only are more of them being planned and built, but they are also becoming increasingly ambitious. The reason for the increasing momentum in these megaprojects can be understood from the projections of infrastructure to meet the world's ever-increasing needs for economic growth and development[46]. A McKinsey study[14] estimates that about \$57 trillion must be spent worldwide by 2030 to achieve the anticipated levels of GDP growth globally. When megaprojects are the solutions to the transportation challenges of a nation, they must be planned, designed and delivered effectively, considering not only their vast cost, immense size and complexity but also their adverse construction and post-construction impacts on daily commerce, quality of life, and the environment[4].

Infrastructure megaprojects are typically uncertain and complex as various people and organizations influence their outcomes. For example,

non-compliance of landowners near the project, utility agencies, and local communities may cause overruns, delays or even the project's failure[36]. Nongovernmental organizations (NGOs) interested in socio-cultural and environmental sustainability can also influence project success[5]. Similarly, pressure from public media outlets can also impact the project badly[44]. Therefore, it is necessary to maintain a harmonious relationship with all members of the project community to achieve the project objectives and proactively advance value delivery [42]. A project community is defined as individuals or groups close to the project in terms of physical distance and includes people affected by land acquisition along with those inconvenienced by diversions, noise and other construction hassles[25]. Understanding and managing the project community's perception of that project is critical for the viability of these infrastructure projects.

The community's perception of the project may change with respect to different pressures, threats, and associated discourses during the megaproject lifecycle. The project management team must be better equipped to identify the community's problems and deal with their social concerns. They must develop strategies depending on the issues prevalent in a particular phase[19]. Studying the changing sentiments of the community will help the project teams plan projects efficiently and make better decisions [20]. In the modern era, naturally occurring data from the social media websites of the project can inform the

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community's perception of the project. Such an approach is more efficient than traditional sentiment surveys in terms of time and cost. Therefore, the primary motivation of this research is to understand the different discourses across the lifecycle of an infrastructure megaproject with the help of social media. Thus, the following research questions are addressed in this article: (1) What are the discourses that affect the infrastructure megaproject over its lifecycle? and (2) How to improve the acceptability of an infrastructure megaproject over its lifecycle?

The scope of this research is limited to a single in-depth case study to facilitate an understanding of the community's perception of a project over its lifecycle. The article is structured as follows. First, the literature review section discusses an overview of the literature on the importance of community perception during the lifecycle of infrastructure projects. Then, the research method section discusses the research choices, such as the reason for selecting the Nagpur metro rail project, the data collection instruments, and the qualitative analysis performed. This is followed by the empirical findings on the different discourses and their context over the lifecycle of the project and some strategies to manage the perception of the megaproject over its lifecycle. Finally, the significant contributions, limitations and recommendations for future research are highlighted in the conclusion section.

Literature review

Due to their large scale, megaprojects create environmental, social and political disruptions in their local area, often affecting the project community[40]. In contrast to the employees and suppliers of a project, the project community does not have any contractual relations with the project, is not accountable to the detailed project report, and even operates in permeable boundaries[36]. Poor relationships with the community can result in lawsuits, petitions, strikes, negative sentiments, vandalism, boycotts, or a refusal to engage with the organization[21]. Counter-narratives from protesters can even cause a democratic government to withdraw support for fear of electoral consequences[35]. Thus, despite the community lacking formal authority in the project, their resistance can adversely affect or even kill the project[30]. Additionally, an infrastructure project's economic and social purpose is to create and distribute its value to all, including the project community [6]. Thus, the successful management of the project community can result in better value from the effort, time and resources employed in the project[47].

The development process of an infrastructure megaproject can be broadly divided into three phases: (1) pre-construction phase, (2) construction phase, and (3) operation phase[49]. The pre-construction phase broadly consists of all the work that needs to be done before the beginning of physical construction. It can be thought of as a period where the planning of a project is done, design is created, permitting is secured, contracts are signed, and resources are gathered[52]. In the construction phase, the physical construction of the project begins. While during the preconstruction phase, the project manager, design and engineering staff do most of the job, the contractor and subcontractors take center stage during the construction process. This phase has the highest amount of risk, and there is a need to manage the time and cost during this phase to successfully complete the project[25]. In the operation phase, with the physical construction completed, the project is commissioned and starts generating revenue. Before handing over the project to the owner for operation, all the resources no longer needed are demobilized, and the work site is cleaned up. Morris [31] records that an infrastructure project moves through different phases during its lifecycle, creating a dynamic community engagement context.

Ninan [34] note that project community management is required in the preconstruction, construction and operation phases. They record that during the pre-construction phase, community engagement is necessary to acquire the essential land for the project's construction. Similarly, Mangioni [27] notes that community engagement is critical to minimize land acquisition delays during pre-construction. Community

engagement is also required to generate support for the construction activities during the construction phase. For instance, an effective engagement is necessary to reduce the resistance to inconveniences caused due to traffic diversions, the presence of construction equipment on roads, construction noises, and air pollution. During the operation phase, community engagement is required to maximize the use of the project and enable seamless integration with other infrastructure assets in the area. Thus, PMBOK [42] highlight that stakeholder engagement activities start before or when the project starts and continue throughout the project. As Jawahar and McLaughlin [19] noted, organizations are likely to experience different demands during the various stages of their life cycle as threats and opportunities vary. While community engagement through group meetings is critical to addressing their concerns, such methods are less efficient for large-scale infrastructure projects as they require managing many members of the project community. Thus, there is a need to engage the project community throughout the lifecycle and manage their perception using public discourses considering the large scale of infrastructure megaprojects.

The project community, social and environmental activists, and other non-governmental organizations must be carefully considered as part of the project decision-making to ensure project success[48]. However, Aaltonen and Kujala [1] caution that far less attention has been devoted to understanding the community side of projects, such as the discourses and how the community reacts to them. Previous research has tried categorizing positive and negative events based on the community's sentiments[53]. We argue that along with the sentiments, there needs to be a focus on the discourses and the context surrounding these discourses to theorize how to improve acceptability of these projects. For example, Ottman and colleagues [38] highlight that different product attributes such as value and sustainability are important to improve consumer appeal for a product. Combining benefits such as personal and environmental benefits is an effective marketing strategy as part of the double benefit theory [50]. Other works note effective communication is essential for community engagement in infrastructure projects[39]. In this research, we seek to understand the significant discourses surrounding project community and their associated contexts during the project's pre-construction, construction and operation phase in social media. We try to understand the similarities between these discourses and how projects can navigate them effectively.

In the modern era, the project community uses social media to voice their concerns regarding the project. Social media has fundamentally changed how we live, learn and connect, enabling the general public to share opinions about products, firms and services quickly and easily [18]. However, this widespread use of social media is still to be leveraged in infrastructure megaproject settings. In infrastructure project settings, social media is currently used for intra-project communication or collaboration[22], for evaluating benefits and value creation of the infrastructure megaprojects[28], for assessing sentiments of the community[53] and for branding and marketing[36]. Social media is considered in this research as it can impact public opinions about what is most significant by covering specific events/issues more than other mediums [32].

The advantage of using social media as a data source for evaluating community perception of a project is multifold. First, individuals and organizations can express their views, thoughts or emotions on social media platforms such as Facebook, Twitter, Weibo, etc. Second, the presence of different individuals with diverse interests can help guarantee the reliability and authenticity of the collected data. Third, compared to traditional data collection methods such as questionnaire surveys and interviews, the data from the new online forms are naturally occurring, more extensive, and available at a comparatively low cost. Finally, as social media data can be retrieved for any period, it can also be used to study the impact of significant construction decisions and the associated community perception at any particular time throughout the life cycle of an infrastructure project. Thus, social media offers naturalistic, unobstructed, and retrospective data, in contrast, to the study of

perception through opinion polls and surveys[45].

Jiang [20] and Zhou [53] conducted a public opinion analysis of the Three Gorges project and Hong Kong–Zhuhai–Macao Bridge in China respectively. In contrast to these quantitative studies of sentiments on social media, this research aims to qualitatively study the different discourses that trigger community perception throughout the lifecycle of a megaproject and the common strategies used to manage them across phases. Such a study would help researchers and practitioners understand the different discourses and their context in the lifecycle of an infrastructure megaproject and how these can be used to inform the management of the project community of other megaprojects.

Research setting and method

Social media posts are used as data in this research to understand the changing public opinions during an infrastructure project’s life cycle. For this, qualitative inductive research is apt because it allows the researcher to start with participants’ views expressed in social media, to construct patterns from these using inferences and create knowledge. Qualitative research investigates how experience is created and given meaning in social contexts[15]. Qualitative methodologies enabled the researcher to better understand people’s lived experiences and generate more intimate and empathetic understanding of these experiences in the context of analysis and dissemination[41]. Within the qualitative methodologies, a case study examines a real-life, contemporary bounded system over time using detailed, in-depth data collection[8]. The case study allows investigators to maintain the holistic and substantive features of real-life events and is also useful for capturing complexity[10], as in this case of studying social media discourses over the lifecycle of megaprojects.

Of all the ongoing diverse infrastructure megaprojects in India, the need for public transportation infrastructure solutions is evident because of its growing population and the migration of people from rural to urban areas. For this, multiple metro rail projects have been started over the years, of which some are currently operational, and many more are under construction. The details of the metro rail projects in India are summarized in Table 1.

This research aims to study the community perception of a metro rail megaproject throughout its lifecycle using social media. The following are the criteria for selecting the project for the case study. First, for an analysis of the lifecycle community perception, the project should have all the phases, i.e., the project should have completed pre-construction and construction and should currently be in the operation phase. Four metro rail projects were excluded based on this criterion, and 13 projects were selected for the next level of screening. Second, the project should have its pre-construction phase during a period when social media use is

prevalent, i.e., the project should have only been approved recently. Ten metro rail projects were excluded based on this criterion, and only three projects in Ahmedabad, Nagpur and Noida were selected for the next level of screening. Finally, the project should have a significant presence on social media. As on 7 July 2021, Ahmedabad metro rail had only 238 followers on Twitter, Noida metro rail had 24 followers, and Nagpur metro rail had 15,300 followers on Twitter. Based on these three criteria, Nagpur metro rail was selected for this research project as it enabled us to address our research objective, i.e., to study a project during all stages of its lifecycle in social media.

Nagpur is Maharashtra state’s third largest district, with a population of about 2.5 million. Nagpur Metropolitan Area is India’s thirteenth-largest urban conglomeration and its motorized transport is dominated by two-wheelers (28 %) and other vehicles, causing pollution and traffic congestion on the highways. The city needed a rapid public transportation system that was accessible, dependable, cost-effective, commuter-friendly, and pollution-free to address these issues. Nagpur’s proposed new rapid transit system will halve travel time and provide fast, uninterrupted movement throughout the region. Moreover, constructing a metro rail system in Nagpur would be a significant step forward in delivering a sustainable mode of transportation that meets people’s mobility and accessibility needs. The Maharashtra state government approved the project in February 2014, the Indian central government approved the project in August 2014, and the foundation stone was laid in the same month. The construction activities started on 31 May 2015. The trial run was in September 2017, and the project was inaugurated on 8 March 2019.

The metro rail organization’s public relations team maintained social media accounts on websites such as Facebook, Twitter, Instagram, and YouTube. The posts on Twitter were similar to posts in other platforms and additionally offered a benefit of providing concise updates and information[16]. Hence, we choose Twitter as it offered a better medium to develop an initial set of codes related to the online discourses. Each post on Twitter was limited to 140 characters and hence was crisp and easy to code as it contained only one message. For extracting the tweets from Twitter, its ‘Advanced Search’ feature was used with the keywords “#NagpurMetro” or “#MaziMetro” (local title for the project) within a given period. The 808 tweets collected for the whole life cycle of the metro rail project can be classified into phases such as pre-construction, construction and operation. The period and the number of tweets associated with different phases used in this research project are given in Table 2.

For doing qualitative analysis, we used qualitative content analysis and open coding of the tweets collected to understand the meaning conveyed by each tweet. We read all the tweets and examined the message delivered by them. Our primary focus was basically on the

Table 1
Metro rail megaprojects in India.

City (State)	Date of approval	Start date of construction	Start date of operation	Operational network	Under-construction	Approved new routes
Ahmedabad (Gujarat)	19 Oct 2014	14 Mar 2015	6 Mar 2019	6 km	33.26 km	28.254 km
Bengaluru (Karnataka)	25 Apr 2006	15 Apr 2007	20 Oct 2011	42.30 km	73.92 km	56.27 km
Bhopal (Madhya Pradesh)	3 Oct 2018	25 Apr 2019	N/A	0 km	6.22 km	21.65 km
Chennai (Tamil Nadu)	16 Apr 2008	10 Jun 2009	29 Jun 2015	45.1 km	9 km	52.01 km
Delhi (Delhi)	3 May 1995	1 Oct 1998	24 Dec 2002	347 km	43.46 km	24.99 km
Gurgaon (Haryana)	30 Sept 2007	11 Aug 2009	14 Nov 2013	12.1 km	0 km	0 km
Hyderabad (Telangana)	19 Sept 2008	26 Apr 2012	28 Nov 2017	67 km	0 km	0 km
Indore (Madhya Pradesh)	30 Jun 2014	28 Jan 2019	N/A	0 km	5.29 km	26.24 km
Jaipur (Rajasthan)	1 Jan 2010	24 Feb 2011	3 Jun 2015	11.98 km	0 km	0 km
Kanpur (Uttar Pradesh)	28 Feb 2019	15 Nov 2019	N/A	0 km	8.73 km	23.66 km
Kochi (Kerala)	3 Jul 2012	7 Jun 2013	19 Jun 2017	25 km	2.94 km	12.36 km
Kolkata (West Bengal)	1 Jun 1972	29 Dec 1972	24 Oct 1984	35.1 km	59.82 km	28.2 km
Lucknow (Uttar Pradesh)	27 Dec 2013	27 Sept 2014	6 Sept 2016	22.90 km	0 km	0 km
Mumbai (Maharashtra)	16 Nov 2005	8 Feb 2008	8 Jun 2014	11.40 km	169 km	21.29 km
Nagpur (Maharashtra)	20 Aug 2014	31 May 2015	8 Mar 2019	22.90 km	18.80 km	48.30 km
Noida (Uttar Pradesh)	14 Nov 2014	15 May 2015	25 Jan 2019	29.70	0 km	14.95 km
Pune (Maharashtra)	7 Dec 2016	08 Jan 2018	N/A	0 km	31.25 km	23.33 km

Table 2
Number of tweets in each phase.

Phase	Period	Number of Tweets
Pre-construction phase	1 February 2014 – 30 May 2015	52
Construction phase	31 May 2015 – 7 March 2019	553
Operation phase	8 March 2019 – 30 December 2019	203
Total		808

contextual meaning of the text, which took a rigorous and repetitive approach of reading tweets manually following a coding pattern as shown in Table 3.

We organized the inferences from the data (tweets), worked from first order observations, through to more structured aggregate conclusions. For example, we coded instances of accidents, traffic issues, and soft issues of staff to an aggregate category of ‘focusing on customer experience’. We extracted multiple discourses over the lifecycle of the project enabling a single context study[33]. The analysis of dramatic discourses across the lifecycle constitutes the study of ‘critical incidents’ and is interesting and often revealing[12]. For external validity, the constructs generated are anchored in existing literature [11]. One of the limitations of using social media for research is it is largely used by younger age groups[23]. However, this does not influence the research findings as social media is suggested here as an augementer and not as a substitute to the current in-person stakeholder engagement processes.

Findings

The social media study of the Nagpur metro rail project over its lifecycle enabled us to understand the different discourses and their context affecting the community perception during the pre-construction, construction, and operation phase. These are depicted in Fig. 1 and discussed in separate sections.

Discourses during the pre-construction phase

The discourses observed affecting the community perception during the pre-construction phase are discussed below.

1. *Concerns over slow progress:* When the Mumbai metro rail project was commissioned on 8 June 2014, citizens of Nagpur raised concerns about the Nagpur metro rail project and questioned its slow progress.

“#NagpurMetro Mumbai metro is launching in Mumbai today. What about Nagpur metro. We nagpurians are eagerly waiting for it ...” (Quoted from a user Tweet dated 8 June 2014).

The push by the citizens shows their interest in the project and also builds pressure on responsible officials to make progress. Similar to the comparison to the Mumbai metro rail, Sergeeva and Ninan [44] record how a comparison with the high-speed rail network in France was influential in creating a clear narrative for the need for the High Speed 2 project in the UK.

2. *Politics over the project:* Many political parties in the area started to claim credit for starting the project.

“Nagpur Metro Project was approved by State Cabinet. All credit to Maha gov” (Quoted from a user Tweet dated 13 October 2014).

There was also politics over the inauguration of the project. There were political differences and conflicts over the decisions related to the projects due to different political parties running the Maharashtra state government and the Indian central government. Additionally, when there were delays, blame shifted to another political party. Governments usually use developmental projects as a tool and battleground for their political gains and often proudly show them in the report card for the work done under their tenures[13].

3. *Embracing the local culture:* The project made multiple efforts to embed the local culture. In an instance the choice of logo for the project was in a manner to bring a sense of belongingness among the people.

“The logo ‘Majhi Metro’ truly depicts that this is people’s project and

Table 3
Representative coding pattern.

Tweets	First order observations	Aggregate dimension
“#nagpur #nagpourmetro Sitabuldi khowa traders move HC against Metro Rail, NMC for land grab” (Quoted from a user Tweet dated 27 January 2017)	Land grab without adequate compensation	Focusing on customer experience
“#NagpurMetro @RailMinIndia #railway #India #rail #wip #car slips into pit dug for #metrorail near #Nagpur” (Quoted from a user Tweet dated 11 November 2016)	Accident due to traffic management	Focusing on customer experience
“#Nagpur Metro’s iron beam collapses on CA road, 3 of family injured” (Quoted from a user Tweet dated 9 October 2017)	Safety accident at site	Focusing on customer experience
“Traffic is going so bad especially in evening time, due to construction of metro #nagpourmetro #Nagpur” (Quoted from a user Tweet dated 10 February 2017)	Traffic issues due to construction	Focusing on customer experience
“The craze to travel in @MetroRailNagpur nagpur metro is increasing day by day people’s are quite happy and satisfied by this project good going #NagpurMetro” (Quoted from a user Tweet dated 18 April 2019)	People are happy and satisfied	Focusing on customer experience
“#NagpurMetro excellent infrastructure, but one thing we overlook here is teaching soft skills to staff. Soft skills are given the least priority in our gov orgs. eventually ending up with bad customer service.” (Quoted from a user Tweet dated 14 July 2019)	Soft skills for staff	Focusing on customer experience
“@NagpurTOI Hope traffic would reduce drastically after metro project. #Nagpourmetro” (Quoted from a user Tweet dated 19 August 2018)	Traffic issues due to construction	Focusing on customer experience
“#nagpur #nagpourmetrorail #nagpourmetro NMRC to utilize solar power to make Nagpur Metro environment-friendly” (Quoted from a user Tweet dated 27 June 2016)	Use of solar energy	Improving sustainability
“#nagpourmetro Majhi Metro to install bio-digesters at all stations” (Quoted from a user Tweet dated 23 July 2016)	Use of biodigesters	Improving sustainability
“#Nagpur is having worst air quality index in Maharashtra with poor grade. Clearly #Nagpourmetro and cement road construction are responsible!!” (Quoted from a user Tweet dated 8 December 2017)	Pollution from construction activities	Improving sustainability
“First you cut full grown trees in the name of development then u plant sapling to show how worried you are about environment and earn applauses n appreciations. Does this really compensates enough? #NagpurMetro #SaveTrees #SaveEnvironment #WeAreFool” (Quoted from a user Tweet dated 19 June 2019)	Cutting trees	Improving sustainability
“A sustainable and pollution-free alternative. #MaziMetro The metro is not just a mode of transport, but a thought process that integrates various transportation modes for a better tomorrow. Use Mazi Metro! #MahaMetro #NagpurMetro #TransformingNagpur” (Quoted	Pollution free alternative	Improving sustainability

(continued on next page)

Table 3 (continued)

Tweets	First order observations	Aggregate dimension
from a user Tweet dated 29 April 2019)		
“65 % of energy required for operation of metro is generated through solar panels. #NagpurMetro #renewables ‘Greenest metro’ in Nagpur sets new standards” (Quoted from a user Tweet dated 12 June 2019)	Use of solar panels	Improving sustainability
“#NagpurMetro will install a 175 thermal response (TR) #cooling system #MahaMetro to use #geothermal AC system, to save 15 % power #Nagpur #energyconservation” (Quoted from a user Tweet dated 2 April 2018)	Geothermal cooling system	Improving sustainability
“#NagpurMetro will get 3750Cr Loan from German bank KfW @CMOMaharashtra @JaiMaharashtraN” (Quoted from a user Tweet dated 31 March 2016)	Bringing investment to the region	Increasing value for money
“#frenchagency #nagpurmetro Nagpur Metro gets Rs 975 crore credit from French agency” (17 November 2016)	Bringing investment to the region	Increasing value for money
“Temperature in Nagpur has already crossed 42C mark and is set to go up and up. The summer heat could add to problems like Sun Stroke. Maha Metro invites to take a cool ride to beat this soaring temperature. So, leave your vehicle behind and travel in #MaziMetro #NagpurMetro” (Quoted from a user Tweet dated 4 May 2019)	Cool temperatures in metro rail	Increasing value for money
“The logo ‘Majhi Metro’ truly depicts that this is people’s project and brings a sense of belongingness among the people. #NagpurMetro” (Quoted from a user Tweet dated 22 March 2015)	Create sense of belongingness	Embracing local
“And here it is @narendramodi sir [Prime Minister of India] talking in Marathi [local language of the region] #NaMolNagpur #NagpurMetro” (Quoted from a user Tweet dated 21 August 2014)	Use of local language	Embracing local
“Modi’s gift to NAGPUR women on this ‘WOMEN’S DAY’..... a special ‘nari shakti’ [strength of women] women’s coach in each train ... #NagpurMetro #ModiOnceMore” (Quoted from a user Tweet dated 7 March 2019)	Focus on women issues	Embracing local
“A woman’s smile on driving #NagpurMetro on #InternationalWomensDay Train Operator: Sumedha Meshram from #Goindia #Maharashtra” (Quoted from a user Tweet dated 8 March 2019)	Focus on women issues	Embracing local
“I’m in Pune city however, the excitement and enthusiasm for our own @MetroRailNagpur is just gearing up. Coming home again for a ride! #WelcometoMyCity #Nagpur #NagpurMetro.” (Quoted from a user Tweet dated 16 April 2019)	Own metro rail project	Embracing local
“Bad #customerservice n staff at #nagpurmetro #Khapri station, In-charges should be taking care here as it brings bad name to the city as well #Nagpur” (Quoted from a user Tweet dated 14 July 2019)	Bad customer service gives bad name to city	Embracing local
“@insbmi Unnecessary project #NagpurMetro for a city with only	Benefits of project not communicated	Better communication

Table 3 (continued)

Tweets	First order observations	Aggregate dimension
25 lakhs [2.5 million] population, more of a stunt than real development” (Quoted from a user Tweet dated 13 December 2015)		
“In Nagpur, @Dev_Fadnavis sir is making @MetroRailNagpur and youth are facing a huge #UnemploymentCRISIS Waste of money in #NagpurMetro” (Quoted from a user Tweet dated 13 May 2017)	Benefits of project not communicated	Better communication
“#NagpurMetro Mumbai metro is launching in Mumbai today. What about Nagpur metro. We nagpurians are eagerly waiting for it ...” (Quoted from a user Tweet dated 8 June 2014)	Lack of information on status	Better communication
“I genuinely believe that a MRTS like the #NagpurMetro would play an important part in checking the traffic snarls and facilitating commute.” (Quoted from a user Tweet dated 22 March 2015)	Benefits of project	Raising awareness for the project
“#NagpurMetro project, I am sure, will change the face of the @OrangeCity” (Quoted from a user Tweet dated 10 April 2016)	Benefits of project	Raising awareness for the project
#nagpurmetro #nagpurnews #selfiecontest Nagpur Metro’s ‘Click and Win Selfie Contest’ starts tomorrow (Quoted from a user Tweet dated 17 September 2016)	Selfie contest	Raising awareness for the project
An amazing #MetroSamwad of Metro Friends & Fans was conducted at #LittleWood Hingna road on Friday. #NagpurMetro’s ongoing construction activities on the stretch of Sitabuldi to Lokmanya Nagar. We thank all our Metro Friends for the overwhelming attendance (Quoted from a user Tweet dated 24 March 2018)	Q&A session on the metro rail project	Raising awareness for the project

brings a sense of belongingness among the people. #NagpurMetro” (Quoted from a user Tweet dated 22 March 2015).

In another instance during the project’s inauguration, the Prime Minister of India spoke in the local language to embrace the local culture. Literature notes that fueling community pride by embracing the local culture can make the community feel proud and is a way of producing ethical subjectivities of the project[7]. These strategies can build a sense of belongingness towards the project and facilitate cooperation with the project community.

4. Land acquisition: Land acquisition is a critical issue for infrastructure projects in pre-construction and can delay the project if not handled properly. In the case of the Nagpur metro rail case, there were disputes regarding land acquisition and land grab.

“#nagpur #nagpurmetro Sitabuldi khowa traders move HC against Metro Rail, NMC for land grab” (Quoted from a user Tweet dated 27 January 2017).

Literature notes how land acquisition can be better managed by adequately compensating the project community and framing the project as essential for the region[36].

5. Optimism about the project: Infrastructure projects are transformative and bring about social and economic development. It has been seen that people had set their hopes on this project to relieve traffic congestion, reduce hours of delay on major travel routes and improve the connectivity in Nagpur.

“I genuinely believe that a MRTS like the #NagpurMetro would play an important part in checking the traffic snarls and facilitating commute.”

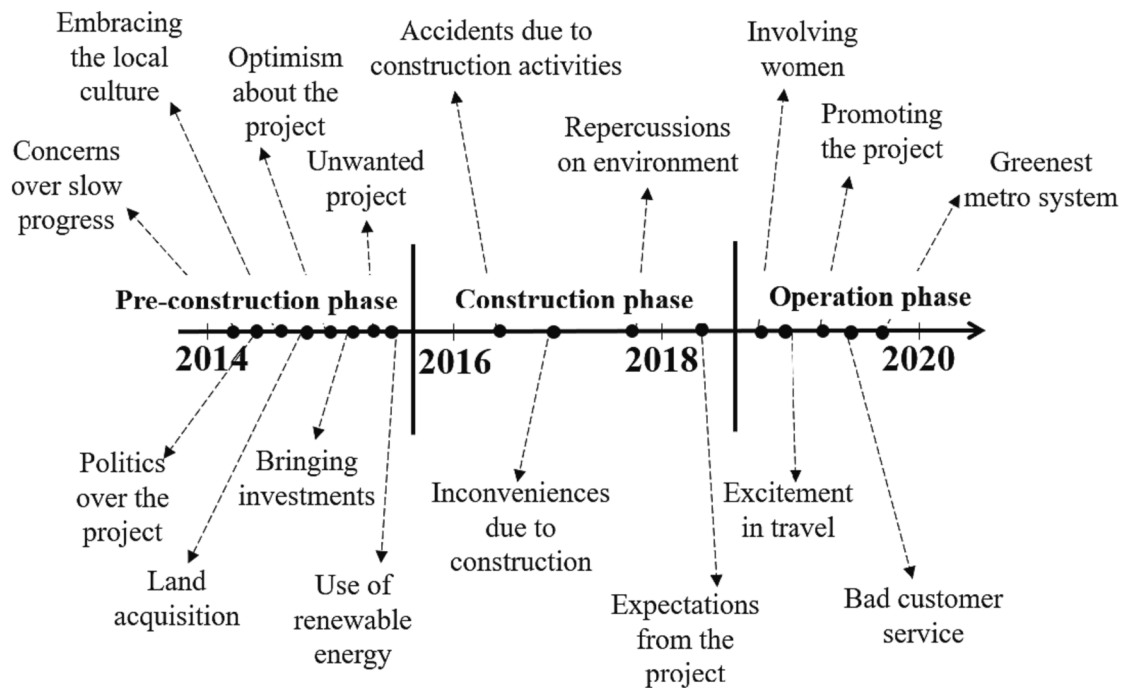


Fig. 1. Different discourses affecting perception over the lifecycle of the megaproject.

(Quoted from a user Tweet dated 22 March 2015).

Our findings are similar to the conclusions of Mathur and colleagues [28] that an infrastructure project addresses society’s multiple objectives, such as reducing travel time, changing the city landscape, and bringing social benefits. It is essential to capture the project’s aspirations, expectations, and optimism during the pre-construction stage to plan an efficient infrastructure. Social media can be an avenue to enable this, considering the large scale of these megaprojects.

6. *Bringing investments:* Development banks play a crucial role in promoting economic development in developing economies by providing them with financial assistance in the form of loans or undertakings. For Nagpur Metro, a loan assistance of around Rs 3,750 crore was received from the German government’s development bank, KfW. Additionally, the project also secured credit of Rs 975 crore from the French Development Agency (AFD), achieving financial closure of the project.

“#frenchagency #nagpurmtr Metro Nagpur Metro gets Rs 975 crore credit from French agency” (17 November 2016).

Such promotion of the project’s achievements can improve the project’s perception[24].

7. *Unwanted project:* It is almost inevitable to avoid criticism from the project community for developmental projects. Development of a megaproject and criticism go hand in hand, irrespective of whatever good intentions they might be constructed with, as these megaprojects not only involve vast amounts of money and time but also bring disturbance and unrest in the form of resettlement and rehabilitation of the people. In the case of the Nagpur metro rail project, it was criticized with calls like “unnecessary project” and “waste of money.”.

“@jnsbmi Unnecessary project #NagpurMetro for a city with only 25 lakhs [2.5 million] population, more of a stunt than real development” (Quoted from a user Tweet dated 13 December 2015).

Criticism can also come from interest groups who seek to shape major megaproject decisions, including budget and scope, with their specific vested interests. A favorable perception of the need for the project is critical to improving the acceptability of the project by the impacted communities.

8. *Use of renewable energy:* According to a metro spokesperson, solar energy was a win-win situation. He said, “The panels are installed by a

private operator through Solar Energy Corporation of India (SECI), a central government undertaking. We don’t put much money into it. We just provide the space in our stations. The operator sells power to us when the panels are installed. We get electricity at less than half of MSEDCL’s power tariff”[43]. The decision to use solar energy in the project was well received by the community on social media.

“#nagpurmtrorail NMRC to utilize solar power to make Nagpur Metro environment-friendly” (Quoted from a user Tweet dated 27 June 2016).

In continuation of its mission of going green, the project has also decided to install bio-digesters or mini sewage treatment plants at all its stations and buildings. For this, a Memorandum of Understanding has also been signed with Defense Research and Development Organization (DRDO) which has developed this technology.

The significant different discourses affecting the project community during the pre-construction are regarding the vision of the project and the politics of the project. The vision of the project can shape the need for the project, the sustainability of the project and the optimism of the project. Since infrastructure projects use considerable resources, they are often politicized regarding its inauguration or taking credit or blame.

Discourses during the construction phase

The discourses observed affecting the community perception during the construction phase in the case are discussed below.

9. *Accidents due to construction activities:* Accidents such as crane accidents, falls from heights, machinery accidents, accidents due to negligence, etc., are some of the primary reasons projects make news during the construction phase. In an instance in the Nagpur metro rail, the driver of a speeding car lost control over the steering wheel, which caused the vehicle to fall into the pit dug for the Metro Rail project at Wardha road. In another instance, three family members were injured due to a lack of safety measures in Metro rail construction on Central Avenue in East Nagpur because of the collapse of an iron beam.

“#Nagpur Metro’s iron beam collapses on CA road, 3 of family injured” (Quoted from a user Tweet dated 9 October 2017).

Accidents in a project usually shock people, make them feel frustrated[17], and cause negative community perception towards the project.

10. *Inconveniences due to construction:* Executing metro rail projects leads to construction operations, which inevitably results in long-term construction work zones. These long-term construction zones on city roads cause numerous issues, including reduced capacity, increased travel time delays, queue duration, and increased traffic rule breaks which result in a more significant number of road accidents. In the case of the Nagpur metro rail, there were complaints regarding the inconvenience caused due to high traffic.

“Traffic is going so bad especially in evening time, due to construction of metro #nagpurmetro #Nagpur” (Quoted from a user Tweet dated 10 February 2017).

Apart from the impacts of construction work on the road traffic, there were complaints of water logging in office premises due to the construction of the Nagpur metro.

11. *Repercussions on the environment:* Development projects create multiple impacts on the environment in the form of air pollution, noise pollution, increased deforestation, global warming, and the potential loss of environmental habitats. These can affect the perception of these projects [26]. In some instances, we observed the community holding the construction work of Nagpur Metro accountable for the increase in levels of air pollution.

“#Nagpur is having worst air quality index in Maharashtra with poor grade. Clearly #Nagpurmetro and cement road construction are responsible!!” (Quoted from a user Tweet dated 8 December 2017).

There were also criticisms even when the administration tried to reduce the negative impacts of these projects on the environment by planting saplings.

12. *Expectations from the project:* Social media gives people a platform to express their thoughts on the project freely, and thus it is a valuable source of information for the project team to understand the aspirations and expectations of the public from the project.

“@NagpurTOI Hope traffic would reduce drastically after metro project. #Nagpurmetro” (Quoted from a user Tweet dated 19 August 2018).

There were also tweets on the expectation that the project would provide economical travel within the city. Infrastructure projects in the future can listen to community voices on social media to understand their expectations of the project during the pre-construction and the construction and operation phases.

The significant discourses affecting the project community during the construction phase surround accidents, inconveniences and repercussions on the environment. Practitioners can study different discourses and their context on social media for their project to reduce its negative impacts and improve acceptance by society.

DISCOURSES DURING THE OPERATION PHASE

The discourses observed affecting the community’s perception during the operations phase are discussed below.

13. *Involving women:* In the Nagpur metro rail project, a separate metro coach was assigned for women. Additionally, stories of women train operators made rounds in social media.

“Modi’s [Prime Minister of India] gift to NAGPUR women on this ‘WOMEN’S DAY’……. a special ‘nari shakti’ [strength of women] women’s coach in each train ... #NagpurMetro #ModiOnceMore” (Quoted from a user Tweet dated 7 March 2019).

A project’s inclusive considerations, such as its accessibility, old-age inclusively and gender equality, can improve the project’s acceptability during its operation, similar to other organizations[29].

14. *Excitement in travel:* It was seen from the empirical data that people were quite excited and happy to use the Nagpur metro rail project.

“I’m in Pune city, the excitement and enthusiasm for our own @MetroRailNagpur is just gearing up. Coming home again for a ride! #WelcomeMyCity #Nagpur #NagpurMetro.” (Quoted from a user Tweet dated 16 April 2019).

Activities like “Click Mazi Metro” (a selfie contest) were conducted to

encourage and capture the excitement in travel. Literature records that the community members often share their experiences of using an infrastructure project with selfies on their social media[3].

15. *Promoting the project:* During the operation phase, the metro rail was presented as a better alternative to personal vehicles to shift people from using private cars. Numerous benefits of such a transition were communicated to the community, such as protecting commuters from the scorching heat, being a sustainable and pollution-free alternative, reducing fuel dependency, and being environmentally friendly.

“A sustainable and pollution-free alternative. #MaziMetro The metro is not just a mode of transport, but a thought process that integrates various transportation modes for a better tomorrow. Use Mazi Metro! #MahaMetro #NagpurMetro #TransformingNagpur” (Quoted from a user Tweet dated 29 April 2019).

The Nagpur Metro was promoted by social media posts on its official channel describing how amazing and visually pleasing the travel is in the metro. The project also offered free rides to school children on selected days to promote the project. Some members of the community stressed the economic benefits of using the metro rail in contrast to using personal vehicles. The official account of Nagpur metro rail also expressed gratitude to users sharing their experience using the project.

Bad customer service: People complained about the bad customer service experience at Nagpur metro station through social media posts.

“Bad #customerservice n staff at #nagpurmetro #Khapri station, In-charges should be taking care here as it brings bad name to the city as well #Nagpur” (Quoted from a user Tweet dated 14 July 2019).

Customer relationship management is critical for infrastructure megaprojects as they seek to improve processes and procedures, particularly during operations[2].

17. *Greenest metro system:* The Nagpur metro rail project has installed solar panels on the roofs of the metro rail, stations, depot boundary walls, depot shed, and other structures. Sixty-five percent of the project’s energy requirements are met by the solar energy generated from these panels, making it the greenest metro system in India. In addition, the project also adopted other ways, such as using a geothermal AC system to save energy consumption.

“65 % of energy required for operation of metro is generated through solar panels. #NagpurMetro #renewables ‘Greenest metro’ in Nagpur sets new standards” (Quoted from a user Tweet dated 12 June 2019).

The significant discourses affecting the project community during the operational phase include customer service, inclusion and promoting the project. In Nagpur metro’s case, women were offered jobs to be more inclusive. Customer service is vital as infrastructure projects provide service during its operation phase. Table 4 summarizes the discourses during the lifecycle of the Nagpur metro rail project and highlights the strategy for improving acceptability.

Discussion

From the case study of the lifecycle of the Nagpur metro rail project, we discuss some common themes. These can be used as guidelines and recommendations for other similar projects to improve acceptance by the community.

1. *Focusing on customer experience:* Infrastructure projects must create a good atmosphere for the community by providing adequate compensation for land acquisition during pre-construction, reducing road accidents during construction, reducing operational issues, and improving customer service during construction and the operation phase. The construction management team should take necessary precautions and safety measures to avoid any type of unfortunate incidents or accidents from happening. In our case, we saw a number of accidents happen due to the team’s mismanagement, resulting in the project’s negative perception. In the case of the Nagpur metro, there were also tweets of poor customer service at some stations which hurt the overall image of the project. In contrast to existing research focusing on customer experience during consumption [9], we highlight that infrastructure

Table 4
Summary of the discourses during the lifecycle of the Nagpur metro rail project.

Sl. no	Discourses	Project phase	Strategy to improve acceptability
1	Concerns over slow progress	Pre-construction	Focusing on customer experience
2	Politics over the project	Pre-construction	Focusing on customer experience
3	Embracing the local culture	Pre-construction	Embracing local
4	Land acquisition	Pre-construction	Focusing on customer experience
5	Optimism about the project	Pre-construction	Raising awareness for the project
6	Bringing investments	Pre-construction	Increasing value for money
7	Unwanted project	Pre-construction	Better communication
8	Use of renewable energy	Pre-construction	Improving sustainability
9	Accidents due to construction activities	Construction	Focusing on customer experience
10	Inconveniences due to construction	Construction	Focusing on customer experience
11	Repercussions on environment	Construction	Improving sustainability
12	Expectations from the project	Construction	Better communication
13	Involving women	Operation	Embracing local
14	Excitement in travel	Operation	Raising awareness for the project
15	Promoting the project	Operation	Increasing value for money
16	Bad customer service	Operation	Focusing on customer experience
17	Greenest metro system	Operation	Improving sustainability

megaprojects need to focus on this during all stages of the lifecycle.

2. Improving sustainability: Nagpur metro has ideally used its stature as the ‘greenest metro’ to build a positive image in the public community and make people supportive of the project, as seen from the positive community perception associated with the move. The project used the sustainability narrative as an effective defense against developmental projects’ criticisms because of all their negative impact on the environment. Being sustainable also helped the project reduce its operational cost. For example, Nagpur metro used solar energy to meet 65 % of its energy requirements, costing them less than half of what they would have paid to the State Electricity Board. In addition, we saw from the empirical data that Nagpur metro received a loan from a German development bank that prioritized green projects over other projects.

3. Increasing value for money: There were social media exchanges on the value for money of the project across the lifecycle of the project. During the pre-construction phase, the potential of the project in bringing investments to the region was discussed. During the construction phase, the expectations of the project in terms of economic travel within the city were discussed. During the operation phase, some members of the community stressed the economic benefits of using the metro rail in contrast to using personal vehicles. Thus, value for money is a significant point of focus for the community across the lifecycle of the megaproject.

4. Embracing local: During the land acquisition phase, it was seen that strategies such as embracing local culture were influential in creating a cooperative stakeholder environment for the project. The Prime Minister of India also used the local language during the project’s inauguration. Additionally, the logo of the project also embraced the local culture. These strategies effectively created a sense of belonging among the people towards the project, which helped in successfully acquiring land for the project. During the operation phase, the presence of women metro rail train operators was emphasized in social media, leading to a positive perception of the project. Ottman [37] note a focus on locally

grown produce is part of sustainability branding and results in increased sales of the product.

5. Better communication: The need for the project was to relieve traffic congestion, reduce hours of delay on major travel routes and improve connectivity. However, there were concerns over the need for the project for a city with less population and whether the project is the best use of the money for development. A clear communication strategy is required for the project, and these have to cover the need for the project, the benefits of the project, and other narratives [35] over multiple mediums such as social media and news articles. Communication should be two-way, as infrastructure projects could listen to community voices on social media to understand their project expectations across the phases.

6. Raising awareness for the project: In the case of Nagpur metro rail, there were instances when people called the project ‘unnecessary’ and a ‘waste of money.’ Also, the project was criticized for its heavy toll on the environment during construction. During such situations, some question-and-answer sessions can be held, where the project team would answer all the critiques and throw some light on their future steps for better handling the situations. There can also be various campaigns and interactive sessions to spread awareness and clear misconceptions about the project. When the operation phase starts, the governing organization’s responsibility is to promote the metro rail by all means and persuade people to use it. It needs to properly convey what this new project has to offer and the benefits and perks of using it. In the case of the Nagpur metro rail project, social media platforms effectively organized a sense of pride for the project. Project organizations can also organize some creative contests or sessions to increase public participation, such as the Nagpur metro rail project giving free rides to school children. In the case of Nagpur metro, we have seen that several activities like “Click Mazi Metro” (a selfie contest) and “Metro Samwad” (a QnA session) were conducted to encourage the dialogue between the representatives of Nagpur metro and the commuters. All these activities are necessary to keep people connected to the project. Social media was an essential medium for these contests and for raising awareness regarding the project.

PMBOK [42] state that stakeholder engagement entails working collaboratively with stakeholders to introduce the project, elicit their requirements, manage expectations, resolve issues, negotiate, prioritize, problem solve, and make decisions. The body of knowledge also calls for increasing engagements to enable stronger project performance and outcomes in addition to increasing stakeholder satisfaction. We see social media as the means to increase stakeholder engagement and call for more research and practice to extend the current stakeholder consultation to include social media because of its reach and inclusiveness. Using social media along with the current in-person stakeholder consultation would result in enhanced value delivery in projects. In addition, our research highlights some common strategies to improve the perception of the project across the lifecycle, in contrast to existing research, which records that organizations use different strategies across the lifecycle [19]. While double benefit theory[50]highlights the importance of combining environmental benefits with personal benefits to improve acceptability, we record a focus on multiple benefits spanning across customer experience, value for money, improving sustainability, and embracing local. A focus on multiple benefits can be a major incentive for multi-stakeholder environments[51]such as megaprojects. Benefits such as cost effectiveness, performance, symbolism, and convenience can be instrumental in improving customer appeal[38]. Along with a focus on multiple-benefits, these benefits also need to be effectively transferred to the project community. A lack of awareness of multiple benefits can result in the project being unattractive for the stakeholders [51]. Our research highlights the role of processes such as better communication and raising awareness of project on social media to make the project attractive to the community.

Conclusion

This research aims to understand the project community's concerns over an infrastructure megaproject's lifecycle. We seek to understand the significant discourses during an infrastructure megaproject's pre-construction, construction and operation phases using social media. We try to understand the similarities in these discourses and theorize how to navigate them effectively using the case study of the Nagpur metro rail project in India.

We make multiple contributions to the theory and practice of managing infrastructure assets. First, we highlight the different discourses over the lifecycle of an infrastructure megaproject concerning the project community, both positive and negative. Second, our research highlights some common strategies to deal with discourses across the lifecycle, in contrast to existing research, which records that organizations use different strategies across the lifecycle. Third, we highlight the community voices on the expectations of the project in social media not only during the pre-construction but also in the construction and operation phases. Infrastructure projects must listen to these voices and constantly adjust to the needs of society. Fourth, we extend the double benefit theory to include a focus on multiple benefits such as customer experience, value for money, improving sustainability, and embracing local. Finally, this research highlights the need for continuous engagement of the project community through better communication and raising awareness of project, thereby emphasizing the importance role of social media in frequently communicating with project community. Social media was used as a medium to persuade people and frame their perceptions regarding the project.

There are some limitations that offer some guidelines for future research. There are some social and demographic barriers to the use of social media, and this affects our evaluation of discourses regarding the project such as younger generations being more active on social media, however, it doesn't affect the research findings as social media is recommended only as an augmentor and not a substitute to the current in-person stakeholder engagement processes. We only considered Twitter for studying community discourses in social media. Future research can look at Facebook and YouTube to give more insights into the multiple discourses of the project, validate the findings, and expand the diversity of data. Future research can also look at how common strategies that deal with discourses across the lifecycle from this study are received by the community. Further research can explore how projects adapt to community voices in social media by evaluating decisions over the lifecycle. In addition, a framework for stakeholder engagement integrating existing stakeholder consultation process with the social media described in this research can be developed to create projects with better value for the society.

CRedit authorship contribution statement

Johan Ninan: Conceptualization, Visualization, Writing – original draft, Supervision, Writing – review & editing. **Rupesh Yadav:** Methodology, Data curation, Investigation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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